

# **Simulations of the temporal and spatial resolution for a compact time-resolved electron diffractometer**

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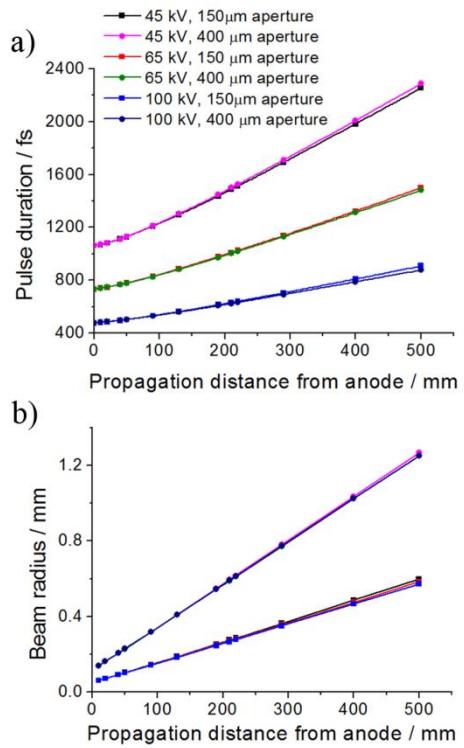
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## **Supporting Information**

### **Initial electron beam conditions**

- 10,000 particles per pulse described by 1,000 macroparticles, each representing 10 electrons and a total beam charge =  $1.6 \times 10^{-15}$  C per pulse.
- The pulse is described as having a 3-D Gaussian shape, with a transverse full-width half-maximum (FWHM) of 0.2 mm, with electrons entering the simulation over a Gaussian-shaped time-period with a FWHM of  $120 \times 10^{-15}$  s, centered around  $1 \times 10^{-12}$  s, in the simulation clock.
- The origin of the electrons is in the center of the photocathode, on the surface closest to the anode.
- The initial energy distribution of the electrons is described as a Gaussian centered around 0.7 eV, with a 0.6 eV FWHM.



**Figure S1.** Graphs showing the predicted a) pulse duration and b) RMS beam radius of an electron pulse, initially containing  $10^4$  electrons passing through apertures of various sizes, for different acceleration potentials and for 15 mm photocathode-to-anode distance electron gun.

## Electron beam radius

Here we present the electron beam root-mean-square radius for various electron gun and magnetic lens properties, as detailed sequentially below.

**Table S1** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150  $\mu\text{m}$  anode aperture, 0.0 mT magnetic field strength.<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.57E-05	6.57E-05	6.59E-05	6.59E-05	6.57E-05							
20	8.00E-05	8.00E-05	8.04E-05	8.04E-05	8.00E-05							
40	1.09E-04	1.09E-04	1.10E-04	1.10E-04	1.09E-04							
50	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04
90	1.84E-04	1.84E-04	1.83E-04	1.83E-04	1.84E-04							
130	2.44E-04	2.44E-04	2.43E-04	2.43E-04	2.44E-04							
190	3.35E-04	3.35E-04	3.32E-04	3.32E-04	3.35E-04							
210	3.65E-04	3.65E-04	3.62E-04	3.62E-04	3.65E-04							
220	3.81E-04	3.81E-04	3.77E-04	3.77E-04	3.81E-04							
290	4.88E-04	4.88E-04	4.82E-04	4.82E-04	4.88E-04							
400	6.57E-04	6.57E-04	6.47E-04	6.47E-04	6.57E-04							
500	8.11E-04	8.11E-04	7.97E-04	7.97E-04	8.11E-04							

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S2** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 12.6 mT magnetic field strength.<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.55E-05	6.57E-05										
20	7.94E-05	7.99E-05	8.00E-05									
40	1.07E-04	1.08E-04	1.08E-04	1.09E-04								
50	1.21E-04	1.22E-04	1.22E-04	1.23E-04	1.24E-04							
90	1.78E-04	1.78E-04	1.78E-04	1.78E-04	1.79E-04	1.79E-04	1.81E-04	1.82E-04	1.83E-04	1.84E-04	1.84E-04	1.84E-04
130	2.36E-04	2.35E-04	2.35E-04	2.34E-04	2.34E-04	2.34E-04	2.35E-04	2.36E-04	2.37E-04	2.38E-04	2.40E-04	2.42E-04
190	3.24E-04	3.22E-04	3.20E-04	3.19E-04	3.18E-04	3.17E-04	3.17E-04	3.17E-04	3.17E-04	3.17E-04	3.18E-04	3.19E-04
210	3.53E-04	3.51E-04	3.49E-04	3.47E-04	3.46E-04	3.45E-04	3.44E-04	3.44E-04	3.44E-04	3.44E-04	3.44E-04	3.45E-04
220	3.67E-04	3.65E-04	3.63E-04	3.62E-04	3.60E-04	3.59E-04	3.58E-04	3.57E-04	3.57E-04	3.57E-04	3.58E-04	3.58E-04
290	4.70E-04	4.67E-04	4.64E-04	4.61E-04	4.59E-04	4.57E-04	4.55E-04	4.53E-04	4.52E-04	4.51E-04	4.50E-04	4.49E-04
400	6.32E-04	6.28E-04	6.23E-04	6.19E-04	6.15E-04	6.11E-04	6.07E-04	6.04E-04	6.01E-04	5.98E-04	5.96E-04	5.94E-04
500	7.80E-04	7.74E-04	7.68E-04	7.62E-04	7.57E-04	7.51E-04	7.46E-04	7.42E-04	7.37E-04	7.33E-04	7.29E-04	7.25E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S3** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 25.2 mT magnetic field strength.<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.51E-05	6.56E-05	6.57E-05									
20	7.76E-05	7.94E-05	8.00E-05									
40	1.02E-04	1.03E-04	1.06E-04	1.08E-04	1.09E-04							
50	1.14E-04	1.15E-04	1.17E-04	1.20E-04	1.23E-04	1.24E-04						
90	1.63E-04	1.62E-04	1.62E-04	1.62E-04	1.64E-04	1.67E-04	1.72E-04	1.77E-04	1.82E-04	1.84E-04	1.84E-04	1.84E-04
130	2.14E-04	2.10E-04	2.07E-04	2.06E-04	2.05E-04	2.06E-04	2.08E-04	2.11E-04	2.15E-04	2.21E-04	2.27E-04	2.35E-04
190	2.90E-04	2.83E-04	2.77E-04	2.72E-04	2.68E-04	2.65E-04	2.63E-04	2.63E-04	2.63E-04	2.65E-04	2.68E-04	2.72E-04
210	3.15E-04	3.07E-04	3.00E-04	2.94E-04	2.89E-04	2.85E-04	2.82E-04	2.80E-04	2.79E-04	2.80E-04	2.82E-04	2.85E-04
220	3.28E-04	3.20E-04	3.12E-04	3.05E-04	2.99E-04	2.94E-04	2.91E-04	2.89E-04	2.88E-04	2.88E-04	2.89E-04	2.91E-04
290	4.18E-04	4.06E-04	3.94E-04	3.83E-04	3.73E-04	3.64E-04	3.57E-04	3.50E-04	3.45E-04	3.41E-04	3.38E-04	3.36E-04
400	5.61E-04	5.42E-04	5.24E-04	5.07E-04	4.90E-04	4.75E-04	4.61E-04	4.48E-04	4.36E-04	4.25E-04	4.16E-04	4.08E-04
500	6.91E-04	6.66E-04	6.43E-04	6.20E-04	5.98E-04	5.77E-04	5.57E-04	5.38E-04	5.20E-04	5.03E-04	4.88E-04	4.73E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S4** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 37.8 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.46E-05	6.56E-05	6.57E-05									
20	7.47E-05	7.85E-05	8.00E-05									
40	9.26E-05	9.56E-05	1.01E-04	1.07E-04	1.09E-04							
50	1.02E-04	1.03E-04	1.08E-04	1.15E-04	1.22E-04	1.24E-04						
90	1.39E-04	1.36E-04	1.35E-04	1.37E-04	1.41E-04	1.48E-04	1.57E-04	1.69E-04	1.80E-04	1.83E-04	1.84E-04	1.84E-04
130	1.77E-04	1.69E-04	1.63E-04	1.59E-04	1.58E-04	1.60E-04	1.64E-04	1.71E-04	1.80E-04	1.92E-04	2.07E-04	2.24E-04
190	2.36E-04	2.20E-04	2.06E-04	1.95E-04	1.86E-04	1.80E-04	1.76E-04	1.75E-04	1.76E-04	1.80E-04	1.87E-04	1.96E-04
210	2.56E-04	2.37E-04	2.21E-04	2.07E-04	1.96E-04	1.87E-04	1.80E-04	1.76E-04	1.75E-04	1.77E-04	1.81E-04	1.87E-04
220	2.66E-04	2.46E-04	2.28E-04	2.13E-04	2.00E-04	1.90E-04	1.83E-04	1.77E-04	1.75E-04	1.75E-04	1.77E-04	1.83E-04
290	3.36E-04	3.07E-04	2.81E-04	2.57E-04	2.35E-04	2.16E-04	1.99E-04	1.84E-04	1.73E-04	1.63E-04	1.56E-04	1.52E-04
400	4.47E-04	4.05E-04	3.65E-04	3.27E-04	2.91E-04	2.58E-04	2.27E-04	1.99E-04	1.73E-04	1.49E-04	1.28E-04	1.09E-04
500	5.49E-04	4.94E-04	4.42E-04	3.92E-04	3.44E-04	2.99E-04	2.55E-04	2.15E-04	1.76E-04	1.40E-04	1.07E-04	7.66E-05

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S5** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 50.4 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.36E-05	6.56E-05	6.57E-05									
20	7.06E-05	7.74E-05	7.99E-05	8.00E-05								
40	8.00E-05	8.55E-05	9.52E-05	1.05E-04	1.09E-04							
50	8.49E-05	8.81E-05	9.58E-05	1.08E-04	1.20E-04	1.24E-04						
90	1.06E-04	1.00E-04	9.87E-05	1.02E-04	1.09E-04	1.21E-04	1.37E-04	1.58E-04	1.77E-04	1.83E-04	1.84E-04	1.84E-04
130	1.28E-04	1.14E-04	1.03E-04	9.71E-05	9.53E-05	9.79E-05	1.05E-04	1.17E-04	1.33E-04	1.54E-04	1.79E-04	2.09E-04
190	1.64E-04	1.36E-04	1.13E-04	9.32E-05	7.78E-05	6.66E-05	5.98E-05	5.74E-05	5.95E-05	6.62E-05	7.75E-05	9.35E-05
210	1.76E-04	1.44E-04	1.17E-04	9.27E-05	7.29E-05	5.73E-05	4.59E-05	3.88E-05	3.61E-05	3.80E-05	4.45E-05	5.56E-05
220	1.82E-04	1.49E-04	1.19E-04	9.26E-05	7.07E-05	5.29E-05	3.93E-05	3.00E-05	2.50E-05	2.43E-05	2.83E-05	3.69E-05
290	2.26E-04	1.78E-04	1.34E-04	9.44E-05	5.89E-05	2.90E-05	1.02E-05	2.53E-05	4.89E-05	6.82E-05	8.20E-05	9.06E-05
400	2.98E-04	2.28E-04	1.64E-04	1.05E-04	5.49E-05	2.86E-05	6.30E-05	1.23E-04	1.78E-04	2.25E-04	2.65E-04	3.00E-04
500	3.65E-04	2.76E-04	1.94E-04	1.20E-04	6.43E-05	5.81E-05	1.29E-04	2.18E-04	2.99E-04	3.71E-04	4.34E-04	4.92E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S6** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 63.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.24E-05	6.55E-05	6.57E-05									
20	6.54E-05	7.59E-05	7.99E-05	8.00E-05								
40	6.45E-05	7.29E-05	8.76E-05	1.03E-04	1.09E-04							
50	6.44E-05	6.93E-05	8.08E-05	9.89E-05	1.17E-04	1.24E-04						
90	6.58E-05	5.70E-05	5.46E-05	5.89E-05	7.00E-05	8.80E-05	1.13E-04	1.44E-04	1.73E-04	1.83E-04	1.84E-04	1.84E-04
130	7.02E-05	4.82E-05	3.23E-05	2.26E-05	1.93E-05	2.27E-05	3.31E-05	5.06E-05	7.52E-05	1.07E-04	1.45E-04	1.90E-04
190	8.16E-05	4.27E-05	1.49E-05	2.30E-05	4.96E-05	6.97E-05	8.14E-05	8.56E-05	8.24E-05	7.22E-05	5.51E-05	3.11E-05
210	8.63E-05	4.29E-05	1.64E-05	3.89E-05	7.47E-05	1.02E-04	1.21E-04	1.32E-04	1.36E-04	1.32E-04	1.22E-04	1.05E-04
220	8.89E-05	4.34E-05	1.85E-05	4.74E-05	8.74E-05	1.19E-04	1.41E-04	1.56E-04	1.63E-04	1.63E-04	1.56E-04	1.42E-04
290	1.09E-04	5.25E-05	4.57E-05	1.10E-04	1.78E-04	2.35E-04	2.81E-04	3.20E-04	3.51E-04	3.75E-04	3.92E-04	4.02E-04
400	1.47E-04	8.00E-05	1.04E-04	2.15E-04	3.24E-04	4.19E-04	5.04E-04	5.80E-04	6.48E-04	7.10E-04	7.64E-04	8.12E-04
500	1.85E-04	1.12E-04	1.62E-04	3.12E-04	4.58E-04	5.88E-04	7.06E-04	8.16E-04	9.19E-04	1.01E-03	1.10E-03	1.19E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S7** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 75.6 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.09E-05	6.55E-05	6.57E-05									
20	5.92E-05	7.41E-05	7.98E-05	8.00E-05								
40	4.66E-05	5.82E-05	7.87E-05	1.01E-04	1.09E-04							
50	4.08E-05	4.75E-05	6.34E-05	8.85E-05	1.14E-04	1.24E-04						
90	2.28E-05	9.72E-06	5.64E-06	1.04E-05	2.53E-05	5.00E-05	8.44E-05	1.28E-04	1.69E-04	1.83E-04	1.84E-04	1.84E-04
130	2.12E-05	2.52E-05	4.99E-05	6.49E-05	6.95E-05	6.41E-05	4.92E-05	2.49E-05	8.69E-06	5.21E-05	1.05E-04	1.68E-04
190	4.64E-05	8.40E-05	1.40E-04	1.84E-04	2.17E-04	2.39E-04	2.53E-04	2.56E-04	2.50E-04	2.35E-04	2.10E-04	1.76E-04
210	5.76E-05	1.05E-04	1.71E-04	2.24E-04	2.66E-04	2.98E-04	3.21E-04	3.34E-04	3.37E-04	3.31E-04	3.16E-04	2.92E-04
220	6.34E-05	1.15E-04	1.86E-04	2.44E-04	2.91E-04	3.28E-04	3.55E-04	3.72E-04	3.81E-04	3.80E-04	3.69E-04	3.49E-04
290	1.07E-04	1.90E-04	2.95E-04	3.85E-04	4.64E-04	5.34E-04	5.93E-04	6.44E-04	6.85E-04	7.17E-04	7.39E-04	7.53E-04
400	1.81E-04	3.09E-04	4.66E-04	6.08E-04	7.38E-04	8.58E-04	9.69E-04	1.07E-03	1.16E-03	1.25E-03	1.32E-03	1.39E-03
500	2.51E-04	4.19E-04	6.23E-04	8.10E-04	9.86E-04	1.15E-03	1.31E-03	1.46E-03	1.60E-03	1.73E-03	1.85E-03	1.96E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S8** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 88.2 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.94E-05	6.54E-05	6.57E-05									
20	5.23E-05	7.20E-05	7.98E-05	8.00E-05								
40	2.71E-05	4.19E-05	6.86E-05	9.79E-05	1.09E-04							
50	1.56E-05	2.35E-05	4.41E-05	7.67E-05	1.11E-04	1.24E-04						
90	3.44E-05	4.68E-05	5.13E-05	4.36E-05	2.36E-05	8.24E-06	5.28E-05	1.10E-04	1.64E-04	1.83E-04	1.84E-04	1.84E-04
130	8.59E-05	1.22E-04	1.50E-04	1.66E-04	1.70E-04	1.62E-04	1.42E-04	1.09E-04	6.45E-05	7.77E-06	6.13E-05	1.43E-04
190	1.67E-04	2.36E-04	2.99E-04	3.51E-04	3.91E-04	4.19E-04	4.35E-04	4.40E-04	4.32E-04	4.11E-04	3.79E-04	3.34E-04
210	1.94E-04	2.74E-04	3.49E-04	4.13E-04	4.65E-04	5.05E-04	5.33E-04	5.50E-04	5.54E-04	5.46E-04	5.26E-04	4.94E-04
220	2.08E-04	2.93E-04	3.74E-04	4.44E-04	5.02E-04	5.48E-04	5.82E-04	6.05E-04	6.15E-04	6.13E-04	6.00E-04	5.74E-04
290	3.04E-04	4.28E-04	5.49E-04	6.61E-04	7.60E-04	8.49E-04	9.26E-04	9.91E-04	1.04E-03	1.09E-03	1.11E-03	1.13E-03
400	4.56E-04	6.40E-04	8.24E-04	1.00E-03	1.17E-03	1.32E-03	1.47E-03	1.60E-03	1.72E-03	1.83E-03	1.92E-03	2.01E-03
500	5.96E-04	8.33E-04	1.08E-03	1.31E-03	1.54E-03	1.75E-03	1.96E-03	2.15E-03	2.33E-03	2.50E-03	2.66E-03	2.81E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S9** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 100.8 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.74E-05	6.54E-05	6.56E-05	6.57E-05								
20	4.47E-05	6.97E-05	7.97E-05	8.00E-05								
40	7.31E-06	2.44E-05	5.74E-05	9.45E-05	1.09E-04							
50	1.41E-05	2.18E-06	2.34E-05	6.37E-05	1.07E-04	1.23E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04
90	9.29E-05	1.09E-04	1.13E-04	1.02E-04	7.66E-05	3.62E-05	1.89E-05	8.93E-05	1.58E-04	1.83E-04	1.84E-04	1.84E-04
130	1.75E-04	2.18E-04	2.51E-04	2.70E-04	2.74E-04	2.64E-04	2.38E-04	1.98E-04	1.42E-04	7.16E-05	1.42E-05	1.15E-04
190	2.98E-04	3.83E-04	4.59E-04	5.22E-04	5.71E-04	6.05E-04	6.25E-04	6.30E-04	6.20E-04	5.95E-04	5.55E-04	5.00E-04
210	3.40E-04	4.38E-04	5.29E-04	6.06E-04	6.70E-04	7.19E-04	7.54E-04	7.74E-04	7.79E-04	7.70E-04	7.45E-04	7.05E-04
220	3.60E-04	4.66E-04	5.63E-04	6.48E-04	7.19E-04	7.76E-04	8.19E-04	8.46E-04	8.59E-04	8.57E-04	8.40E-04	8.07E-04
290	5.05E-04	6.59E-04	8.07E-04	9.43E-04	1.07E-03	1.18E-03	1.27E-03	1.35E-03	1.42E-03	1.47E-03	1.50E-03	1.53E-03
400	7.34E-04	9.62E-04	1.19E-03	1.41E-03	1.61E-03	1.80E-03	1.98E-03	2.14E-03	2.29E-03	2.43E-03	2.55E-03	2.65E-03
500	9.42E-04	1.24E-03	1.54E-03	1.83E-03	2.11E-03	2.37E-03	2.63E-03	2.86E-03	3.09E-03	3.30E-03	3.50E-03	3.68E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S10** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 113.4 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.55E-05	6.53E-05	6.56E-05	6.57E-05								
20	3.66E-05	6.70E-05	7.96E-05	8.00E-05								
40	1.66E-05	6.24E-06	4.55E-05	9.08E-05	1.09E-04							
50	4.31E-05	2.84E-05	1.97E-06	4.99E-05	1.03E-04	1.23E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04
90	1.52E-04	1.70E-04	1.74E-04	1.61E-04	1.31E-04	8.22E-05	1.62E-05	6.76E-05	1.51E-04	1.82E-04	1.84E-04	1.84E-04
130	2.62E-04	3.13E-04	3.52E-04	3.74E-04	3.78E-04	3.66E-04	3.35E-04	2.87E-04	2.21E-04	1.37E-04	3.47E-05	8.55E-05
190	4.28E-04	5.28E-04	6.18E-04	6.93E-04	7.51E-04	7.91E-04	8.15E-04	8.21E-04	8.09E-04	7.79E-04	7.32E-04	6.66E-04
210	4.84E-04	5.99E-04	7.07E-04	7.99E-04	8.75E-04	9.33E-04	9.75E-04	9.99E-04	1.01E-03	9.94E-04	9.64E-04	9.17E-04
220	5.11E-04	6.35E-04	7.52E-04	8.52E-04	9.37E-04	1.00E-03	1.05E-03	1.09E-03	1.10E-03	1.10E-03	1.08E-03	1.04E-03
290	7.05E-04	8.86E-04	1.06E-03	1.22E-03	1.37E-03	1.50E-03	1.61E-03	1.71E-03	1.79E-03	1.85E-03	1.89E-03	1.92E-03
400	1.01E-03	1.28E-03	1.55E-03	1.81E-03	2.05E-03	2.28E-03	2.49E-03	2.69E-03	2.87E-03	3.03E-03	3.17E-03	3.30E-03
500	1.29E-03	1.64E-03	2.00E-03	2.34E-03	2.67E-03	2.99E-03	3.29E-03	3.58E-03	3.85E-03	4.10E-03	4.33E-03	4.55E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S11** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 126.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.30E-05	6.52E-05	6.56E-05	6.57E-05								
20	2.79E-05	6.41E-05	7.95E-05	8.00E-05								
40	3.88E-05	1.22E-05	3.29E-05	8.67E-05	1.08E-04	1.09E-04						
50	7.26E-05	5.54E-05	2.00E-05	3.54E-05	9.80E-05	1.23E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04
90	2.09E-04	2.30E-04	2.34E-04	2.19E-04	1.84E-04	1.28E-04	5.17E-05	4.50E-05	1.44E-04	1.82E-04	1.84E-04	1.84E-04
130	3.46E-04	4.05E-04	4.49E-04	4.74E-04	4.80E-04	4.65E-04	4.30E-04	3.75E-04	2.99E-04	2.02E-04	8.41E-05	5.46E-05
190	5.52E-04	6.67E-04	7.71E-04	8.57E-04	9.24E-04	9.71E-04	9.98E-04	1.01E-03	9.92E-04	9.58E-04	9.03E-04	8.27E-04
210	6.21E-04	7.55E-04	8.79E-04	9.85E-04	1.07E-03	1.14E-03	1.19E-03	1.22E-03	1.22E-03	1.21E-03	1.18E-03	1.12E-03
220	6.55E-04	7.99E-04	9.33E-04	1.05E-03	1.15E-03	1.22E-03	1.28E-03	1.32E-03	1.34E-03	1.34E-03	1.31E-03	1.27E-03
290	8.95E-04	1.11E-03	1.31E-03	1.50E-03	1.66E-03	1.81E-03	1.95E-03	2.06E-03	2.15E-03	2.22E-03	2.27E-03	2.30E-03
400	1.27E-03	1.59E-03	1.90E-03	2.20E-03	2.48E-03	2.74E-03	2.99E-03	3.21E-03	3.42E-03	3.60E-03	3.77E-03	3.91E-03
500	1.62E-03	2.03E-03	2.44E-03	2.84E-03	3.22E-03	3.59E-03	3.93E-03	4.26E-03	4.57E-03	4.86E-03	5.13E-03	5.38E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S12** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 0.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04
20	1.80E-04	1.80E-04	1.82E-04	1.82E-04	1.80E-04							
40	2.45E-04	2.45E-04	2.47E-04	2.47E-04	2.45E-04							
50	2.77E-04	2.77E-04	2.80E-04	2.80E-04	2.77E-04							
90	4.06E-04	4.06E-04	4.11E-04	4.11E-04	4.06E-04							
130	5.36E-04	5.36E-04	5.43E-04	5.43E-04	5.36E-04							
190	7.32E-04	7.32E-04	7.41E-04	7.41E-04	7.32E-04							
210	7.98E-04	7.98E-04	8.07E-04	8.07E-04	7.98E-04							
220	8.30E-04	8.30E-04	8.40E-04	8.40E-04	8.30E-04							
290	1.06E-03	1.06E-03	1.07E-03	1.07E-03	1.06E-03							
400	1.42E-03	1.42E-03	1.43E-03	1.43E-03	1.42E-03							
500	1.75E-03	1.75E-03	1.76E-03	1.76E-03	1.75E-03							

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S13** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 12.6 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.48E-04	1.49E-04										
20	1.79E-04	1.80E-04										
40	2.40E-04	2.41E-04	2.43E-04	2.44E-04	2.45E-04							
50	2.71E-04	2.72E-04	2.73E-04	2.74E-04	2.76E-04	2.77E-04						
90	3.95E-04	3.94E-04	3.94E-04	3.94E-04	3.95E-04	3.97E-04	4.00E-04	4.03E-04	4.05E-04	4.06E-04	4.06E-04	4.06E-04
130	5.19E-04	5.17E-04	5.16E-04	5.15E-04	5.15E-04	5.15E-04	5.16E-04	5.18E-04	5.20E-04	5.23E-04	5.27E-04	5.31E-04
190	7.06E-04	7.02E-04	6.99E-04	6.96E-04	6.94E-04	6.93E-04	6.92E-04	6.92E-04	6.92E-04	6.93E-04	6.95E-04	6.97E-04
210	7.69E-04	7.64E-04	7.60E-04	7.57E-04	7.54E-04	7.52E-04	7.51E-04	7.50E-04	7.50E-04	7.50E-04	7.51E-04	7.53E-04
220	8.00E-04	7.95E-04	7.91E-04	7.87E-04	7.84E-04	7.82E-04	7.80E-04	7.79E-04	7.78E-04	7.78E-04	7.79E-04	7.81E-04
290	1.02E-03	1.01E-03	1.01E-03	1.00E-03	9.94E-04	9.90E-04	9.86E-04	9.82E-04	9.80E-04	9.77E-04	9.76E-04	9.75E-04
400	1.36E-03	1.35E-03	1.34E-03	1.33E-03	1.33E-03	1.32E-03	1.31E-03	1.30E-03	1.30E-03	1.29E-03	1.29E-03	1.28E-03
500	1.68E-03	1.66E-03	1.65E-03	1.64E-03	1.63E-03	1.62E-03	1.60E-03	1.59E-03	1.58E-03	1.58E-03	1.57E-03	1.56E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S14** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 25.2 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.47E-04	1.49E-04										
20	1.75E-04	1.79E-04	1.80E-04									
40	2.27E-04	2.31E-04	2.37E-04	2.42E-04	2.44E-04	2.45E-04						
50	2.54E-04	2.56E-04	2.60E-04	2.67E-04	2.74E-04	2.77E-04						
90	3.60E-04	3.57E-04	3.57E-04	3.59E-04	3.63E-04	3.70E-04	3.80E-04	3.92E-04	4.03E-04	4.06E-04	4.06E-04	4.06E-04
130	4.67E-04	4.59E-04	4.54E-04	4.51E-04	4.50E-04	4.52E-04	4.56E-04	4.63E-04	4.73E-04	4.85E-04	5.00E-04	5.17E-04
190	6.29E-04	6.13E-04	6.00E-04	5.89E-04	5.81E-04	5.75E-04	5.72E-04	5.72E-04	5.73E-04	5.78E-04	5.85E-04	5.94E-04
210	6.83E-04	6.65E-04	6.49E-04	6.36E-04	6.25E-04	6.17E-04	6.11E-04	6.08E-04	6.07E-04	6.09E-04	6.13E-04	6.20E-04
220	7.10E-04	6.91E-04	6.74E-04	6.59E-04	6.47E-04	6.37E-04	6.30E-04	6.26E-04	6.24E-04	6.24E-04	6.27E-04	6.33E-04
290	8.99E-04	8.72E-04	8.46E-04	8.22E-04	8.01E-04	7.83E-04	7.67E-04	7.53E-04	7.42E-04	7.34E-04	7.28E-04	7.24E-04
400	1.20E-03	1.16E-03	1.12E-03	1.08E-03	1.04E-03	1.01E-03	9.82E-04	9.54E-04	9.29E-04	9.07E-04	8.87E-04	8.69E-04
500	1.47E-03	1.42E-03	1.36E-03	1.31E-03	1.27E-03	1.22E-03	1.18E-03	1.14E-03	1.10E-03	1.06E-03	1.03E-03	1.00E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S15** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 37.8 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.46E-04	1.48E-04	1.49E-04									
20	1.68E-04	1.77E-04	1.80E-04									
40	2.07E-04	2.14E-04	2.27E-04	2.40E-04	2.44E-04	2.45E-04						
50	2.26E-04	2.30E-04	2.41E-04	2.56E-04	2.71E-04	2.77E-04						
90	3.04E-04	2.98E-04	2.96E-04	3.01E-04	3.11E-04	3.26E-04	3.47E-04	3.74E-04	3.98E-04	4.06E-04	4.06E-04	4.06E-04
130	3.84E-04	3.66E-04	3.53E-04	3.46E-04	3.45E-04	3.49E-04	3.59E-04	3.75E-04	3.96E-04	4.22E-04	4.55E-04	4.93E-04
190	5.04E-04	4.69E-04	4.40E-04	4.16E-04	3.98E-04	3.85E-04	3.78E-04	3.76E-04	3.80E-04	3.90E-04	4.05E-04	4.26E-04
210	5.44E-04	5.04E-04	4.69E-04	4.40E-04	4.16E-04	3.97E-04	3.84E-04	3.77E-04	3.75E-04	3.79E-04	3.89E-04	4.04E-04
220	5.64E-04	5.22E-04	4.84E-04	4.52E-04	4.25E-04	4.04E-04	3.88E-04	3.78E-04	3.73E-04	3.74E-04	3.81E-04	3.93E-04
290	7.06E-04	6.44E-04	5.87E-04	5.35E-04	4.89E-04	4.48E-04	4.12E-04	3.82E-04	3.58E-04	3.39E-04	3.26E-04	3.18E-04
400	9.30E-04	8.38E-04	7.51E-04	6.69E-04	5.92E-04	5.20E-04	4.54E-04	3.93E-04	3.38E-04	2.88E-04	2.44E-04	2.05E-04
500	1.13E-03	1.02E-03	9.01E-04	7.91E-04	6.87E-04	5.88E-04	4.95E-04	4.07E-04	3.24E-04	2.48E-04	1.77E-04	1.13E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S16** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 50.4 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.44E-04	1.48E-04	1.49E-04									
20	1.59E-04	1.74E-04	1.80E-04									
40	1.78E-04	1.91E-04	2.13E-04	2.36E-04	2.44E-04	2.45E-04						
50	1.88E-04	1.96E-04	2.13E-04	2.40E-04	2.67E-04	2.76E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
90	2.29E-04	2.17E-04	2.15E-04	2.22E-04	2.40E-04	2.67E-04	3.03E-04	3.50E-04	3.92E-04	4.06E-04	4.06E-04	4.06E-04
130	2.71E-04	2.40E-04	2.18E-04	2.06E-04	2.03E-04	2.11E-04	2.28E-04	2.54E-04	2.91E-04	3.38E-04	3.94E-04	4.59E-04
190	3.37E-04	2.77E-04	2.26E-04	1.85E-04	1.53E-04	1.30E-04	1.17E-04	1.14E-04	1.21E-04	1.37E-04	1.63E-04	2.00E-04
210	3.60E-04	2.90E-04	2.30E-04	1.79E-04	1.37E-04	1.05E-04	8.24E-05	6.91E-05	6.55E-05	7.16E-05	8.77E-05	1.14E-04
220	3.71E-04	2.97E-04	2.32E-04	1.76E-04	1.30E-04	9.31E-05	6.55E-05	4.74E-05	3.88E-05	3.96E-05	5.04E-05	7.12E-05
290	4.51E-04	3.44E-04	2.47E-04	1.61E-04	8.47E-05	2.48E-05	4.15E-05	9.73E-05	1.46E-04	1.83E-04	2.09E-04	2.24E-04
400	5.79E-04	4.23E-04	2.79E-04	1.50E-04	5.10E-05	9.24E-05	2.21E-04	3.44E-04	4.52E-04	5.47E-04	6.28E-04	6.98E-04
500	6.97E-04	4.98E-04	3.13E-04	1.53E-04	7.02E-05	2.02E-04	3.94E-04	5.73E-04	7.34E-04	8.80E-04	1.01E-03	1.13E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S17** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 63.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.42E-04	1.48E-04	1.49E-04									
20	1.48E-04	1.71E-04	1.80E-04									
40	1.44E-04	1.63E-04	1.96E-04	2.31E-04	2.44E-04	2.45E-04						
50	1.42E-04	1.53E-04	1.80E-04	2.21E-04	2.62E-04	2.76E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
90	1.37E-04	1.19E-04	1.15E-04	1.26E-04	1.52E-04	1.93E-04	2.49E-04	3.19E-04	3.84E-04	4.06E-04	4.06E-04	4.06E-04
130	1.37E-04	8.93E-05	5.62E-05	3.71E-05	3.22E-05	4.20E-05	6.71E-05	1.07E-04	1.63E-04	2.33E-04	3.18E-04	4.18E-04
190	1.44E-04	5.82E-05	2.26E-05	8.38E-05	1.40E-04	1.78E-04	2.00E-04	2.05E-04	1.96E-04	1.71E-04	1.31E-04	7.59E-05
210	1.47E-04	5.27E-05	4.31E-05	1.27E-04	2.00E-04	2.54E-04	2.91E-04	3.11E-04	3.16E-04	3.06E-04	2.81E-04	2.41E-04
220	1.50E-04	5.10E-05	5.48E-05	1.49E-04	2.30E-04	2.92E-04	3.36E-04	3.64E-04	3.77E-04	3.74E-04	3.56E-04	3.24E-04
290	1.70E-04	5.74E-05	1.47E-04	3.06E-04	4.44E-04	5.59E-04	6.56E-04	7.36E-04	8.01E-04	8.50E-04	8.84E-04	9.03E-04
400	2.14E-04	1.08E-04	3.03E-04	5.57E-04	7.82E-04	9.81E-04	1.16E-03	1.32E-03	1.47E-03	1.60E-03	1.71E-03	1.82E-03
500	2.62E-04	1.71E-04	4.49E-04	7.87E-04	1.09E-03	1.37E-03	1.62E-03	1.85E-03	2.07E-03	2.28E-03	2.47E-03	2.64E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S18** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 75.6 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.39E-04	1.48E-04	1.49E-04									
20	1.34E-04	1.67E-04	1.80E-04									
40	1.03E-04	1.29E-04	1.76E-04	2.26E-04	2.44E-04	2.45E-04						
50	8.82E-05	1.04E-04	1.41E-04	1.97E-04	2.55E-04	2.76E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
90	3.83E-05	1.11E-05	4.80E-06	1.70E-05	5.21E-05	1.09E-04	1.86E-04	2.83E-04	3.74E-04	4.05E-04	4.06E-04	4.06E-04
130	4.23E-05	8.06E-05	1.32E-04	1.60E-04	1.67E-04	1.52E-04	1.17E-04	6.08E-05	1.53E-05	1.13E-04	2.31E-04	3.69E-04
190	1.20E-04	2.27E-04	3.43E-04	4.34E-04	5.02E-04	5.49E-04	5.75E-04	5.80E-04	5.64E-04	5.29E-04	4.72E-04	3.95E-04
210	1.49E-04	2.77E-04	4.14E-04	5.26E-04	6.14E-04	6.81E-04	7.27E-04	7.53E-04	7.58E-04	7.43E-04	7.07E-04	6.51E-04
220	1.64E-04	3.02E-04	4.50E-04	5.71E-04	6.70E-04	7.48E-04	8.04E-04	8.40E-04	8.55E-04	8.50E-04	8.25E-04	7.78E-04
290	2.71E-04	4.77E-04	6.99E-04	8.93E-04	1.06E-03	1.21E-03	1.34E-03	1.45E-03	1.53E-03	1.60E-03	1.65E-03	1.67E-03
400	4.44E-04	7.55E-04	1.09E-03	1.40E-03	1.68E-03	1.94E-03	2.18E-03	2.40E-03	2.60E-03	2.78E-03	2.94E-03	3.08E-03
500	6.04E-04	1.01E-03	1.45E-03	1.86E-03	2.24E-03	2.60E-03	2.95E-03	3.27E-03	3.57E-03	3.85E-03	4.12E-03	4.36E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S19** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 88.2 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.35E-04	1.48E-04	1.49E-04									
20	1.18E-04	1.62E-04	1.80E-04									
40	5.83E-05	9.26E-05	1.53E-04	2.19E-04	2.44E-04	2.45E-04						
50	3.04E-05	4.98E-05	9.72E-05	1.71E-04	2.48E-04	2.76E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
90	9.11E-05	1.17E-04	1.24E-04	1.04E-04	5.76E-05	1.53E-05	1.15E-04	2.42E-04	3.62E-04	4.05E-04	4.06E-04	4.06E-04
130	2.13E-04	2.90E-04	3.50E-04	3.83E-04	3.89E-04	3.68E-04	3.21E-04	2.47E-04	1.47E-04	2.01E-05	1.33E-04	3.13E-04
190	3.99E-04	5.52E-04	6.90E-04	8.02E-04	8.87E-04	9.46E-04	9.78E-04	9.85E-04	9.64E-04	9.17E-04	8.44E-04	7.43E-04
210	4.62E-04	6.39E-04	8.04E-04	9.42E-04	1.05E-03	1.14E-03	1.20E-03	1.23E-03	1.24E-03	1.22E-03	1.17E-03	1.10E-03
220	4.93E-04	6.83E-04	8.60E-04	1.01E-03	1.14E-03	1.23E-03	1.31E-03	1.35E-03	1.37E-03	1.37E-03	1.33E-03	1.27E-03
290	7.13E-04	9.89E-04	1.26E-03	1.50E-03	1.72E-03	1.91E-03	2.07E-03	2.21E-03	2.33E-03	2.41E-03	2.47E-03	2.51E-03
400	1.06E-03	1.47E-03	1.88E-03	2.27E-03	2.63E-03	2.97E-03	3.28E-03	3.57E-03	3.83E-03	4.06E-03	4.27E-03	4.45E-03
500	1.37E-03	1.91E-03	2.45E-03	2.97E-03	3.46E-03	3.93E-03	4.38E-03	4.80E-03	5.19E-03	5.56E-03	5.90E-03	6.21E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S20** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 100.8 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.30E-04	1.48E-04	1.49E-04									
20	1.01E-04	1.57E-04	1.80E-04									
40	1.36E-05	5.30E-05	1.28E-04	2.12E-04	2.43E-04	2.45E-04						
50	3.69E-05	7.76E-06	5.05E-05	1.42E-04	2.39E-04	2.76E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
90	2.21E-04	2.54E-04	2.60E-04	2.34E-04	1.75E-04	8.39E-05	4.01E-05	1.97E-04	3.49E-04	4.04E-04	4.06E-04	4.06E-04
130	4.08E-04	5.03E-04	5.74E-04	6.13E-04	6.20E-04	5.94E-04	5.35E-04	4.43E-04	3.19E-04	1.61E-04	2.93E-05	2.52E-04
190	6.89E-04	8.77E-04	1.04E-03	1.18E-03	1.29E-03	1.36E-03	1.40E-03	1.41E-03	1.38E-03	1.32E-03	1.23E-03	1.11E-03
210	7.83E-04	1.00E-03	1.20E-03	1.37E-03	1.51E-03	1.61E-03	1.69E-03	1.73E-03	1.73E-03	1.71E-03	1.65E-03	1.56E-03
220	8.30E-04	1.06E-03	1.28E-03	1.47E-03	1.62E-03	1.74E-03	1.83E-03	1.89E-03	1.91E-03	1.90E-03	1.86E-03	1.79E-03
290	1.16E-03	1.50E-03	1.83E-03	2.13E-03	2.40E-03	2.63E-03	2.84E-03	3.01E-03	3.15E-03	3.26E-03	3.33E-03	3.38E-03
400	1.68E-03	2.19E-03	2.69E-03	3.17E-03	3.62E-03	4.04E-03	4.42E-03	4.78E-03	5.10E-03	5.39E-03	5.65E-03	5.87E-03
500	2.15E-03	2.81E-03	3.48E-03	4.12E-03	4.73E-03	5.31E-03	5.86E-03	6.38E-03	6.87E-03	7.32E-03	7.75E-03	8.14E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S21** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 113.4 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.25E-04	1.48E-04	1.49E-04									
20	8.19E-05	1.51E-04	1.79E-04	1.80E-04								
40	4.12E-05	1.20E-05	1.01E-04	2.03E-04	2.43E-04	2.45E-04						
50	1.02E-04	6.76E-05	2.31E-06	1.11E-04	2.29E-04	2.75E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
90	3.51E-04	3.90E-04	3.97E-04	3.66E-04	2.95E-04	1.86E-04	3.80E-05	1.49E-04	3.35E-04	4.04E-04	4.06E-04	4.06E-04
130	6.01E-04	7.14E-04	7.98E-04	8.44E-04	8.52E-04	8.21E-04	7.51E-04	6.42E-04	4.93E-04	3.06E-04	7.88E-05	1.87E-04
190	9.76E-04	1.20E-03	1.40E-03	1.56E-03	1.69E-03	1.77E-03	1.82E-03	1.83E-03	1.80E-03	1.73E-03	1.62E-03	1.47E-03
210	1.10E-03	1.36E-03	1.60E-03	1.80E-03	1.96E-03	2.09E-03	2.18E-03	2.23E-03	2.23E-03	2.20E-03	2.14E-03	2.03E-03
220	1.16E-03	1.44E-03	1.70E-03	1.92E-03	2.10E-03	2.25E-03	2.36E-03	2.42E-03	2.45E-03	2.44E-03	2.39E-03	2.30E-03
290	1.60E-03	2.01E-03	2.40E-03	2.76E-03	3.08E-03	3.36E-03	3.60E-03	3.81E-03	3.98E-03	4.10E-03	4.19E-03	4.24E-03
400	2.29E-03	2.90E-03	3.51E-03	4.08E-03	4.61E-03	5.11E-03	5.56E-03	5.99E-03	6.37E-03	6.71E-03	7.02E-03	7.29E-03
500	2.92E-03	3.71E-03	4.51E-03	5.27E-03	6.00E-03	6.69E-03	7.35E-03	7.97E-03	8.55E-03	9.09E-03	9.59E-03	1.01E-02

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S22** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 126.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.20E-04	1.48E-04	1.49E-04									
20	6.23E-05	1.44E-04	1.79E-04	1.80E-04								
40	9.11E-05	2.98E-05	7.30E-05	1.94E-04	2.43E-04	2.45E-04						
50	1.68E-04	1.28E-04	4.71E-05	7.81E-05	2.19E-04	2.75E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
90	4.78E-04	5.24E-04	5.31E-04	4.95E-04	4.14E-04	2.88E-04	1.17E-04	9.87E-05	3.19E-04	4.03E-04	4.06E-04	4.06E-04
130	7.88E-04	9.19E-04	1.02E-03	1.07E-03	1.08E-03	1.04E-03	9.61E-04	8.36E-04	6.65E-04	4.49E-04	1.88E-04	1.19E-04
190	1.25E-03	1.51E-03	1.74E-03	1.93E-03	2.07E-03	2.17E-03	2.23E-03	2.24E-03	2.20E-03	2.12E-03	2.00E-03	1.83E-03
210	1.41E-03	1.71E-03	1.99E-03	2.22E-03	2.40E-03	2.55E-03	2.65E-03	2.70E-03	2.72E-03	2.68E-03	2.60E-03	2.48E-03
220	1.49E-03	1.81E-03	2.11E-03	2.36E-03	2.57E-03	2.74E-03	2.86E-03	2.94E-03	2.97E-03	2.96E-03	2.90E-03	2.80E-03
290	2.03E-03	2.50E-03	2.96E-03	3.36E-03	3.73E-03	4.06E-03	4.34E-03	4.57E-03	4.77E-03	4.91E-03	5.02E-03	5.07E-03
400	2.88E-03	3.59E-03	4.29E-03	4.94E-03	5.56E-03	6.13E-03	6.66E-03	7.14E-03	7.59E-03	7.98E-03	8.34E-03	8.65E-03
500	3.66E-03	4.58E-03	5.50E-03	6.38E-03	7.22E-03	8.02E-03	8.77E-03	9.48E-03	1.02E-02	1.08E-02	1.14E-02	1.19E-02

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S23** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150  $\mu\text{m}$  anode aperture, 0.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05
20	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05
40	9.19E-05	9.19E-05	9.19E-05	9.19E-05	9.19E-05	9.19E-05	9.19E-05	9.19E-05	9.19E-05	9.19E-05	9.19E-05	9.19E-05
50	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	1.44E-04	1.44E-04	1.44E-04	1.44E-04	1.44E-04	1.44E-04	1.44E-04	1.44E-04	1.44E-04	1.44E-04	1.44E-04	1.44E-04
130	1.87E-04	1.87E-04	1.87E-04	1.87E-04	1.87E-04	1.87E-04	1.87E-04	1.87E-04	1.87E-04	1.87E-04	1.87E-04	1.87E-04
190	2.53E-04	2.53E-04	2.53E-04	2.53E-04	2.53E-04	2.53E-04	2.53E-04	2.53E-04	2.53E-04	2.53E-04	2.53E-04	2.53E-04
210	2.75E-04	2.75E-04	2.75E-04	2.75E-04	2.75E-04	2.75E-04	2.75E-04	2.75E-04	2.75E-04	2.75E-04	2.75E-04	2.75E-04
220	2.86E-04	2.86E-04	2.86E-04	2.86E-04	2.86E-04	2.86E-04	2.86E-04	2.86E-04	2.86E-04	2.86E-04	2.86E-04	2.86E-04
290	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04	3.63E-04
400	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04
500	5.98E-04	5.98E-04	5.98E-04	5.98E-04	5.98E-04	5.98E-04	5.98E-04	5.98E-04	5.98E-04	5.98E-04	5.98E-04	5.98E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S24** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 12.6 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.13E-05	6.15E-05										
20	7.09E-05	7.13E-05	7.15E-05									
40	9.01E-05	9.06E-05	9.12E-05	9.17E-05	9.19E-05							
50	9.99E-05	1.00E-04	1.01E-04	1.01E-04	1.02E-04							
90	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.41E-04	1.42E-04	1.43E-04	1.44E-04	1.44E-04	1.44E-04	1.44E-04
130	1.80E-04	1.80E-04	1.79E-04	1.79E-04	1.79E-04	1.80E-04	1.80E-04	1.81E-04	1.82E-04	1.83E-04	1.84E-04	1.86E-04
190	2.42E-04	2.41E-04	2.40E-04	2.39E-04	2.39E-04	2.38E-04	2.38E-04	2.38E-04	2.39E-04	2.39E-04	2.40E-04	2.41E-04
210	2.63E-04	2.62E-04	2.61E-04	2.60E-04	2.59E-04	2.58E-04	2.58E-04	2.58E-04	2.58E-04	2.58E-04	2.58E-04	2.59E-04
220	2.73E-04	2.72E-04	2.71E-04	2.70E-04	2.69E-04	2.68E-04	2.68E-04	2.67E-04	2.67E-04	2.67E-04	2.68E-04	2.68E-04
290	3.47E-04	3.45E-04	3.43E-04	3.41E-04	3.39E-04	3.38E-04	3.37E-04	3.36E-04	3.35E-04	3.34E-04	3.34E-04	3.34E-04
400	4.63E-04	4.60E-04	4.57E-04	4.54E-04	4.51E-04	4.49E-04	4.46E-04	4.44E-04	4.42E-04	4.40E-04	4.39E-04	4.37E-04
500	5.70E-04	5.66E-04	5.62E-04	5.58E-04	5.54E-04	5.50E-04	5.47E-04	5.44E-04	5.40E-04	5.38E-04	5.35E-04	5.32E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S25** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 25.2 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.09E-05	6.15E-05										
20	6.92E-05	7.09E-05	7.15E-05									
40	8.48E-05	8.64E-05	8.88E-05	9.11E-05	9.19E-05							
50	9.28E-05	9.40E-05	9.60E-05	9.88E-05	1.01E-04	1.02E-04						
90	1.25E-04	1.25E-04	1.25E-04	1.27E-04	1.29E-04	1.31E-04	1.35E-04	1.39E-04	1.43E-04	1.44E-04	1.44E-04	1.44E-04
130	1.59E-04	1.57E-04	1.56E-04	1.55E-04	1.56E-04	1.57E-04	1.59E-04	1.61E-04	1.65E-04	1.69E-04	1.75E-04	1.81E-04
190	2.11E-04	2.07E-04	2.03E-04	2.00E-04	1.97E-04	1.96E-04	1.95E-04	1.95E-04	1.96E-04	1.98E-04	2.01E-04	2.04E-04
210	2.28E-04	2.23E-04	2.19E-04	2.15E-04	2.12E-04	2.09E-04	2.08E-04	2.07E-04	2.07E-04	2.08E-04	2.10E-04	2.13E-04
220	2.37E-04	2.32E-04	2.27E-04	2.22E-04	2.19E-04	2.16E-04	2.14E-04	2.13E-04	2.13E-04	2.13E-04	2.15E-04	2.17E-04
290	2.99E-04	2.91E-04	2.83E-04	2.76E-04	2.69E-04	2.64E-04	2.59E-04	2.55E-04	2.51E-04	2.49E-04	2.47E-04	2.46E-04
400	3.97E-04	3.85E-04	3.73E-04	3.61E-04	3.50E-04	3.40E-04	3.30E-04	3.22E-04	3.14E-04	3.06E-04	3.00E-04	2.94E-04
500	4.88E-04	4.71E-04	4.55E-04	4.40E-04	4.25E-04	4.10E-04	3.97E-04	3.84E-04	3.71E-04	3.60E-04	3.49E-04	3.39E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S26** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 37.8 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.03E-05	6.14E-05	6.15E-05									
20	6.63E-05	7.01E-05	7.15E-05									
40	7.61E-05	7.97E-05	8.50E-05	9.01E-05	9.19E-05							
50	8.11E-05	8.39E-05	8.83E-05	9.44E-05	1.00E-04	1.02E-04						
90	1.02E-04	1.02E-04	1.02E-04	1.05E-04	1.09E-04	1.15E-04	1.23E-04	1.33E-04	1.42E-04	1.44E-04	1.44E-04	1.44E-04
130	1.25E-04	1.21E-04	1.18E-04	1.16E-04	1.17E-04	1.19E-04	1.24E-04	1.30E-04	1.37E-04	1.47E-04	1.59E-04	1.72E-04
190	1.60E-04	1.51E-04	1.42E-04	1.36E-04	1.31E-04	1.27E-04	1.26E-04	1.26E-04	1.28E-04	1.32E-04	1.38E-04	1.46E-04
210	1.73E-04	1.61E-04	1.51E-04	1.42E-04	1.36E-04	1.30E-04	1.27E-04	1.25E-04	1.25E-04	1.27E-04	1.31E-04	1.37E-04
220	1.79E-04	1.67E-04	1.55E-04	1.46E-04	1.38E-04	1.32E-04	1.28E-04	1.25E-04	1.24E-04	1.25E-04	1.28E-04	1.33E-04
290	2.22E-04	2.04E-04	1.87E-04	1.71E-04	1.57E-04	1.44E-04	1.34E-04	1.24E-04	1.17E-04	1.11E-04	1.07E-04	1.05E-04
400	2.93E-04	2.66E-04	2.39E-04	2.14E-04	1.90E-04	1.68E-04	1.47E-04	1.28E-04	1.10E-04	9.45E-05	8.03E-05	6.79E-05
500	3.58E-04	3.23E-04	2.89E-04	2.55E-04	2.23E-04	1.92E-04	1.63E-04	1.36E-04	1.10E-04	8.59E-05	6.39E-05	4.40E-05

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S27** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 50.4 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.93E-05	6.14E-05	6.15E-05									
20	6.23E-05	6.91E-05	7.14E-05	7.15E-05								
40	6.43E-05	7.06E-05	7.97E-05	8.87E-05	9.18E-05	9.19E-05						
50	6.54E-05	7.02E-05	7.79E-05	8.85E-05	9.87E-05	1.02E-04						
90	7.15E-05	7.00E-05	7.12E-05	7.55E-05	8.29E-05	9.35E-05	1.07E-04	1.24E-04	1.39E-04	1.44E-04	1.44E-04	1.44E-04
130	7.96E-05	7.18E-05	6.66E-05	6.43E-05	6.51E-05	6.91E-05	7.62E-05	8.66E-05	1.00E-04	1.17E-04	1.37E-04	1.60E-04
190	9.48E-05	7.81E-05	6.36E-05	5.17E-05	4.27E-05	3.66E-05	3.34E-05	3.35E-05	3.67E-05	4.33E-05	5.32E-05	6.65E-05
210	1.00E-04	8.10E-05	6.36E-05	4.88E-05	3.68E-05	2.76E-05	2.12E-05	1.77E-05	1.73E-05	2.01E-05	2.63E-05	3.59E-05
220	1.03E-04	8.26E-05	6.38E-05	4.76E-05	3.42E-05	2.36E-05	1.58E-05	1.09E-05	8.71E-06	9.39E-06	1.34E-05	2.10E-05
290	1.26E-04	9.60E-05	6.85E-05	4.43E-05	2.48E-05	1.49E-05	2.46E-05	4.20E-05	5.79E-05	6.99E-05	7.80E-05	8.23E-05
400	1.65E-04	1.23E-04	8.50E-05	5.46E-05	3.97E-05	5.61E-05	9.52E-05	1.37E-04	1.73E-04	2.04E-04	2.31E-04	2.54E-04
500	2.04E-04	1.52E-04	1.07E-04	7.48E-05	7.02E-05	1.07E-04	1.67E-04	2.27E-04	2.81E-04	3.29E-04	3.72E-04	4.11E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S28** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 63.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.83E-05	6.14E-05	6.15E-05									
20	5.75E-05	6.77E-05	7.14E-05	7.15E-05								
40	4.98E-05	5.93E-05	7.31E-05	8.69E-05	9.18E-05	9.19E-05						
50	4.63E-05	5.33E-05	6.49E-05	8.10E-05	9.67E-05	1.02E-04						
90	3.46E-05	3.18E-05	3.33E-05	3.96E-05	5.08E-05	6.68E-05	8.77E-05	1.13E-04	1.36E-04	1.44E-04	1.44E-04	1.44E-04
130	2.81E-05	1.63E-05	8.53E-06	4.83E-06	4.33E-06	8.59E-06	1.87E-05	3.42E-05	5.47E-05	8.02E-05	1.11E-04	1.46E-04
190	3.01E-05	1.81E-05	3.12E-05	5.13E-05	6.70E-05	7.69E-05	8.15E-05	8.10E-05	7.55E-05	6.50E-05	4.97E-05	2.95E-05
210	3.35E-05	2.48E-05	4.51E-05	7.11E-05	9.19E-05	1.07E-04	1.16E-04	1.21E-04	1.20E-04	1.14E-04	1.04E-04	8.81E-05
220	3.56E-05	2.87E-05	5.23E-05	8.12E-05	1.05E-04	1.22E-04	1.34E-04	1.40E-04	1.42E-04	1.39E-04	1.31E-04	1.18E-04
290	5.56E-05	6.18E-05	1.06E-04	1.54E-04	1.94E-04	2.28E-04	2.57E-04	2.80E-04	2.99E-04	3.12E-04	3.21E-04	3.25E-04
400	9.76E-05	1.23E-04	1.95E-04	2.71E-04	3.37E-04	3.97E-04	4.52E-04	5.01E-04	5.46E-04	5.86E-04	6.21E-04	6.52E-04
500	1.41E-04	1.82E-04	2.79E-04	3.78E-04	4.69E-04	5.52E-04	6.30E-04	7.03E-04	7.72E-04	8.35E-04	8.95E-04	9.49E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S29** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 75.6 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.69E-05	6.13E-05	6.15E-05									
20	5.16E-05	6.60E-05	7.13E-05	7.15E-05								
40	3.30E-05	4.61E-05	6.53E-05	8.48E-05	9.17E-05	9.19E-05						
50	2.42E-05	3.39E-05	4.98E-05	7.22E-05	9.43E-05	1.02E-04						
90	1.01E-05	1.11E-05	9.27E-06	2.00E-06	1.39E-05	3.59E-05	6.48E-05	1.00E-04	1.33E-04	1.44E-04	1.44E-04	1.44E-04
130	4.26E-05	5.77E-05	6.92E-05	7.38E-05	7.16E-05	6.29E-05	4.76E-05	2.58E-05	2.63E-06	3.77E-05	7.99E-05	1.29E-04
190	9.91E-05	1.33E-04	1.63E-04	1.87E-04	2.04E-04	2.15E-04	2.19E-04	2.17E-04	2.08E-04	1.93E-04	1.71E-04	1.42E-04
210	1.19E-04	1.58E-04	1.95E-04	2.25E-04	2.49E-04	2.66E-04	2.77E-04	2.81E-04	2.79E-04	2.70E-04	2.55E-04	2.33E-04
220	1.28E-04	1.71E-04	2.11E-04	2.44E-04	2.71E-04	2.91E-04	3.05E-04	3.13E-04	3.14E-04	3.09E-04	2.97E-04	2.78E-04
290	1.98E-04	2.61E-04	3.23E-04	3.78E-04	4.27E-04	4.70E-04	5.07E-04	5.38E-04	5.62E-04	5.80E-04	5.91E-04	5.96E-04
400	3.10E-04	4.04E-04	5.00E-04	5.90E-04	6.73E-04	7.52E-04	8.25E-04	8.91E-04	9.51E-04	1.01E-03	1.05E-03	1.10E-03
500	4.13E-04	5.35E-04	6.61E-04	7.82E-04	8.98E-04	1.01E-03	1.11E-03	1.21E-03	1.31E-03	1.39E-03	1.48E-03	1.55E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S30** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 88.2 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.53E-05	6.13E-05	6.15E-05									
20	4.51E-05	6.41E-05	7.13E-05	7.15E-05								
40	1.47E-05	3.15E-05	5.65E-05	8.22E-05	9.16E-05	9.19E-05						
50	2.98E-06	1.25E-05	3.31E-05	6.22E-05	9.14E-05	1.02E-04						
90	6.04E-05	6.31E-05	5.91E-05	4.70E-05	2.66E-05	2.16E-06	3.94E-05	8.56E-05	1.29E-04	1.44E-04	1.44E-04	1.44E-04
130	1.24E-04	1.42E-04	1.54E-04	1.58E-04	1.54E-04	1.42E-04	1.22E-04	9.28E-05	5.52E-05	9.13E-06	4.57E-05	1.09E-04
190	2.21E-04	2.61E-04	2.98E-04	3.27E-04	3.48E-04	3.61E-04	3.66E-04	3.63E-04	3.51E-04	3.30E-04	3.02E-04	2.64E-04
210	2.53E-04	3.01E-04	3.46E-04	3.83E-04	4.12E-04	4.34E-04	4.47E-04	4.53E-04	4.50E-04	4.38E-04	4.18E-04	3.89E-04
220	2.70E-04	3.21E-04	3.70E-04	4.11E-04	4.45E-04	4.70E-04	4.88E-04	4.98E-04	4.99E-04	4.91E-04	4.76E-04	4.52E-04
290	3.84E-04	4.62E-04	5.38E-04	6.08E-04	6.71E-04	7.26E-04	7.73E-04	8.13E-04	8.45E-04	8.67E-04	8.83E-04	8.89E-04
400	5.65E-04	6.83E-04	8.03E-04	9.18E-04	1.03E-03	1.13E-03	1.22E-03	1.31E-03	1.39E-03	1.46E-03	1.52E-03	1.58E-03
500	7.29E-04	8.84E-04	1.04E-03	1.20E-03	1.35E-03	1.49E-03	1.63E-03	1.76E-03	1.88E-03	2.00E-03	2.10E-03	2.20E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S31** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 100.8 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.36E-05	6.12E-05	6.15E-05									
20	3.79E-05	6.19E-05	7.12E-05	7.15E-05								
40	5.44E-06	1.58E-05	4.68E-05	7.94E-05	9.15E-05	9.19E-05						
50	2.66E-05	1.02E-05	1.52E-05	5.13E-05	8.82E-05	1.02E-04						
90	1.15E-04	1.17E-04	1.12E-04	9.61E-05	7.03E-05	3.41E-05	1.23E-05	6.94E-05	1.24E-04	1.44E-04	1.44E-04	1.44E-04
130	2.05E-04	2.26E-04	2.40E-04	2.45E-04	2.40E-04	2.25E-04	1.99E-04	1.63E-04	1.16E-04	5.90E-05	9.04E-06	8.79E-05
190	3.41E-04	3.89E-04	4.34E-04	4.69E-04	4.95E-04	5.11E-04	5.18E-04	5.14E-04	4.99E-04	4.74E-04	4.38E-04	3.92E-04
210	3.87E-04	4.44E-04	4.98E-04	5.44E-04	5.81E-04	6.07E-04	6.24E-04	6.30E-04	6.27E-04	6.12E-04	5.88E-04	5.52E-04
220	4.10E-04	4.71E-04	5.31E-04	5.82E-04	6.23E-04	6.55E-04	6.77E-04	6.89E-04	6.91E-04	6.82E-04	6.62E-04	6.32E-04
290	5.69E-04	6.62E-04	7.57E-04	8.44E-04	9.22E-04	9.89E-04	1.05E-03	1.10E-03	1.14E-03	1.17E-03	1.18E-03	1.19E-03
400	8.20E-04	9.63E-04	1.11E-03	1.26E-03	1.39E-03	1.52E-03	1.63E-03	1.74E-03	1.84E-03	1.93E-03	2.01E-03	2.07E-03
500	1.05E-03	1.24E-03	1.44E-03	1.63E-03	1.82E-03	1.99E-03	2.16E-03	2.33E-03	2.48E-03	2.62E-03	2.75E-03	2.88E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S32** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 113.4 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.16E-05	6.11E-05	6.15E-05									
20	3.02E-05	5.95E-05	7.11E-05	7.15E-05								
40	2.59E-05	8.96E-07	3.64E-05	7.62E-05	9.14E-05	9.19E-05						
50	5.44E-05	3.41E-05	3.41E-06	3.95E-05	8.46E-05	1.02E-04						
90	1.70E-04	1.71E-04	1.64E-04	1.46E-04	1.15E-04	7.15E-05	1.59E-05	5.22E-05	1.19E-04	1.44E-04	1.44E-04	1.44E-04
130	2.86E-04	3.09E-04	3.26E-04	3.32E-04	3.26E-04	3.08E-04	2.77E-04	2.34E-04	1.79E-04	1.10E-04	2.89E-05	6.50E-05
190	4.60E-04	5.17E-04	5.70E-04	6.12E-04	6.43E-04	6.62E-04	6.70E-04	6.65E-04	6.48E-04	6.18E-04	5.75E-04	5.20E-04
210	5.18E-04	5.86E-04	6.51E-04	7.05E-04	7.49E-04	7.81E-04	8.01E-04	8.08E-04	8.04E-04	7.87E-04	7.58E-04	7.15E-04
220	5.47E-04	6.20E-04	6.91E-04	7.52E-04	8.02E-04	8.40E-04	8.66E-04	8.80E-04	8.82E-04	8.72E-04	8.49E-04	8.13E-04
290	7.51E-04	8.63E-04	9.76E-04	1.08E-03	1.17E-03	1.25E-03	1.32E-03	1.38E-03	1.43E-03	1.46E-03	1.49E-03	1.50E-03
400	1.07E-03	1.24E-03	1.42E-03	1.59E-03	1.75E-03	1.90E-03	2.04E-03	2.17E-03	2.29E-03	2.40E-03	2.49E-03	2.57E-03
500	1.36E-03	1.59E-03	1.83E-03	2.06E-03	2.28E-03	2.50E-03	2.70E-03	2.89E-03	3.07E-03	3.24E-03	3.40E-03	3.55E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S33** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 126.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	4.93E-05	6.10E-05	6.15E-05									
20	2.19E-05	5.68E-05	7.10E-05	7.15E-05								
40	4.68E-05	1.69E-05	2.55E-05	7.26E-05	9.13E-05	9.19E-05						
50	8.16E-05	5.80E-05	2.23E-05	2.73E-05	8.06E-05	1.02E-04						
90	2.22E-04	2.24E-04	2.16E-04	1.94E-04	1.58E-04	1.09E-04	4.44E-05	3.42E-05	1.13E-04	1.43E-04	1.44E-04	1.44E-04
130	3.62E-04	3.90E-04	4.09E-04	4.16E-04	4.09E-04	3.88E-04	3.53E-04	3.03E-04	2.39E-04	1.61E-04	6.72E-05	4.11E-05
190	5.73E-04	6.39E-04	7.00E-04	7.49E-04	7.85E-04	8.07E-04	8.16E-04	8.10E-04	7.91E-04	7.57E-04	7.08E-04	6.44E-04
210	6.43E-04	7.22E-04	7.97E-04	8.61E-04	9.11E-04	9.47E-04	9.71E-04	9.80E-04	9.75E-04	9.55E-04	9.21E-04	8.73E-04
220	6.78E-04	7.64E-04	8.46E-04	9.16E-04	9.73E-04	1.02E-03	1.05E-03	1.06E-03	1.07E-03	1.05E-03	1.03E-03	9.87E-04
290	9.25E-04	1.05E-03	1.19E-03	1.31E-03	1.41E-03	1.51E-03	1.59E-03	1.66E-03	1.71E-03	1.75E-03	1.78E-03	1.79E-03
400	1.31E-03	1.51E-03	1.72E-03	1.92E-03	2.10E-03	2.28E-03	2.44E-03	2.59E-03	2.72E-03	2.84E-03	2.95E-03	3.04E-03
500	1.66E-03	1.93E-03	2.21E-03	2.47E-03	2.73E-03	2.98E-03	3.21E-03	3.43E-03	3.64E-03	3.84E-03	4.02E-03	4.19E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S34** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 0.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04
20	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04
40	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04
50	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04
90	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04
130	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04
190	5.48E-04	5.48E-04	5.48E-04	5.48E-04	5.48E-04	5.48E-04	5.48E-04	5.48E-04	5.48E-04	5.48E-04	5.48E-04	5.48E-04
210	5.95E-04	5.95E-04	5.95E-04	5.95E-04	5.95E-04	5.95E-04	5.95E-04	5.95E-04	5.95E-04	5.95E-04	5.95E-04	5.95E-04
220	6.18E-04	6.18E-04	6.18E-04	6.18E-04	6.18E-04	6.18E-04	6.18E-04	6.18E-04	6.18E-04	6.18E-04	6.18E-04	6.18E-04
290	7.80E-04	7.80E-04	7.80E-04	7.80E-04	7.80E-04	7.80E-04	7.80E-04	7.80E-04	7.80E-04	7.80E-04	7.80E-04	7.80E-04
400	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03
500	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.27E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S35** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 12.6 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.39E-04	1.40E-04										
20	1.60E-04	1.61E-04	1.62E-04									
40	2.02E-04	2.03E-04	2.04E-04	2.06E-04								
50	2.23E-04	2.24E-04	2.25E-04	2.27E-04	2.28E-04	2.29E-04						
90	3.08E-04	3.08E-04	3.08E-04	3.09E-04	3.10E-04	3.12E-04	3.14E-04	3.16E-04	3.18E-04	3.19E-04	3.19E-04	3.19E-04
130	3.94E-04	3.93E-04	3.92E-04	3.92E-04	3.92E-04	3.93E-04	3.94E-04	3.96E-04	3.98E-04	4.00E-04	4.03E-04	4.07E-04
190	5.24E-04	5.22E-04	5.20E-04	5.18E-04	5.17E-04	5.16E-04	5.16E-04	5.16E-04	5.17E-04	5.18E-04	5.20E-04	5.22E-04
210	5.67E-04	5.65E-04	5.62E-04	5.60E-04	5.59E-04	5.58E-04	5.57E-04	5.57E-04	5.57E-04	5.57E-04	5.59E-04	5.60E-04
220	5.89E-04	5.86E-04	5.84E-04	5.81E-04	5.80E-04	5.78E-04	5.77E-04	5.77E-04	5.77E-04	5.77E-04	5.78E-04	5.79E-04
290	7.42E-04	7.37E-04	7.33E-04	7.29E-04	7.26E-04	7.23E-04	7.21E-04	7.19E-04	7.17E-04	7.16E-04	7.15E-04	7.15E-04
400	9.83E-04	9.76E-04	9.70E-04	9.63E-04	9.57E-04	9.52E-04	9.47E-04	9.42E-04	9.38E-04	9.35E-04	9.31E-04	9.29E-04
500	1.20E-03	1.19E-03	1.19E-03	1.18E-03	1.17E-03	1.16E-03	1.15E-03	1.15E-03	1.14E-03	1.13E-03	1.13E-03	1.12E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S36** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 25.2 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.39E-04	1.40E-04										
20	1.56E-04	1.60E-04	1.62E-04									
40	1.90E-04	1.94E-04	1.99E-04	2.04E-04	2.06E-04							
50	2.07E-04	2.10E-04	2.14E-04	2.21E-04	2.27E-04	2.29E-04						
90	2.76E-04	2.75E-04	2.76E-04	2.79E-04	2.84E-04	2.90E-04	2.98E-04	3.08E-04	3.16E-04	3.19E-04	3.19E-04	3.19E-04
130	3.45E-04	3.42E-04	3.39E-04	3.38E-04	3.39E-04	3.42E-04	3.46E-04	3.53E-04	3.61E-04	3.70E-04	3.82E-04	3.95E-04
190	4.51E-04	4.42E-04	4.35E-04	4.28E-04	4.24E-04	4.21E-04	4.20E-04	4.21E-04	4.24E-04	4.28E-04	4.34E-04	4.42E-04
210	4.87E-04	4.76E-04	4.67E-04	4.59E-04	4.52E-04	4.48E-04	4.45E-04	4.44E-04	4.45E-04	4.48E-04	4.52E-04	4.58E-04
220	5.05E-04	4.93E-04	4.83E-04	4.74E-04	4.67E-04	4.61E-04	4.58E-04	4.56E-04	4.56E-04	4.57E-04	4.61E-04	4.66E-04
290	6.30E-04	6.13E-04	5.96E-04	5.81E-04	5.67E-04	5.56E-04	5.46E-04	5.38E-04	5.31E-04	5.26E-04	5.23E-04	5.22E-04
400	8.29E-04	8.02E-04	7.75E-04	7.51E-04	7.28E-04	7.06E-04	6.86E-04	6.68E-04	6.52E-04	6.37E-04	6.24E-04	6.13E-04
500	1.01E-03	9.75E-04	9.40E-04	9.06E-04	8.74E-04	8.44E-04	8.15E-04	7.88E-04	7.63E-04	7.39E-04	7.17E-04	6.97E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S37** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 37.8 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.37E-04	1.40E-04										
20	1.50E-04	1.59E-04	1.62E-04									
40	1.70E-04	1.79E-04	1.91E-04	2.02E-04	2.06E-04							
50	1.80E-04	1.87E-04	1.97E-04	2.11E-04	2.24E-04	2.29E-04						
90	2.23E-04	2.22E-04	2.24E-04	2.30E-04	2.40E-04	2.54E-04	2.72E-04	2.93E-04	3.13E-04	3.19E-04	3.19E-04	3.19E-04
130	2.67E-04	2.58E-04	2.52E-04	2.50E-04	2.52E-04	2.58E-04	2.68E-04	2.82E-04	3.00E-04	3.22E-04	3.47E-04	3.77E-04
190	3.35E-04	3.14E-04	2.97E-04	2.83E-04	2.73E-04	2.67E-04	2.65E-04	2.67E-04	2.72E-04	2.82E-04	2.95E-04	3.13E-04
210	3.58E-04	3.34E-04	3.12E-04	2.95E-04	2.81E-04	2.71E-04	2.64E-04	2.62E-04	2.64E-04	2.69E-04	2.79E-04	2.92E-04
220	3.69E-04	3.43E-04	3.20E-04	3.00E-04	2.84E-04	2.72E-04	2.64E-04	2.60E-04	2.59E-04	2.63E-04	2.70E-04	2.82E-04
290	4.51E-04	4.12E-04	3.76E-04	3.42E-04	3.13E-04	2.87E-04	2.64E-04	2.46E-04	2.31E-04	2.21E-04	2.14E-04	2.11E-04
400	5.82E-04	5.23E-04	4.66E-04	4.12E-04	3.61E-04	3.14E-04	2.71E-04	2.31E-04	1.95E-04	1.63E-04	1.35E-04	1.10E-04
500	7.03E-04	6.26E-04	5.51E-04	4.78E-04	4.09E-04	3.44E-04	2.83E-04	2.25E-04	1.71E-04	1.22E-04	7.82E-05	4.10E-05

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S38** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 50.4 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.35E-04	1.40E-04										
20	1.41E-04	1.56E-04	1.62E-04									
40	1.43E-04	1.58E-04	1.79E-04	1.99E-04	2.06E-04							
50	1.45E-04	1.56E-04	1.74E-04	1.98E-04	2.21E-04	2.28E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04
90	1.52E-04	1.50E-04	1.54E-04	1.64E-04	1.81E-04	2.06E-04	2.37E-04	2.74E-04	3.08E-04	3.19E-04	3.19E-04	3.19E-04
130	1.62E-04	1.46E-04	1.36E-04	1.33E-04	1.36E-04	1.46E-04	1.63E-04	1.87E-04	2.18E-04	2.55E-04	3.00E-04	3.51E-04
190	1.82E-04	1.46E-04	1.16E-04	9.19E-05	7.41E-05	6.29E-05	5.82E-05	6.03E-05	6.94E-05	8.55E-05	1.09E-04	1.39E-04
210	1.89E-04	1.47E-04	1.11E-04	8.05E-05	5.64E-05	3.87E-05	2.72E-05	2.19E-05	2.30E-05	3.12E-05	4.66E-05	6.94E-05
220	1.93E-04	1.48E-04	1.09E-04	7.54E-05	4.84E-05	2.81E-05	1.46E-05	8.38E-06	6.67E-06	7.29E-06	1.68E-05	3.52E-05
290	2.23E-04	1.58E-04	9.99E-05	5.16E-05	2.72E-05	5.46E-05	9.65E-05	1.34E-04	1.64E-04	1.85E-04	1.99E-04	2.05E-04
400	2.77E-04	1.85E-04	1.07E-04	6.44E-05	1.05E-04	1.94E-04	2.84E-04	3.65E-04	4.35E-04	4.96E-04	5.49E-04	5.93E-04
500	3.31E-04	2.18E-04	1.30E-04	1.10E-04	1.98E-04	3.30E-04	4.60E-04	5.79E-04	6.85E-04	7.82E-04	8.69E-04	9.48E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S39** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 63.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.33E-04	1.40E-04										
20	1.30E-04	1.53E-04	1.61E-04	1.62E-04								
40	1.11E-04	1.32E-04	1.64E-04	1.95E-04	2.06E-04							
50	1.01E-04	1.18E-04	1.44E-04	1.81E-04	2.16E-04	2.28E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04
90	6.69E-05	6.24E-05	6.76E-05	8.33E-05	1.09E-04	1.46E-04	1.93E-04	2.50E-04	3.01E-04	3.19E-04	3.19E-04	3.19E-04
130	4.24E-05	1.91E-05	8.41E-06	9.19E-06	5.98E-06	1.06E-05	3.48E-05	7.04E-05	1.17E-04	1.74E-04	2.42E-04	3.19E-04
190	4.04E-05	5.32E-05	1.02E-04	1.44E-04	1.74E-04	1.92E-04	1.99E-04	1.94E-04	1.80E-04	1.54E-04	1.19E-04	7.25E-05
210	4.92E-05	7.67E-05	1.39E-04	1.92E-04	2.33E-04	2.61E-04	2.78E-04	2.84E-04	2.80E-04	2.65E-04	2.39E-04	2.03E-04
220	5.47E-05	8.90E-05	1.57E-04	2.17E-04	2.62E-04	2.96E-04	3.18E-04	3.29E-04	3.30E-04	3.20E-04	3.00E-04	2.69E-04
290	1.05E-04	1.80E-04	2.89E-04	3.87E-04	4.70E-04	5.40E-04	5.98E-04	6.46E-04	6.82E-04	7.09E-04	7.25E-04	7.30E-04
400	1.99E-04	3.30E-04	5.02E-04	6.59E-04	7.99E-04	9.26E-04	1.04E-03	1.14E-03	1.24E-03	1.32E-03	1.39E-03	1.46E-03
500	2.92E-04	4.70E-04	6.96E-04	9.07E-04	1.10E-03	1.28E-03	1.44E-03	1.60E-03	1.74E-03	1.88E-03	2.00E-03	2.12E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S40** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 75.6 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.30E-04	1.39E-04	1.40E-04									
20	1.17E-04	1.49E-04	1.61E-04	1.62E-04								
40	7.23E-05	1.02E-04	1.46E-04	1.90E-04	2.06E-04							
50	5.06E-05	7.35E-05	1.10E-04	1.61E-04	2.11E-04	2.28E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04
90	3.30E-05	3.58E-05	2.92E-05	8.71E-06	2.67E-05	7.70E-05	1.42E-04	2.21E-04	2.93E-04	3.18E-04	3.19E-04	3.19E-04
130	1.19E-04	1.50E-04	1.71E-04	1.78E-04	1.71E-04	1.49E-04	1.13E-04	6.28E-05	2.07E-06	8.01E-05	1.74E-04	2.81E-04
190	2.55E-04	3.26E-04	3.90E-04	4.38E-04	4.73E-04	4.93E-04	5.00E-04	4.92E-04	4.70E-04	4.34E-04	3.83E-04	3.18E-04
210	3.00E-04	3.85E-04	4.63E-04	5.25E-04	5.74E-04	6.09E-04	6.29E-04	6.35E-04	6.28E-04	6.06E-04	5.70E-04	5.19E-04
220	3.24E-04	4.14E-04	4.99E-04	5.69E-04	6.25E-04	6.66E-04	6.94E-04	7.07E-04	7.07E-04	6.92E-04	6.63E-04	6.20E-04
290	4.86E-04	6.22E-04	7.56E-04	8.74E-04	9.79E-04	1.07E-03	1.15E-03	1.21E-03	1.26E-03	1.29E-03	1.32E-03	1.32E-03
400	7.43E-04	9.50E-04	1.16E-03	1.35E-03	1.54E-03	1.70E-03	1.86E-03	2.00E-03	2.13E-03	2.24E-03	2.34E-03	2.43E-03
500	9.77E-04	1.25E-03	1.53E-03	1.79E-03	2.04E-03	2.28E-03	2.51E-03	2.72E-03	2.92E-03	3.10E-03	3.27E-03	3.43E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S41** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 88.2 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.26E-04	1.39E-04	1.40E-04									
20	1.02E-04	1.45E-04	1.61E-04	1.62E-04								
40	3.02E-05	6.93E-05	1.26E-04	1.84E-04	2.06E-04							
50	7.63E-06	2.49E-05	7.26E-05	1.39E-04	2.04E-04	2.28E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04
90	1.49E-04	1.52E-04	1.41E-04	1.12E-04	6.42E-05	1.89E-06	8.56E-05	1.88E-04	2.84E-04	3.18E-04	3.19E-04	3.19E-04
130	2.97E-04	3.34E-04	3.58E-04	3.65E-04	3.54E-04	3.25E-04	2.77E-04	2.11E-04	1.26E-04	2.31E-05	9.85E-05	2.39E-04
190	5.20E-04	6.07E-04	6.86E-04	7.47E-04	7.90E-04	8.16E-04	8.23E-04	8.13E-04	7.84E-04	7.37E-04	6.71E-04	5.86E-04
210	5.95E-04	6.99E-04	7.95E-04	8.74E-04	9.36E-04	9.80E-04	1.01E-03	1.01E-03	1.00E-03	9.75E-04	9.27E-04	8.62E-04
220	6.32E-04	7.45E-04	8.50E-04	9.38E-04	1.01E-03	1.06E-03	1.10E-03	1.11E-03	1.11E-03	1.09E-03	1.06E-03	9.99E-04
290	8.94E-04	1.06E-03	1.23E-03	1.38E-03	1.52E-03	1.64E-03	1.74E-03	1.82E-03	1.88E-03	1.93E-03	1.95E-03	1.96E-03
400	1.31E-03	1.57E-03	1.83E-03	2.08E-03	2.32E-03	2.54E-03	2.74E-03	2.92E-03	3.09E-03	3.24E-03	3.37E-03	3.48E-03
500	1.68E-03	2.03E-03	2.38E-03	2.72E-03	3.05E-03	3.36E-03	3.65E-03	3.93E-03	4.19E-03	4.43E-03	4.65E-03	4.86E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S42** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 100.8 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.22E-04	1.39E-04	1.40E-04									
20	8.53E-05	1.40E-04	1.61E-04	1.62E-04								
40	1.56E-05	3.38E-05	1.04E-04	1.78E-04	2.05E-04	2.06E-04						
50	6.54E-05	2.66E-05	3.22E-05	1.14E-04	1.97E-04	2.28E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04
90	2.70E-04	2.73E-04	2.58E-04	2.21E-04	1.61E-04	7.93E-05	2.52E-05	1.53E-04	2.74E-04	3.18E-04	3.19E-04	3.19E-04
130	4.77E-04	5.21E-04	5.51E-04	5.58E-04	5.44E-04	5.07E-04	4.48E-04	3.66E-04	2.61E-04	1.33E-04	1.79E-05	1.92E-04
190	7.87E-04	8.94E-04	9.90E-04	1.07E-03	1.12E-03	1.15E-03	1.16E-03	1.15E-03	1.11E-03	1.05E-03	9.71E-04	8.66E-04
210	8.91E-04	1.02E-03	1.14E-03	1.23E-03	1.31E-03	1.36E-03	1.40E-03	1.41E-03	1.39E-03	1.36E-03	1.30E-03	1.22E-03
220	9.42E-04	1.08E-03	1.21E-03	1.32E-03	1.41E-03	1.47E-03	1.52E-03	1.54E-03	1.54E-03	1.51E-03	1.47E-03	1.40E-03
290	1.30E-03	1.52E-03	1.72E-03	1.91E-03	2.08E-03	2.22E-03	2.35E-03	2.45E-03	2.53E-03	2.58E-03	2.62E-03	2.63E-03
400	1.88E-03	2.20E-03	2.53E-03	2.84E-03	3.13E-03	3.40E-03	3.65E-03	3.88E-03	4.09E-03	4.27E-03	4.43E-03	4.57E-03
500	2.39E-03	2.82E-03	3.26E-03	3.69E-03	4.09E-03	4.47E-03	4.84E-03	5.18E-03	5.50E-03	5.80E-03	6.08E-03	6.34E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S43** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 113.4 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.17E-04	1.39E-04	1.40E-04									
20	6.74E-05	1.35E-04	1.61E-04	1.62E-04								
40	6.21E-05	3.29E-06	8.10E-05	1.71E-04	2.05E-04	2.06E-04						
50	1.28E-04	8.06E-05	9.74E-06	8.77E-05	1.89E-04	2.27E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04
90	3.91E-04	3.94E-04	3.76E-04	3.31E-04	2.60E-04	1.62E-04	3.74E-05	1.15E-04	2.63E-04	3.17E-04	3.19E-04	3.19E-04
130	6.55E-04	7.08E-04	7.43E-04	7.52E-04	7.35E-04	6.91E-04	6.21E-04	5.23E-04	3.98E-04	2.46E-04	6.57E-05	1.42E-04
190	1.05E-03	1.18E-03	1.29E-03	1.38E-03	1.45E-03	1.49E-03	1.50E-03	1.48E-03	1.44E-03	1.37E-03	1.27E-03	1.15E-03
210	1.18E-03	1.34E-03	1.48E-03	1.59E-03	1.69E-03	1.75E-03	1.79E-03	1.80E-03	1.79E-03	1.74E-03	1.67E-03	1.58E-03
220	1.25E-03	1.42E-03	1.57E-03	1.70E-03	1.80E-03	1.88E-03	1.93E-03	1.96E-03	1.96E-03	1.93E-03	1.87E-03	1.79E-03
290	1.71E-03	1.97E-03	2.21E-03	2.44E-03	2.64E-03	2.81E-03	2.96E-03	3.08E-03	3.17E-03	3.24E-03	3.28E-03	3.30E-03
400	2.44E-03	2.83E-03	3.22E-03	3.60E-03	3.94E-03	4.27E-03	4.56E-03	4.84E-03	5.08E-03	5.30E-03	5.49E-03	5.66E-03
500	3.10E-03	3.62E-03	4.14E-03	4.65E-03	5.13E-03	5.59E-03	6.02E-03	6.43E-03	6.82E-03	7.17E-03	7.50E-03	7.81E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S44** Variation in electron beam radius through its flight, for different lens positions with a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 126.0 mT magnetic field strength <sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.12E-04	1.39E-04	1.40E-04									
20	4.87E-05	1.28E-04	1.61E-04	1.62E-04								
40	1.09E-04	4.04E-05	5.64E-05	1.63E-04	2.05E-04	2.06E-04						
50	1.89E-04	1.34E-04	5.23E-05	6.01E-05	1.80E-04	2.27E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04
90	5.07E-04	5.11E-04	4.91E-04	4.39E-04	3.58E-04	2.45E-04	1.01E-04	7.46E-05	2.50E-04	3.17E-04	3.19E-04	3.19E-04
130	8.27E-04	8.89E-04	9.29E-04	9.40E-04	9.20E-04	8.70E-04	7.89E-04	6.76E-04	5.33E-04	3.57E-04	1.50E-04	8.90E-05
190	1.31E-03	1.46E-03	1.59E-03	1.69E-03	1.76E-03	1.81E-03	1.82E-03	1.80E-03	1.75E-03	1.67E-03	1.56E-03	1.42E-03
210	1.47E-03	1.64E-03	1.81E-03	1.94E-03	2.05E-03	2.12E-03	2.17E-03	2.18E-03	2.16E-03	2.11E-03	2.03E-03	1.92E-03
220	1.55E-03	1.74E-03	1.92E-03	2.07E-03	2.19E-03	2.28E-03	2.34E-03	2.37E-03	2.37E-03	2.33E-03	2.27E-03	2.17E-03
290	2.11E-03	2.40E-03	2.69E-03	2.94E-03	3.17E-03	3.37E-03	3.54E-03	3.68E-03	3.79E-03	3.87E-03	3.92E-03	3.93E-03
400	2.98E-03	3.44E-03	3.89E-03	4.32E-03	4.72E-03	5.09E-03	5.44E-03	5.75E-03	6.03E-03	6.29E-03	6.51E-03	6.70E-03
500	3.78E-03	4.38E-03	4.99E-03	5.57E-03	6.13E-03	6.66E-03	7.16E-03	7.63E-03	8.07E-03	8.48E-03	8.86E-03	9.21E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S45** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 0.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.56E-05	6.56E-05	6.56E-05	6.56E-05	6.56E-05	6.56E-05	6.56E-05	6.56E-05	6.56E-05	6.56E-05	6.56E-05	6.56E-05
20	7.99E-05	7.99E-05	7.99E-05	7.99E-05	7.99E-05	7.99E-05	7.99E-05	7.99E-05	7.99E-05	7.99E-05	7.99E-05	7.99E-05
40	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04
50	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04	1.23E-04
90	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04
130	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04	2.42E-04
190	3.31E-04	3.31E-04	3.31E-04	3.31E-04	3.31E-04	3.31E-04	3.31E-04	3.31E-04	3.31E-04	3.31E-04	3.31E-04	3.31E-04
210	3.61E-04	3.61E-04	3.61E-04	3.61E-04	3.61E-04	3.61E-04	3.61E-04	3.61E-04	3.61E-04	3.61E-04	3.61E-04	3.61E-04
220	3.76E-04	3.76E-04	3.76E-04	3.76E-04	3.76E-04	3.76E-04	3.76E-04	3.76E-04	3.76E-04	3.76E-04	3.76E-04	3.76E-04
290	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04
400	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04
500	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S46** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 12.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.55E-05	6.56E-05										
20	7.95E-05	7.98E-05	7.99E-05									
40	1.08E-04	1.08E-04	1.08E-04	1.09E-04								
50	1.22E-04	1.22E-04	1.22E-04	1.23E-04								
90	1.79E-04	1.79E-04	1.79E-04	1.79E-04	1.79E-04	1.80E-04	1.80E-04	1.81E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04
130	2.37E-04	2.36E-04	2.36E-04	2.35E-04	2.35E-04	2.35E-04	2.36E-04	2.36E-04	2.37E-04	2.38E-04	2.39E-04	2.40E-04
190	3.24E-04	3.22E-04	3.21E-04	3.21E-04	3.20E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.20E-04	3.21E-04
210	3.53E-04	3.51E-04	3.50E-04	3.49E-04	3.48E-04	3.48E-04	3.47E-04	3.47E-04	3.47E-04	3.47E-04	3.47E-04	3.48E-04
220	3.67E-04	3.66E-04	3.64E-04	3.63E-04	3.62E-04	3.62E-04	3.61E-04	3.61E-04	3.60E-04	3.60E-04	3.61E-04	3.61E-04
290	4.69E-04	4.67E-04	4.65E-04	4.63E-04	4.62E-04	4.60E-04	4.59E-04	4.58E-04	4.57E-04	4.56E-04	4.56E-04	4.56E-04
400	6.30E-04	6.27E-04	6.24E-04	6.21E-04	6.19E-04	6.16E-04	6.14E-04	6.11E-04	6.09E-04	6.08E-04	6.06E-04	6.05E-04
500	7.77E-04	7.73E-04	7.69E-04	7.65E-04	7.61E-04	7.58E-04	7.54E-04	7.51E-04	7.48E-04	7.45E-04	7.43E-04	7.40E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S47** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 25.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.52E-05	6.56E-05										
20	7.82E-05	7.95E-05	7.99E-05									
40	1.04E-04	1.05E-04	1.06E-04	1.08E-04	1.09E-04							
50	1.17E-04	1.17E-04	1.19E-04	1.21E-04	1.23E-04							
90	1.69E-04	1.68E-04	1.67E-04	1.68E-04	1.69E-04	1.71E-04	1.74E-04	1.78E-04	1.81E-04	1.82E-04	1.82E-04	1.82E-04
130	2.21E-04	2.19E-04	2.17E-04	2.16E-04	2.16E-04	2.16E-04	2.17E-04	2.19E-04	2.22E-04	2.26E-04	2.31E-04	2.36E-04
190	3.00E-04	2.96E-04	2.92E-04	2.88E-04	2.86E-04	2.84E-04	2.83E-04	2.82E-04	2.83E-04	2.84E-04	2.86E-04	2.89E-04
210	3.27E-04	3.22E-04	3.17E-04	3.12E-04	3.09E-04	3.06E-04	3.04E-04	3.03E-04	3.03E-04	3.03E-04	3.05E-04	3.07E-04
220	3.40E-04	3.34E-04	3.29E-04	3.25E-04	3.21E-04	3.18E-04	3.15E-04	3.14E-04	3.13E-04	3.13E-04	3.14E-04	3.16E-04
290	4.34E-04	4.25E-04	4.17E-04	4.10E-04	4.03E-04	3.97E-04	3.92E-04	3.88E-04	3.84E-04	3.82E-04	3.80E-04	3.79E-04
400	5.81E-04	5.68E-04	5.56E-04	5.44E-04	5.33E-04	5.23E-04	5.14E-04	5.05E-04	4.97E-04	4.90E-04	4.84E-04	4.78E-04
500	7.15E-04	6.99E-04	6.82E-04	6.67E-04	6.52E-04	6.38E-04	6.25E-04	6.12E-04	6.00E-04	5.89E-04	5.79E-04	5.69E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S48** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 37.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.47E-05	6.56E-05										
20	7.62E-05	7.89E-05	7.99E-05									
40	9.74E-05	9.96E-05	1.03E-04	1.07E-04	1.09E-04							
50	1.08E-04	1.09E-04	1.12E-04	1.17E-04	1.22E-04	1.23E-04						
90	1.52E-04	1.49E-04	1.49E-04	1.50E-04	1.53E-04	1.58E-04	1.64E-04	1.73E-04	1.80E-04	1.82E-04	1.82E-04	1.82E-04
130	1.96E-04	1.90E-04	1.86E-04	1.84E-04	1.83E-04	1.84E-04	1.87E-04	1.92E-04	1.99E-04	2.07E-04	2.17E-04	2.28E-04
190	2.63E-04	2.52E-04	2.43E-04	2.35E-04	2.29E-04	2.25E-04	2.23E-04	2.22E-04	2.23E-04	2.26E-04	2.31E-04	2.37E-04
210	2.85E-04	2.73E-04	2.62E-04	2.52E-04	2.45E-04	2.39E-04	2.35E-04	2.32E-04	2.32E-04	2.33E-04	2.35E-04	2.40E-04
220	2.96E-04	2.83E-04	2.71E-04	2.61E-04	2.53E-04	2.46E-04	2.41E-04	2.37E-04	2.36E-04	2.36E-04	2.38E-04	2.41E-04
290	3.75E-04	3.56E-04	3.38E-04	3.22E-04	3.07E-04	2.94E-04	2.83E-04	2.74E-04	2.66E-04	2.60E-04	2.55E-04	2.53E-04
400	5.00E-04	4.72E-04	4.45E-04	4.19E-04	3.95E-04	3.72E-04	3.51E-04	3.32E-04	3.14E-04	2.98E-04	2.84E-04	2.72E-04
500	6.14E-04	5.78E-04	5.42E-04	5.07E-04	4.75E-04	4.43E-04	4.14E-04	3.85E-04	3.59E-04	3.34E-04	3.11E-04	2.90E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S49** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 50.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.41E-05	6.55E-05	6.56E-05									
20	7.33E-05	7.81E-05	7.98E-05	7.99E-05								
40	8.87E-05	9.26E-05	9.93E-05	1.06E-04	1.09E-04							
50	9.64E-05	9.89E-05	1.04E-04	1.12E-04	1.21E-04	1.23E-04						
90	1.28E-04	1.25E-04	1.24E-04	1.26E-04	1.31E-04	1.39E-04	1.51E-04	1.65E-04	1.78E-04	1.82E-04	1.82E-04	1.82E-04
130	1.61E-04	1.51E-04	1.44E-04	1.40E-04	1.39E-04	1.41E-04	1.46E-04	1.55E-04	1.66E-04	1.80E-04	1.98E-04	2.18E-04
190	2.11E-04	1.93E-04	1.77E-04	1.63E-04	1.53E-04	1.46E-04	1.41E-04	1.40E-04	1.42E-04	1.47E-04	1.55E-04	1.66E-04
210	2.28E-04	2.07E-04	1.88E-04	1.71E-04	1.58E-04	1.47E-04	1.40E-04	1.35E-04	1.34E-04	1.36E-04	1.41E-04	1.49E-04
220	2.37E-04	2.14E-04	1.93E-04	1.75E-04	1.60E-04	1.48E-04	1.39E-04	1.33E-04	1.30E-04	1.31E-04	1.34E-04	1.40E-04
290	2.97E-04	2.63E-04	2.32E-04	2.04E-04	1.78E-04	1.56E-04	1.36E-04	1.19E-04	1.05E-04	9.44E-05	8.66E-05	8.18E-05
400	3.92E-04	3.43E-04	2.95E-04	2.51E-04	2.09E-04	1.70E-04	1.34E-04	1.02E-04	7.17E-05	4.51E-05	2.22E-05	6.39E-06
500	4.79E-04	4.16E-04	3.54E-04	2.95E-04	2.39E-04	1.86E-04	1.37E-04	9.11E-05	5.00E-05	1.82E-05	2.70E-05	6.67E-05

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S50** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 63.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.34E-05	6.55E-05	6.56E-05									
20	6.99E-05	7.71E-05	7.98E-05	7.99E-05								
40	7.79E-05	8.38E-05	9.41E-05	1.05E-04	1.09E-04							
50	8.21E-05	8.56E-05	9.37E-05	1.06E-04	1.19E-04	1.23E-04						
90	9.98E-05	9.40E-05	9.26E-05	9.58E-05	1.04E-04	1.16E-04	1.34E-04	1.55E-04	1.75E-04	1.82E-04	1.82E-04	1.82E-04
130	1.19E-04	1.04E-04	9.29E-05	8.66E-05	8.49E-05	8.78E-05	9.56E-05	1.08E-04	1.25E-04	1.47E-04	1.74E-04	2.05E-04
190	1.49E-04	1.20E-04	9.57E-05	7.54E-05	5.95E-05	4.81E-05	4.12E-05	3.90E-05	4.14E-05	4.87E-05	6.08E-05	7.77E-05
210	1.59E-04	1.26E-04	9.72E-05	7.25E-05	5.21E-05	3.61E-05	2.46E-05	1.76E-05	1.50E-05	1.71E-05	2.40E-05	3.58E-05
220	1.65E-04	1.29E-04	9.81E-05	7.12E-05	4.86E-05	3.05E-05	1.70E-05	7.97E-06	3.64E-06	2.95E-06	6.33E-06	1.53E-05
290	2.02E-04	1.52E-04	1.06E-04	6.49E-05	3.01E-05	1.07E-05	3.49E-05	6.51E-05	8.97E-05	1.08E-04	1.21E-04	1.29E-04
400	2.63E-04	1.90E-04	1.23E-04	6.50E-05	2.83E-05	6.04E-05	1.28E-04	1.90E-04	2.43E-04	2.88E-04	3.28E-04	3.62E-04
500	3.19E-04	2.27E-04	1.43E-04	7.37E-05	4.95E-05	1.19E-04	2.17E-04	3.06E-04	3.84E-04	4.53E-04	5.17E-04	5.75E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S51** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 75.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.24E-05	6.55E-05	6.56E-05									
20	6.56E-05	7.59E-05	7.98E-05	7.99E-05								
40	6.51E-05	7.33E-05	8.78E-05	1.03E-04	1.09E-04							
50	6.50E-05	7.00E-05	8.13E-05	9.90E-05	1.17E-04	1.23E-04						
90	6.64E-05	5.81E-05	5.60E-05	6.04E-05	7.15E-05	8.92E-05	1.13E-04	1.44E-04	1.72E-04	1.82E-04	1.82E-04	1.82E-04
130	7.02E-05	4.89E-05	3.36E-05	2.45E-05	2.18E-05	2.55E-05	3.61E-05	5.34E-05	7.75E-05	1.08E-04	1.46E-04	1.90E-04
190	7.94E-05	4.10E-05	1.27E-05	2.08E-05	4.64E-05	6.49E-05	7.56E-05	7.92E-05	7.58E-05	6.55E-05	4.85E-05	2.49E-05
210	8.33E-05	4.01E-05	1.28E-05	3.66E-05	7.08E-05	9.65E-05	1.14E-04	1.24E-04	1.28E-04	1.24E-04	1.14E-04	9.64E-05
220	8.54E-05	4.00E-05	1.44E-05	4.49E-05	8.32E-05	1.12E-04	1.33E-04	1.47E-04	1.54E-04	1.53E-04	1.46E-04	1.32E-04
290	1.02E-04	4.44E-05	3.99E-05	1.06E-04	1.71E-04	2.25E-04	2.69E-04	3.06E-04	3.36E-04	3.59E-04	3.75E-04	3.84E-04
400	1.33E-04	6.47E-05	9.52E-05	2.07E-04	3.12E-04	4.03E-04	4.84E-04	5.58E-04	6.24E-04	6.83E-04	7.35E-04	7.81E-04
500	1.65E-04	9.07E-05	1.50E-04	3.01E-04	4.41E-04	5.66E-04	6.79E-04	7.86E-04	8.86E-04	9.78E-04	1.06E-03	1.14E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S52** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 88.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.14E-05	6.54E-05	6.56E-05									
20	6.07E-05	7.44E-05	7.97E-05	7.99E-05								
40	5.07E-05	6.15E-05	8.06E-05	1.01E-04	1.09E-04							
50	4.60E-05	5.23E-05	6.73E-05	9.06E-05	1.15E-04	1.23E-04						
90	3.04E-05	1.87E-05	1.55E-05	2.09E-05	3.52E-05	5.85E-05	9.05E-05	1.31E-04	1.69E-04	1.82E-04	1.82E-04	1.82E-04
130	2.33E-05	1.12E-05	3.14E-05	4.52E-05	4.92E-05	4.42E-05	3.02E-05	7.57E-06	2.38E-05	6.44E-05	1.14E-04	1.72E-04
190	3.35E-05	5.64E-05	1.09E-04	1.50E-04	1.80E-04	2.01E-04	2.13E-04	2.17E-04	2.11E-04	1.97E-04	1.73E-04	1.42E-04
210	4.06E-05	7.32E-05	1.35E-04	1.85E-04	2.24E-04	2.54E-04	2.75E-04	2.87E-04	2.90E-04	2.84E-04	2.70E-04	2.46E-04
220	4.45E-05	8.18E-05	1.49E-04	2.03E-04	2.46E-04	2.81E-04	3.06E-04	3.22E-04	3.29E-04	3.28E-04	3.18E-04	2.99E-04
290	7.58E-05	1.43E-04	2.43E-04	3.28E-04	4.01E-04	4.65E-04	5.21E-04	5.67E-04	6.05E-04	6.34E-04	6.55E-04	6.66E-04
400	1.32E-04	2.42E-04	3.91E-04	5.24E-04	6.45E-04	7.57E-04	8.59E-04	9.53E-04	1.04E-03	1.12E-03	1.18E-03	1.24E-03
500	1.86E-04	3.33E-04	5.27E-04	7.03E-04	8.66E-04	1.02E-03	1.17E-03	1.30E-03	1.43E-03	1.55E-03	1.67E-03	1.77E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S53** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 100.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.00E-05	6.54E-05	6.56E-05									
20	5.52E-05	7.28E-05	7.97E-05	7.99E-05								
40	3.49E-05	4.84E-05	7.25E-05	9.88E-05	1.09E-04							
50	2.53E-05	3.31E-05	5.18E-05	8.13E-05	1.12E-04	1.23E-04						
90	1.61E-05	2.44E-05	2.87E-05	2.18E-05	3.99E-06	2.50E-05	6.53E-05	1.16E-04	1.65E-04	1.82E-04	1.82E-04	1.82E-04
130	5.36E-05	8.51E-05	1.12E-04	1.26E-04	1.30E-04	1.22E-04	1.04E-04	7.47E-05	3.45E-05	1.65E-05	7.88E-05	1.52E-04
190	1.16E-04	1.79E-04	2.38E-04	2.85E-04	3.21E-04	3.46E-04	3.60E-04	3.64E-04	3.56E-04	3.38E-04	3.08E-04	2.68E-04
210	1.38E-04	2.10E-04	2.80E-04	3.38E-04	3.84E-04	4.21E-04	4.46E-04	4.60E-04	4.63E-04	4.56E-04	4.38E-04	4.08E-04
220	1.48E-04	2.26E-04	3.01E-04	3.64E-04	4.16E-04	4.58E-04	4.88E-04	5.08E-04	5.17E-04	5.15E-04	5.02E-04	4.79E-04
290	2.24E-04	3.37E-04	4.49E-04	5.50E-04	6.40E-04	7.19E-04	7.88E-04	8.46E-04	8.93E-04	9.30E-04	9.55E-04	9.70E-04
400	3.45E-04	5.12E-04	6.83E-04	8.42E-04	9.91E-04	1.13E-03	1.26E-03	1.38E-03	1.48E-03	1.58E-03	1.67E-03	1.74E-03
500	4.55E-04	6.71E-04	8.95E-04	1.11E-03	1.31E-03	1.50E-03	1.69E-03	1.86E-03	2.02E-03	2.17E-03	2.31E-03	2.44E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S54** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 113.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.86E-05	6.53E-05	6.56E-05									
20	4.92E-05	7.10E-05	7.96E-05	7.99E-05								
40	1.82E-05	3.44E-05	6.38E-05	9.62E-05	1.08E-04	1.09E-04						
50	6.09E-06	1.26E-05	3.52E-05	7.11E-05	1.09E-04	1.23E-04						
90	6.02E-05	7.42E-05	7.80E-05	6.86E-05	4.61E-05	1.05E-05	3.83E-05	1.01E-04	1.60E-04	1.82E-04	1.82E-04	1.82E-04
130	1.25E-04	1.64E-04	1.93E-04	2.10E-04	2.14E-04	2.04E-04	1.82E-04	1.46E-04	9.68E-05	3.44E-05	4.13E-05	1.30E-04
190	2.24E-04	2.99E-04	3.67E-04	4.23E-04	4.66E-04	4.96E-04	5.13E-04	5.17E-04	5.08E-04	4.86E-04	4.50E-04	4.01E-04
210	2.57E-04	3.44E-04	4.25E-04	4.94E-04	5.50E-04	5.94E-04	6.24E-04	6.41E-04	6.45E-04	6.36E-04	6.14E-04	5.78E-04
220	2.74E-04	3.67E-04	4.54E-04	5.30E-04	5.92E-04	6.42E-04	6.79E-04	7.03E-04	7.14E-04	7.11E-04	6.96E-04	6.67E-04
290	3.90E-04	5.26E-04	6.58E-04	7.79E-04	8.87E-04	9.83E-04	1.07E-03	1.14E-03	1.19E-03	1.24E-03	1.27E-03	1.29E-03
400	5.74E-04	7.75E-04	9.78E-04	1.17E-03	1.35E-03	1.52E-03	1.67E-03	1.82E-03	1.95E-03	2.07E-03	2.17E-03	2.26E-03
500	7.42E-04	1.00E-03	1.27E-03	1.53E-03	1.77E-03	2.01E-03	2.23E-03	2.44E-03	2.64E-03	2.82E-03	2.99E-03	3.15E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S55** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 126.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.69E-05	6.53E-05	6.56E-05									
20	4.27E-05	6.89E-05	7.95E-05	7.99E-05								
40	4.37E-06	1.97E-05	5.43E-05	9.34E-05	1.08E-04	1.09E-04						
50	2.15E-05	8.58E-06	1.79E-05	6.02E-05	1.06E-04	1.23E-04						
90	1.08E-04	1.25E-04	1.28E-04	1.17E-04	9.00E-05	4.77E-05	1.01E-05	8.35E-05	1.55E-04	1.82E-04	1.82E-04	1.82E-04
130	1.97E-04	2.42E-04	2.76E-04	2.95E-04	2.99E-04	2.88E-04	2.61E-04	2.19E-04	1.61E-04	8.73E-05	2.09E-06	1.07E-04
190	3.31E-04	4.19E-04	4.98E-04	5.64E-04	6.14E-04	6.49E-04	6.69E-04	6.74E-04	6.63E-04	6.37E-04	5.95E-04	5.37E-04
210	3.75E-04	4.78E-04	5.72E-04	6.53E-04	7.19E-04	7.70E-04	8.06E-04	8.26E-04	8.31E-04	8.20E-04	7.94E-04	7.52E-04
220	3.98E-04	5.07E-04	6.09E-04	6.98E-04	7.71E-04	8.30E-04	8.74E-04	9.02E-04	9.14E-04	9.12E-04	8.93E-04	8.59E-04
290	5.54E-04	7.14E-04	8.69E-04	1.01E-03	1.14E-03	1.25E-03	1.35E-03	1.43E-03	1.50E-03	1.55E-03	1.59E-03	1.61E-03
400	8.00E-04	1.04E-03	1.28E-03	1.50E-03	1.72E-03	1.91E-03	2.10E-03	2.27E-03	2.42E-03	2.56E-03	2.68E-03	2.79E-03
500	1.02E-03	1.33E-03	1.65E-03	1.95E-03	2.24E-03	2.52E-03	2.78E-03	3.03E-03	3.26E-03	3.48E-03	3.68E-03	3.87E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S56** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture, 0.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04
20	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04
40	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04	2.45E-04
50	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
90	4.07E-04	4.07E-04	4.07E-04	4.07E-04	4.07E-04	4.07E-04	4.07E-04	4.07E-04	4.07E-04	4.07E-04	4.07E-04	4.07E-04
130	5.37E-04	5.37E-04	5.37E-04	5.37E-04	5.37E-04	5.37E-04	5.37E-04	5.37E-04	5.37E-04	5.37E-04	5.37E-04	5.37E-04
190	7.32E-04	7.32E-04	7.32E-04	7.32E-04	7.32E-04	7.32E-04	7.32E-04	7.32E-04	7.32E-04	7.32E-04	7.32E-04	7.32E-04
210	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04
220	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04
290	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03
400	1.42E-03	1.42E-03	1.42E-03	1.42E-03	1.42E-03	1.42E-03	1.42E-03	1.42E-03	1.42E-03	1.42E-03	1.42E-03	1.42E-03
500	1.75E-03	1.75E-03	1.75E-03	1.75E-03	1.75E-03	1.75E-03	1.75E-03	1.75E-03	1.75E-03	1.75E-03	1.75E-03	1.75E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S57** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 12.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04
20	1.80E-04	1.81E-04										
40	2.42E-04	2.43E-04	2.44E-04	2.45E-04								
50	2.73E-04	2.74E-04	2.75E-04	2.76E-04	2.77E-04							
90	3.99E-04	3.99E-04	3.98E-04	3.99E-04	4.00E-04	4.01E-04	4.02E-04	4.04E-04	4.06E-04	4.07E-04	4.07E-04	4.07E-04
130	5.25E-04	5.24E-04	5.23E-04	5.22E-04	5.22E-04	5.22E-04	5.23E-04	5.24E-04	5.26E-04	5.28E-04	5.31E-04	5.34E-04
190	7.15E-04	7.12E-04	7.10E-04	7.08E-04	7.06E-04	7.05E-04	7.05E-04	7.05E-04	7.05E-04	7.06E-04	7.07E-04	7.09E-04
210	7.78E-04	7.75E-04	7.72E-04	7.70E-04	7.68E-04	7.67E-04	7.66E-04	7.65E-04	7.65E-04	7.65E-04	7.66E-04	7.67E-04
220	8.09E-04	8.06E-04	8.03E-04	8.01E-04	7.99E-04	7.97E-04	7.96E-04	7.95E-04	7.95E-04	7.95E-04	7.95E-04	7.96E-04
290	1.03E-03	1.03E-03	1.02E-03	1.02E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03
400	1.38E-03	1.37E-03	1.37E-03	1.36E-03	1.35E-03	1.35E-03	1.34E-03	1.34E-03	1.33E-03	1.33E-03	1.33E-03	1.32E-03
500	1.70E-03	1.69E-03	1.68E-03	1.67E-03	1.66E-03	1.65E-03	1.65E-03	1.64E-03	1.63E-03	1.63E-03	1.62E-03	1.62E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S58** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 25.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.48E-04	1.49E-04										
20	1.77E-04	1.80E-04	1.81E-04									
40	2.34E-04	2.36E-04	2.40E-04	2.44E-04	2.45E-04							
50	2.62E-04	2.63E-04	2.66E-04	2.71E-04	2.76E-04	2.77E-04						
90	3.76E-04	3.73E-04	3.73E-04	3.74E-04	3.78E-04	3.82E-04	3.89E-04	3.97E-04	4.04E-04	4.07E-04	4.07E-04	4.07E-04
130	4.90E-04	4.84E-04	4.80E-04	4.78E-04	4.78E-04	4.79E-04	4.82E-04	4.87E-04	4.94E-04	5.02E-04	5.12E-04	5.24E-04
190	6.62E-04	6.51E-04	6.42E-04	6.35E-04	6.29E-04	6.25E-04	6.23E-04	6.22E-04	6.24E-04	6.27E-04	6.32E-04	6.38E-04
210	7.19E-04	7.07E-04	6.96E-04	6.87E-04	6.79E-04	6.74E-04	6.70E-04	6.68E-04	6.67E-04	6.69E-04	6.72E-04	6.76E-04
220	7.48E-04	7.34E-04	7.23E-04	7.13E-04	7.05E-04	6.98E-04	6.93E-04	6.90E-04	6.89E-04	6.89E-04	6.92E-04	6.96E-04
290	9.50E-04	9.30E-04	9.12E-04	8.96E-04	8.82E-04	8.69E-04	8.58E-04	8.49E-04	8.42E-04	8.36E-04	8.32E-04	8.30E-04
400	1.27E-03	1.24E-03	1.21E-03	1.18E-03	1.16E-03	1.14E-03	1.12E-03	1.10E-03	1.08E-03	1.07E-03	1.05E-03	1.04E-03
500	1.55E-03	1.52E-03	1.48E-03	1.45E-03	1.41E-03	1.38E-03	1.35E-03	1.33E-03	1.30E-03	1.28E-03	1.25E-03	1.23E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S59** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 37.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.47E-04	1.49E-04										
20	1.73E-04	1.78E-04	1.81E-04									
40	2.19E-04	2.24E-04	2.33E-04	2.42E-04	2.45E-04							
50	2.43E-04	2.46E-04	2.53E-04	2.63E-04	2.74E-04	2.77E-04						
90	3.37E-04	3.32E-04	3.31E-04	3.34E-04	3.41E-04	3.52E-04	3.67E-04	3.85E-04	4.01E-04	4.07E-04	4.07E-04	4.07E-04
130	4.32E-04	4.19E-04	4.11E-04	4.06E-04	4.05E-04	4.08E-04	4.15E-04	4.26E-04	4.40E-04	4.59E-04	4.81E-04	5.07E-04
190	5.76E-04	5.51E-04	5.31E-04	5.15E-04	5.02E-04	4.93E-04	4.89E-04	4.88E-04	4.91E-04	4.97E-04	5.08E-04	5.22E-04
210	6.23E-04	5.95E-04	5.71E-04	5.51E-04	5.35E-04	5.22E-04	5.13E-04	5.08E-04	5.07E-04	5.10E-04	5.17E-04	5.28E-04
220	6.47E-04	6.17E-04	5.91E-04	5.69E-04	5.51E-04	5.36E-04	5.26E-04	5.19E-04	5.16E-04	5.17E-04	5.22E-04	5.30E-04
290	8.15E-04	7.72E-04	7.32E-04	6.97E-04	6.65E-04	6.37E-04	6.12E-04	5.92E-04	5.75E-04	5.63E-04	5.54E-04	5.49E-04
400	1.08E-03	1.01E-03	9.55E-04	8.98E-04	8.45E-04	7.96E-04	7.50E-04	7.08E-04	6.70E-04	6.36E-04	6.06E-04	5.80E-04
500	1.32E-03	1.24E-03	1.16E-03	1.08E-03	1.01E-03	9.41E-04	8.76E-04	8.15E-04	7.58E-04	7.04E-04	6.55E-04	6.09E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S60** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 50.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.46E-04	1.49E-04										
20	1.66E-04	1.77E-04	1.81E-04									
40	2.00E-04	2.08E-04	2.23E-04	2.39E-04	2.45E-04							
50	2.17E-04	2.22E-04	2.34E-04	2.52E-04	2.71E-04	2.77E-04						
90	2.84E-04	2.76E-04	2.75E-04	2.80E-04	2.92E-04	3.11E-04	3.36E-04	3.68E-04	3.97E-04	4.07E-04	4.07E-04	4.07E-04
130	3.53E-04	3.31E-04	3.16E-04	3.08E-04	3.06E-04	3.11E-04	3.23E-04	3.42E-04	3.68E-04	4.00E-04	4.39E-04	4.84E-04
190	4.57E-04	4.15E-04	3.80E-04	3.51E-04	3.29E-04	3.14E-04	3.06E-04	3.04E-04	3.09E-04	3.20E-04	3.39E-04	3.64E-04
210	4.92E-04	4.43E-04	4.01E-04	3.66E-04	3.37E-04	3.15E-04	3.00E-04	2.91E-04	2.89E-04	2.94E-04	3.06E-04	3.25E-04
220	5.10E-04	4.57E-04	4.12E-04	3.74E-04	3.41E-04	3.16E-04	2.97E-04	2.85E-04	2.80E-04	2.81E-04	2.90E-04	3.05E-04
290	6.33E-04	5.57E-04	4.88E-04	4.26E-04	3.71E-04	3.22E-04	2.79E-04	2.43E-04	2.14E-04	1.92E-04	1.76E-04	1.67E-04
400	8.27E-04	7.15E-04	6.10E-04	5.11E-04	4.19E-04	3.34E-04	2.56E-04	1.84E-04	1.20E-04	6.26E-05	1.63E-05	3.21E-05
500	1.00E-03	8.59E-04	7.21E-04	5.90E-04	4.66E-04	3.49E-04	2.39E-04	1.39E-04	5.13E-05	3.85E-05	1.24E-04	2.13E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S61** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture, 63.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.44E-04	1.49E-04										
20	1.58E-04	1.74E-04	1.81E-04									
40	1.75E-04	1.88E-04	2.12E-04	2.36E-04	2.45E-04							
50	1.84E-04	1.92E-04	2.10E-04	2.39E-04	2.67E-04	2.77E-04						
90	2.19E-04	2.06E-04	2.04E-04	2.12E-04	2.30E-04	2.59E-04	2.98E-04	3.47E-04	3.91E-04	4.06E-04	4.07E-04	4.07E-04
130	2.55E-04	2.22E-04	1.99E-04	1.86E-04	1.83E-04	1.91E-04	2.09E-04	2.38E-04	2.77E-04	3.26E-04	3.86E-04	4.55E-04
190	3.12E-04	2.48E-04	1.94E-04	1.50E-04	1.17E-04	9.31E-05	7.96E-05	7.64E-05	8.35E-05	1.01E-04	1.29E-04	1.68E-04
210	3.31E-04	2.57E-04	1.93E-04	1.40E-04	9.59E-05	6.23E-05	3.87E-05	2.51E-05	2.14E-05	2.78E-05	4.49E-05	7.27E-05
220	3.41E-04	2.62E-04	1.93E-04	1.34E-04	8.59E-05	4.76E-05	1.97E-05	5.16E-06	9.39E-06	8.25E-06	4.67E-06	2.56E-05
290	4.09E-04	2.96E-04	1.93E-04	1.03E-04	2.88E-05	4.69E-05	1.18E-04	1.79E-04	2.28E-04	2.65E-04	2.91E-04	3.06E-04
400	5.19E-04	3.53E-04	2.02E-04	7.40E-05	6.71E-05	2.08E-04	3.49E-04	4.73E-04	5.82E-04	6.77E-04	7.61E-04	8.33E-04
500	6.21E-04	4.08E-04	2.16E-04	7.28E-05	1.53E-04	3.63E-04	5.63E-04	7.42E-04	9.04E-04	1.05E-03	1.19E-03	1.31E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S62** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture, 75.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.42E-04	1.49E-04										
20	1.49E-04	1.72E-04	1.80E-04	1.81E-04								
40	1.46E-04	1.65E-04	1.97E-04	2.32E-04	2.45E-04							
50	1.45E-04	1.56E-04	1.82E-04	2.22E-04	2.63E-04	2.77E-04						
90	1.42E-04	1.24E-04	1.21E-04	1.32E-04	1.58E-04	1.98E-04	2.53E-04	3.21E-04	3.85E-04	4.06E-04	4.07E-04	4.07E-04
130	1.42E-04	9.53E-05	6.30E-05	4.46E-05	4.03E-05	5.06E-05	7.56E-05	1.15E-04	1.70E-04	2.39E-04	3.23E-04	4.21E-04
190	1.48E-04	6.16E-05	1.56E-05	7.40E-05	1.28E-04	1.64E-04	1.85E-04	1.90E-04	1.79E-04	1.55E-04	1.15E-04	6.11E-05
210	1.51E-04	5.39E-05	3.44E-05	1.16E-04	1.86E-04	2.38E-04	2.73E-04	2.93E-04	2.97E-04	2.87E-04	2.62E-04	2.22E-04
220	1.53E-04	5.09E-05	4.57E-05	1.37E-04	2.15E-04	2.75E-04	3.17E-04	3.44E-04	3.56E-04	3.53E-04	3.35E-04	3.03E-04
290	1.69E-04	4.64E-05	1.34E-04	2.89E-04	4.22E-04	5.33E-04	6.28E-04	7.06E-04	7.68E-04	8.16E-04	8.49E-04	8.68E-04
400	2.04E-04	8.46E-05	2.84E-04	5.31E-04	7.48E-04	9.42E-04	1.12E-03	1.27E-03	1.42E-03	1.54E-03	1.66E-03	1.76E-03
500	2.43E-04	1.38E-04	4.23E-04	7.52E-04	1.05E-03	1.31E-03	1.56E-03	1.79E-03	2.01E-03	2.21E-03	2.39E-03	2.56E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S63** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 88.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.39E-04	1.48E-04	1.49E-04									
20	1.37E-04	1.68E-04	1.80E-04	1.81E-04								
40	1.13E-04	1.38E-04	1.81E-04	2.28E-04	2.45E-04							
50	1.01E-04	1.16E-04	1.50E-04	2.03E-04	2.57E-04	2.77E-04						
90	5.83E-05	3.35E-05	2.83E-05	4.23E-05	7.58E-05	1.29E-04	2.01E-04	2.92E-04	3.77E-04	4.06E-04	4.07E-04	4.07E-04
130	3.61E-05	4.10E-05	8.75E-05	1.14E-04	1.20E-04	1.07E-04	7.36E-05	2.12E-05	5.01E-05	1.41E-04	2.52E-04	3.81E-04
190	7.34E-05	1.62E-04	2.71E-04	3.57E-04	4.21E-04	4.65E-04	4.89E-04	4.93E-04	4.79E-04	4.45E-04	3.92E-04	3.20E-04
210	9.40E-05	2.03E-04	3.33E-04	4.38E-04	5.21E-04	5.84E-04	6.27E-04	6.51E-04	6.56E-04	6.41E-04	6.08E-04	5.55E-04
220	1.05E-04	2.24E-04	3.64E-04	4.79E-04	5.72E-04	6.44E-04	6.97E-04	7.30E-04	7.44E-04	7.40E-04	7.15E-04	6.72E-04
290	1.85E-04	3.71E-04	5.81E-04	7.64E-04	9.23E-04	1.06E-03	1.18E-03	1.28E-03	1.36E-03	1.43E-03	1.47E-03	1.49E-03
400	3.19E-04	6.04E-04	9.23E-04	1.21E-03	1.48E-03	1.72E-03	1.95E-03	2.15E-03	2.34E-03	2.51E-03	2.65E-03	2.78E-03
500	4.43E-04	8.17E-04	1.23E-03	1.62E-03	1.98E-03	2.32E-03	2.64E-03	2.94E-03	3.22E-03	3.49E-03	3.73E-03	3.96E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S64** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 100.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.36E-04	1.48E-04	1.49E-04									
20	1.25E-04	1.65E-04	1.80E-04	1.81E-04								
40	7.68E-05	1.08E-04	1.63E-04	2.22E-04	2.44E-04	2.45E-04						
50	5.36E-05	7.24E-05	1.15E-04	1.82E-04	2.51E-04	2.77E-04						
90	4.45E-05	6.55E-05	7.23E-05	5.45E-05	1.25E-05	5.36E-05	1.45E-04	2.60E-04	3.68E-04	4.06E-04	4.07E-04	4.07E-04
130	1.38E-04	2.08E-04	2.63E-04	2.94E-04	2.99E-04	2.81E-04	2.38E-04	1.71E-04	8.03E-05	3.45E-05	1.74E-04	3.37E-04
190	2.85E-04	4.25E-04	5.52E-04	6.54E-04	7.32E-04	7.86E-04	8.15E-04	8.20E-04	8.02E-04	7.59E-04	6.92E-04	6.01E-04
210	3.34E-04	4.97E-04	6.48E-04	7.75E-04	8.76E-04	9.54E-04	1.01E-03	1.04E-03	1.04E-03	1.02E-03	9.81E-04	9.14E-04
220	3.59E-04	5.33E-04	6.97E-04	8.35E-04	9.48E-04	1.04E-03	1.10E-03	1.15E-03	1.16E-03	1.16E-03	1.13E-03	1.07E-03
290	5.33E-04	7.87E-04	1.03E-03	1.26E-03	1.45E-03	1.63E-03	1.78E-03	1.90E-03	2.01E-03	2.08E-03	2.14E-03	2.17E-03
400	8.08E-04	1.19E-03	1.56E-03	1.92E-03	2.25E-03	2.55E-03	2.84E-03	3.09E-03	3.33E-03	3.54E-03	3.73E-03	3.89E-03
500	1.06E-03	1.55E-03	2.05E-03	2.52E-03	2.97E-03	3.40E-03	3.80E-03	4.18E-03	4.53E-03	4.86E-03	5.17E-03	5.46E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S65** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture, 113.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.33E-04	1.48E-04	1.49E-04									
20	1.11E-04	1.61E-04	1.80E-04	1.81E-04								
40	3.88E-05	7.64E-05	1.43E-04	2.17E-04	2.44E-04	2.45E-04						
50	1.18E-05	2.59E-05	7.80E-05	1.59E-04	2.45E-04	2.76E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
90	1.46E-04	1.76E-04	1.82E-04	1.59E-04	1.07E-04	2.61E-05	8.43E-05	2.24E-04	3.58E-04	4.05E-04	4.07E-04	4.07E-04
130	2.95E-04	3.81E-04	4.45E-04	4.81E-04	4.87E-04	4.64E-04	4.12E-04	3.30E-04	2.19E-04	7.90E-05	9.04E-05	2.89E-04
190	5.20E-04	6.90E-04	8.41E-04	9.63E-04	1.06E-03	1.12E-03	1.16E-03	1.16E-03	1.14E-03	1.09E-03	1.01E-03	8.96E-04
210	5.95E-04	7.93E-04	9.73E-04	1.12E-03	1.25E-03	1.34E-03	1.41E-03	1.44E-03	1.45E-03	1.43E-03	1.37E-03	1.29E-03
220	6.33E-04	8.44E-04	1.04E-03	1.20E-03	1.34E-03	1.45E-03	1.53E-03	1.58E-03	1.60E-03	1.59E-03	1.56E-03	1.49E-03
290	8.97E-04	1.20E-03	1.50E-03	1.77E-03	2.01E-03	2.22E-03	2.40E-03	2.55E-03	2.68E-03	2.77E-03	2.84E-03	2.87E-03
400	1.31E-03	1.77E-03	2.23E-03	2.65E-03	3.05E-03	3.42E-03	3.77E-03	4.08E-03	4.37E-03	4.62E-03	4.85E-03	5.05E-03
500	1.69E-03	2.29E-03	2.89E-03	3.46E-03	4.00E-03	4.52E-03	5.01E-03	5.47E-03	5.90E-03	6.31E-03	6.68E-03	7.03E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S66** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 126.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.29E-04	1.48E-04	1.49E-04									
20	9.62E-05	1.56E-04	1.80E-04	1.81E-04								
40	9.81E-06	4.32E-05	1.22E-04	2.10E-04	2.44E-04	2.45E-04						
50	5.27E-05	2.23E-05	3.88E-05	1.35E-04	2.37E-04	2.76E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
90	2.52E-04	2.89E-04	2.95E-04	2.67E-04	2.06E-04	1.09E-04	2.11E-05	1.86E-04	3.47E-04	4.05E-04	4.07E-04	4.07E-04
130	4.54E-04	5.56E-04	6.31E-04	6.72E-04	6.78E-04	6.51E-04	5.89E-04	4.93E-04	3.62E-04	1.97E-04	3.02E-06	2.37E-04
190	7.57E-04	9.58E-04	1.13E-03	1.28E-03	1.39E-03	1.46E-03	1.51E-03	1.51E-03	1.49E-03	1.43E-03	1.33E-03	1.20E-03
210	8.58E-04	1.09E-03	1.30E-03	1.48E-03	1.62E-03	1.73E-03	1.81E-03	1.85E-03	1.86E-03	1.83E-03	1.77E-03	1.68E-03
220	9.09E-04	1.16E-03	1.39E-03	1.58E-03	1.74E-03	1.87E-03	1.96E-03	2.02E-03	2.05E-03	2.04E-03	2.00E-03	1.92E-03
290	1.26E-03	1.63E-03	1.97E-03	2.29E-03	2.57E-03	2.82E-03	3.03E-03	3.21E-03	3.36E-03	3.47E-03	3.55E-03	3.59E-03
400	1.82E-03	2.37E-03	2.90E-03	3.40E-03	3.87E-03	4.31E-03	4.71E-03	5.08E-03	5.42E-03	5.72E-03	5.99E-03	6.23E-03
500	2.33E-03	3.04E-03	3.74E-03	4.41E-03	5.05E-03	5.66E-03	6.24E-03	6.79E-03	7.30E-03	7.77E-03	8.21E-03	8.62E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S67** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 0.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.16E-05	6.16E-05	6.16E-05	6.16E-05	6.16E-05	6.16E-05	6.16E-05	6.16E-05	6.16E-05	6.16E-05	6.16E-05	6.16E-05
20	7.16E-05	7.16E-05	7.16E-05	7.16E-05	7.16E-05	7.16E-05	7.16E-05	7.16E-05	7.16E-05	7.16E-05	7.16E-05	7.16E-05
40	9.18E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05
50	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	1.43E-04	1.43E-04	1.43E-04	1.43E-04	1.43E-04	1.43E-04	1.43E-04	1.43E-04	1.43E-04	1.43E-04	1.43E-04	1.43E-04
130	1.85E-04	1.85E-04	1.85E-04	1.85E-04	1.85E-04	1.85E-04	1.85E-04	1.85E-04	1.85E-04	1.85E-04	1.85E-04	1.85E-04
190	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04
210	2.70E-04	2.70E-04	2.70E-04	2.70E-04	2.70E-04	2.70E-04	2.70E-04	2.70E-04	2.70E-04	2.70E-04	2.70E-04	2.70E-04
220	2.81E-04	2.81E-04	2.81E-04	2.81E-04	2.81E-04	2.81E-04	2.81E-04	2.81E-04	2.81E-04	2.81E-04	2.81E-04	2.81E-04
290	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04	3.56E-04
400	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04	4.75E-04
500	5.84E-04	5.84E-04	5.84E-04	5.84E-04	5.84E-04	5.84E-04	5.84E-04	5.84E-04	5.84E-04	5.84E-04	5.84E-04	5.84E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S68** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 12.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.14E-05	6.16E-05										
20	7.10E-05	7.15E-05	7.16E-05									
40	9.03E-05	9.08E-05	9.12E-05	9.16E-05	9.18E-05							
50	1.00E-04	1.01E-04	1.01E-04	1.01E-04	1.02E-04							
90	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.41E-04	1.41E-04	1.42E-04	1.42E-04	1.43E-04	1.43E-04	1.43E-04	1.43E-04
130	1.80E-04	1.80E-04	1.80E-04	1.80E-04	1.80E-04	1.80E-04	1.80E-04	1.81E-04	1.82E-04	1.82E-04	1.83E-04	1.84E-04
190	2.41E-04	2.41E-04	2.40E-04	2.40E-04	2.40E-04	2.39E-04	2.39E-04	2.39E-04	2.39E-04	2.40E-04	2.40E-04	2.41E-04
210	2.62E-04	2.62E-04	2.61E-04	2.60E-04	2.60E-04	2.59E-04	2.59E-04	2.59E-04	2.59E-04	2.59E-04	2.59E-04	2.60E-04
220	2.72E-04	2.72E-04	2.71E-04	2.70E-04	2.70E-04	2.69E-04						
290	3.44E-04	3.44E-04	3.42E-04	3.41E-04	3.40E-04	3.39E-04	3.38E-04	3.38E-04	3.37E-04	3.37E-04	3.37E-04	3.36E-04
400	4.59E-04	4.58E-04	4.56E-04	4.54E-04	4.52E-04	4.50E-04	4.49E-04	4.47E-04	4.46E-04	4.45E-04	4.44E-04	4.43E-04
500	5.63E-04	5.62E-04	5.59E-04	5.56E-04	5.54E-04	5.51E-04	5.49E-04	5.47E-04	5.45E-04	5.43E-04	5.41E-04	5.40E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S69** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 25.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.13E-05	6.16E-05										
20	7.00E-05	7.12E-05	7.16E-05									
40	8.69E-05	8.80E-05	8.96E-05	9.12E-05	9.17E-05	9.18E-05						
50	9.54E-05	9.63E-05	9.77E-05	9.96E-05	1.01E-04	1.02E-04						
90	1.30E-04	1.30E-04	1.30E-04	1.31E-04	1.33E-04	1.34E-04	1.37E-04	1.40E-04	1.42E-04	1.43E-04	1.43E-04	1.43E-04
130	1.66E-04	1.65E-04	1.64E-04	1.63E-04	1.64E-04	1.64E-04	1.66E-04	1.68E-04	1.70E-04	1.73E-04	1.77E-04	1.81E-04
190	2.20E-04	2.17E-04	2.15E-04	2.13E-04	2.11E-04	2.10E-04	2.10E-04	2.10E-04	2.11E-04	2.12E-04	2.14E-04	2.16E-04
210	2.38E-04	2.35E-04	2.32E-04	2.29E-04	2.27E-04	2.26E-04	2.25E-04	2.25E-04	2.25E-04	2.25E-04	2.27E-04	2.28E-04
220	2.48E-04	2.44E-04	2.41E-04	2.38E-04	2.35E-04	2.34E-04	2.32E-04	2.32E-04	2.32E-04	2.32E-04	2.33E-04	2.35E-04
290	3.12E-04	3.06E-04	3.01E-04	2.96E-04	2.92E-04	2.88E-04	2.85E-04	2.82E-04	2.80E-04	2.79E-04	2.78E-04	2.77E-04
400	4.14E-04	4.05E-04	3.97E-04	3.90E-04	3.82E-04	3.75E-04	3.69E-04	3.63E-04	3.58E-04	3.53E-04	3.49E-04	3.46E-04
500	5.07E-04	4.96E-04	4.85E-04	4.75E-04	4.65E-04	4.55E-04	4.46E-04	4.38E-04	4.30E-04	4.22E-04	4.15E-04	4.08E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S70** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 37.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.08E-05	6.16E-05										
20	6.80E-05	7.06E-05	7.15E-05	7.16E-05								
40	8.09E-05	8.34E-05	8.70E-05	9.05E-05	9.17E-05	9.18E-05						
50	8.74E-05	8.94E-05	9.24E-05	9.66E-05	1.01E-04	1.02E-04						
90	1.14E-04	1.14E-04	1.14E-04	1.16E-04	1.19E-04	1.23E-04	1.29E-04	1.36E-04	1.41E-04	1.43E-04	1.43E-04	1.43E-04
130	1.42E-04	1.39E-04	1.37E-04	1.37E-04	1.37E-04	1.39E-04	1.42E-04	1.46E-04	1.51E-04	1.58E-04	1.66E-04	1.75E-04
190	1.85E-04	1.78E-04	1.73E-04	1.68E-04	1.65E-04	1.63E-04	1.62E-04	1.63E-04	1.64E-04	1.67E-04	1.71E-04	1.76E-04
210	1.99E-04	1.92E-04	1.85E-04	1.79E-04	1.75E-04	1.71E-04	1.69E-04	1.68E-04	1.69E-04	1.70E-04	1.73E-04	1.77E-04
220	2.07E-04	1.98E-04	1.91E-04	1.85E-04	1.80E-04	1.76E-04	1.73E-04	1.71E-04	1.71E-04	1.72E-04	1.74E-04	1.77E-04
290	2.58E-04	2.46E-04	2.34E-04	2.23E-04	2.14E-04	2.06E-04	1.98E-04	1.92E-04	1.88E-04	1.84E-04	1.82E-04	1.81E-04
400	3.40E-04	3.21E-04	3.03E-04	2.86E-04	2.69E-04	2.54E-04	2.40E-04	2.27E-04	2.16E-04	2.05E-04	1.96E-04	1.88E-04
500	4.15E-04	3.91E-04	3.67E-04	3.43E-04	3.21E-04	3.00E-04	2.80E-04	2.61E-04	2.43E-04	2.26E-04	2.11E-04	1.96E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S71** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 50.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.02E-05	6.16E-05	6.15E-05	6.16E-05								
20	6.53E-05	6.99E-05	7.14E-05	7.16E-05								
40	7.26E-05	7.71E-05	8.32E-05	8.96E-05	9.17E-05	9.18E-05						
50	7.64E-05	7.98E-05	8.50E-05	9.25E-05	9.95E-05	1.02E-04						
90	9.26E-05	9.17E-05	9.25E-05	9.58E-05	1.01E-04	1.08E-04	1.18E-04	1.30E-04	1.40E-04	1.43E-04	1.43E-04	1.43E-04
130	1.10E-04	1.05E-04	1.01E-04	1.00E-04	1.01E-04	1.04E-04	1.09E-04	1.16E-04	1.26E-04	1.37E-04	1.51E-04	1.67E-04
190	1.37E-04	1.26E-04	1.16E-04	1.08E-04	1.03E-04	9.88E-05	9.71E-05	9.77E-05	1.00E-04	1.05E-04	1.12E-04	1.22E-04
210	1.47E-04	1.33E-04	1.21E-04	1.12E-04	1.03E-04	9.75E-05	9.37E-05	9.19E-05	9.24E-05	9.50E-05	9.98E-05	1.07E-04
220	1.51E-04	1.37E-04	1.24E-04	1.13E-04	1.04E-04	9.70E-05	9.20E-05	8.92E-05	8.84E-05	8.99E-05	9.36E-05	9.95E-05
290	1.86E-04	1.64E-04	1.44E-04	1.26E-04	1.09E-04	9.49E-05	8.23E-05	7.17E-05	6.31E-05	5.66E-05	5.22E-05	5.00E-05
400	2.41E-04	2.10E-04	1.79E-04	1.50E-04	1.22E-04	9.69E-05	7.36E-05	5.25E-05	3.38E-05	1.84E-05	9.91E-06	1.64E-05
500	2.94E-04	2.52E-04	2.12E-04	1.74E-04	1.38E-04	1.04E-04	7.26E-05	4.56E-05	2.59E-05	2.51E-05	4.72E-05	7.68E-05

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S72** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 63.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.94E-05	6.16E-05	6.15E-05	6.16E-05								
20	6.18E-05	6.90E-05	7.13E-05	7.16E-05								
40	6.23E-05	6.91E-05	7.86E-05	8.84E-05	9.16E-05	9.18E-05						
50	6.28E-05	6.79E-05	7.59E-05	8.73E-05	9.82E-05	1.02E-04						
90	6.57E-05	6.43E-05	6.56E-05	7.04E-05	7.84E-05	8.96E-05	1.04E-04	1.22E-04	1.38E-04	1.43E-04	1.43E-04	1.43E-04
130	7.03E-05	6.24E-05	5.70E-05	5.50E-05	5.61E-05	6.05E-05	6.82E-05	7.93E-05	9.37E-05	1.12E-04	1.33E-04	1.57E-04
190	8.02E-05	6.30E-05	4.81E-05	3.62E-05	2.72E-05	2.11E-05	1.82E-05	1.84E-05	2.20E-05	2.91E-05	3.97E-05	5.38E-05
210	8.41E-05	6.41E-05	4.63E-05	3.15E-05	1.97E-05	1.10E-05	5.73E-06	3.83E-06	3.14E-06	4.08E-06	1.00E-05	2.02E-05
220	8.62E-05	6.48E-05	4.56E-05	2.95E-05	1.66E-05	7.77E-06	6.22E-06	9.44E-06	1.10E-05	9.52E-06	4.92E-06	4.28E-06
290	1.02E-04	7.20E-05	4.49E-05	2.38E-05	1.78E-05	3.52E-05	5.74E-05	7.69E-05	9.18E-05	1.03E-04	1.10E-04	1.13E-04
400	1.32E-04	9.02E-05	5.61E-05	4.03E-05	6.14E-05	1.07E-04	1.51E-04	1.91E-04	2.26E-04	2.55E-04	2.81E-04	3.03E-04
500	1.62E-04	1.12E-04	7.49E-05	6.88E-05	1.10E-04	1.76E-04	2.40E-04	2.98E-04	3.49E-04	3.95E-04	4.38E-04	4.76E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S73** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 75.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.84E-05	6.15E-05	6.15E-05	6.16E-05								
20	5.77E-05	6.78E-05	7.13E-05	7.16E-05								
40	5.03E-05	5.97E-05	7.32E-05	8.69E-05	9.16E-05	9.18E-05						
50	4.67E-05	5.39E-05	6.52E-05	8.12E-05	9.65E-05	1.02E-04						
90	3.47E-05	3.24E-05	3.42E-05	4.07E-05	5.18E-05	6.75E-05	8.80E-05	1.13E-04	1.36E-04	1.43E-04	1.43E-04	1.43E-04
130	2.69E-05	1.57E-05	8.39E-06	5.01E-06	5.24E-06	1.03E-05	2.07E-05	3.60E-05	5.62E-05	8.12E-05	1.11E-04	1.45E-04
190	2.58E-05	1.56E-05	3.07E-05	5.00E-05	6.46E-05	7.36E-05	7.75E-05	7.65E-05	7.06E-05	6.01E-05	4.49E-05	2.50E-05
210	2.82E-05	2.23E-05	4.46E-05	6.95E-05	8.91E-05	1.03E-04	1.11E-04	1.15E-04	1.14E-04	1.08E-04	9.71E-05	8.18E-05
220	2.98E-05	2.62E-05	5.17E-05	7.94E-05	1.01E-04	1.17E-04	1.28E-04	1.34E-04	1.35E-04	1.32E-04	1.23E-04	1.10E-04
290	4.68E-05	5.87E-05	1.05E-04	1.50E-04	1.89E-04	2.21E-04	2.48E-04	2.70E-04	2.87E-04	3.00E-04	3.07E-04	3.11E-04
400	8.42E-05	1.18E-04	1.92E-04	2.64E-04	3.28E-04	3.86E-04	4.38E-04	4.85E-04	5.27E-04	5.65E-04	5.98E-04	6.27E-04
500	1.23E-04	1.74E-04	2.72E-04	3.68E-04	4.55E-04	5.36E-04	6.11E-04	6.80E-04	7.45E-04	8.06E-04	8.62E-04	9.14E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S74** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 88.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.72E-05	6.15E-05	6.15E-05	6.16E-05								
20	5.29E-05	6.65E-05	7.12E-05	7.16E-05								
40	3.66E-05	4.90E-05	6.69E-05	8.51E-05	9.15E-05	9.18E-05						
50	2.87E-05	3.81E-05	5.30E-05	7.41E-05	9.45E-05	1.02E-04						
90	6.28E-06	3.91E-06	2.19E-06	7.60E-06	2.19E-05	4.26E-05	6.96E-05	1.03E-04	1.33E-04	1.43E-04	1.43E-04	1.43E-04
130	2.92E-05	4.27E-05	5.30E-05	5.73E-05	5.52E-05	4.70E-05	3.26E-05	1.22E-05	1.41E-05	4.69E-05	8.62E-05	1.31E-04
190	7.67E-05	1.08E-04	1.36E-04	1.59E-04	1.75E-04	1.85E-04	1.88E-04	1.86E-04	1.77E-04	1.63E-04	1.42E-04	1.15E-04
210	9.34E-05	1.31E-04	1.65E-04	1.93E-04	2.15E-04	2.31E-04	2.40E-04	2.44E-04	2.41E-04	2.33E-04	2.19E-04	1.98E-04
220	1.02E-04	1.42E-04	1.79E-04	2.10E-04	2.35E-04	2.54E-04	2.66E-04	2.73E-04	2.74E-04	2.68E-04	2.57E-04	2.39E-04
290	1.62E-04	2.22E-04	2.78E-04	3.31E-04	3.76E-04	4.16E-04	4.49E-04	4.77E-04	4.99E-04	5.15E-04	5.25E-04	5.29E-04
400	2.58E-04	3.48E-04	4.36E-04	5.21E-04	5.98E-04	6.71E-04	7.37E-04	7.98E-04	8.54E-04	9.03E-04	9.47E-04	9.84E-04
500	3.47E-04	4.64E-04	5.79E-04	6.94E-04	8.01E-04	9.03E-04	9.99E-04	1.09E-03	1.18E-03	1.26E-03	1.33E-03	1.40E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S75** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 100.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.59E-05	6.14E-05	6.15E-05	6.16E-05								
20	4.77E-05	6.50E-05	7.12E-05	7.16E-05								
40	2.17E-05	3.73E-05	5.99E-05	8.31E-05	9.15E-05	9.18E-05						
50	9.53E-06	2.08E-05	3.97E-05	6.61E-05	9.23E-05	1.02E-04						
90	4.07E-05	4.33E-05	3.97E-05	2.88E-05	1.04E-05	1.54E-05	4.94E-05	9.09E-05	1.30E-04	1.43E-04	1.43E-04	1.43E-04
130	9.37E-05	1.10E-04	1.21E-04	1.25E-04	1.22E-04	1.11E-04	9.19E-05	6.56E-05	3.18E-05	9.63E-06	5.90E-05	1.16E-04
190	1.75E-04	2.13E-04	2.45E-04	2.72E-04	2.90E-04	3.02E-04	3.06E-04	3.02E-04	2.91E-04	2.73E-04	2.47E-04	2.13E-04
210	2.03E-04	2.47E-04	2.86E-04	3.21E-04	3.47E-04	3.65E-04	3.77E-04	3.81E-04	3.78E-04	3.67E-04	3.49E-04	3.23E-04
220	2.16E-04	2.64E-04	3.07E-04	3.45E-04	3.75E-04	3.97E-04	4.13E-04	4.21E-04	4.22E-04	4.15E-04	4.00E-04	3.78E-04
290	3.13E-04	3.84E-04	4.52E-04	5.16E-04	5.72E-04	6.21E-04	6.63E-04	6.98E-04	7.25E-04	7.45E-04	7.58E-04	7.63E-04
400	4.65E-04	5.74E-04	6.81E-04	7.86E-04	8.82E-04	9.73E-04	1.06E-03	1.13E-03	1.20E-03	1.27E-03	1.32E-03	1.37E-03
500	6.04E-04	7.46E-04	8.89E-04	1.03E-03	1.16E-03	1.29E-03	1.41E-03	1.53E-03	1.64E-03	1.74E-03	1.83E-03	1.92E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S76** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 113.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.44E-05	6.14E-05	6.16E-05									
20	4.19E-05	6.33E-05	7.13E-05	7.16E-05								
40	6.27E-06	2.47E-05	5.24E-05	8.09E-05	9.14E-05	9.18E-05						
50	1.18E-05	2.75E-06	2.54E-05	5.75E-05	8.98E-05	1.02E-04						
90	8.47E-05	8.73E-05	8.22E-05	6.83E-05	4.54E-05	1.34E-05	2.77E-05	7.83E-05	1.26E-04	1.43E-04	1.43E-04	1.43E-04
130	1.59E-04	1.79E-04	1.91E-04	1.96E-04	1.91E-04	1.77E-04	1.54E-04	1.22E-04	8.07E-05	3.00E-05	2.99E-05	9.93E-05
190	2.72E-04	3.17E-04	3.56E-04	3.87E-04	4.10E-04	4.24E-04	4.28E-04	4.24E-04	4.11E-04	3.88E-04	3.56E-04	3.15E-04
210	3.10E-04	3.64E-04	4.11E-04	4.51E-04	4.83E-04	5.06E-04	5.20E-04	5.25E-04	5.21E-04	5.08E-04	4.85E-04	4.54E-04
220	3.29E-04	3.87E-04	4.39E-04	4.83E-04	5.20E-04	5.47E-04	5.66E-04	5.75E-04	5.76E-04	5.68E-04	5.50E-04	5.23E-04
290	4.61E-04	5.49E-04	6.31E-04	7.08E-04	7.75E-04	8.35E-04	8.86E-04	9.28E-04	9.62E-04	9.86E-04	1.00E-03	1.01E-03
400	6.70E-04	8.03E-04	9.34E-04	1.06E-03	1.18E-03	1.29E-03	1.39E-03	1.48E-03	1.57E-03	1.64E-03	1.71E-03	1.77E-03
500	8.59E-04	1.04E-03	1.21E-03	1.38E-03	1.54E-03	1.70E-03	1.85E-03	1.99E-03	2.12E-03	2.24E-03	2.36E-03	2.46E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S77** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 126.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.30E-05	6.13E-05	6.16E-05									
20	3.59E-05	6.14E-05	7.12E-05	7.16E-05								
40	1.07E-05	1.16E-05	4.41E-05	7.85E-05	9.13E-05	9.17E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05	9.18E-05
50	3.40E-05	1.66E-05	1.04E-05	4.82E-05	8.71E-05	1.01E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	1.29E-04	1.32E-04	1.25E-04	1.09E-04	8.15E-05	4.35E-05	5.11E-06	6.47E-05	1.22E-04	1.43E-04	1.43E-04	1.43E-04
130	2.26E-04	2.48E-04	2.62E-04	2.67E-04	2.61E-04	2.45E-04	2.18E-04	1.80E-04	1.31E-04	7.13E-05	5.65E-07	8.14E-05
190	3.71E-04	4.22E-04	4.68E-04	5.05E-04	5.31E-04	5.47E-04	5.53E-04	5.48E-04	5.33E-04	5.06E-04	4.69E-04	4.20E-04
210	4.19E-04	4.81E-04	5.37E-04	5.84E-04	6.21E-04	6.48E-04	6.65E-04	6.71E-04	6.67E-04	6.51E-04	6.25E-04	5.87E-04
220	4.43E-04	5.10E-04	5.72E-04	6.24E-04	6.67E-04	6.98E-04	7.21E-04	7.33E-04	7.34E-04	7.24E-04	7.03E-04	6.71E-04
290	6.13E-04	7.14E-04	8.12E-04	9.02E-04	9.82E-04	1.05E-03	1.11E-03	1.16E-03	1.20E-03	1.23E-03	1.25E-03	1.26E-03
400	8.79E-04	1.03E-03	1.19E-03	1.34E-03	1.48E-03	1.61E-03	1.73E-03	1.84E-03	1.94E-03	2.03E-03	2.11E-03	2.18E-03
500	1.12E-03	1.33E-03	1.53E-03	1.74E-03	1.93E-03	2.11E-03	2.29E-03	2.45E-03	2.61E-03	2.75E-03	2.89E-03	3.01E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S78** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 0.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04
20	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04
40	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04	2.06E-04
50	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04
90	3.18E-04	3.18E-04	3.18E-04	3.18E-04	3.18E-04	3.18E-04	3.18E-04	3.18E-04	3.18E-04	3.18E-04	3.18E-04	3.18E-04
130	4.08E-04	4.08E-04	4.08E-04	4.08E-04	4.08E-04	4.08E-04	4.08E-04	4.08E-04	4.08E-04	4.08E-04	4.08E-04	4.08E-04
190	5.44E-04	5.44E-04	5.44E-04	5.44E-04	5.44E-04	5.44E-04	5.44E-04	5.44E-04	5.44E-04	5.44E-04	5.44E-04	5.44E-04
210	5.89E-04	5.89E-04	5.89E-04	5.89E-04	5.89E-04	5.89E-04	5.89E-04	5.89E-04	5.89E-04	5.89E-04	5.89E-04	5.89E-04
220	6.12E-04	6.12E-04	6.12E-04	6.12E-04	6.12E-04	6.12E-04	6.12E-04	6.12E-04	6.12E-04	6.12E-04	6.12E-04	6.12E-04
290	7.72E-04	7.72E-04	7.72E-04	7.72E-04	7.72E-04	7.72E-04	7.72E-04	7.72E-04	7.72E-04	7.72E-04	7.72E-04	7.72E-04
400	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03
500	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S79** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 12.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04
20	1.61E-04	1.61E-04	1.62E-04									
40	2.03E-04	2.04E-04	2.05E-04	2.06E-04								
50	2.24E-04	2.25E-04	2.26E-04	2.27E-04	2.28E-04							
90	3.10E-04	3.10E-04	3.10E-04	3.11E-04	3.12E-04	3.13E-04	3.14E-04	3.16E-04	3.17E-04	3.18E-04	3.18E-04	3.18E-04
130	3.97E-04	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.97E-04	3.98E-04	3.99E-04	4.01E-04	4.03E-04	4.05E-04
190	5.27E-04	5.26E-04	5.24E-04	5.23E-04	5.23E-04	5.22E-04	5.22E-04	5.22E-04	5.23E-04	5.23E-04	5.24E-04	5.26E-04
210	5.71E-04	5.69E-04	5.67E-04	5.66E-04	5.65E-04	5.64E-04	5.64E-04	5.64E-04	5.64E-04	5.64E-04	5.65E-04	5.66E-04
220	5.93E-04	5.91E-04	5.89E-04	5.87E-04	5.86E-04	5.85E-04	5.85E-04	5.84E-04	5.84E-04	5.85E-04	5.85E-04	5.86E-04
290	7.46E-04	7.43E-04	7.40E-04	7.37E-04	7.35E-04	7.33E-04	7.32E-04	7.30E-04	7.29E-04	7.28E-04	7.28E-04	7.28E-04
400	9.87E-04	9.83E-04	9.78E-04	9.74E-04	9.70E-04	9.66E-04	9.63E-04	9.60E-04	9.57E-04	9.55E-04	9.53E-04	9.51E-04
500	1.21E-03	1.20E-03	1.20E-03	1.19E-03	1.18E-03	1.18E-03	1.17E-03	1.17E-03	1.17E-03	1.16E-03	1.16E-03	1.15E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S80** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 25.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.39E-04	1.40E-04										
20	1.58E-04	1.61E-04	1.62E-04									
40	1.95E-04	1.97E-04	2.01E-04	2.05E-04	2.06E-04							
50	2.13E-04	2.15E-04	2.18E-04	2.23E-04	2.27E-04	2.28E-04						
90	2.88E-04	2.88E-04	2.88E-04	2.90E-04	2.93E-04	2.98E-04	3.03E-04	3.10E-04	3.16E-04	3.18E-04	3.18E-04	3.18E-04
130	3.63E-04	3.61E-04	3.59E-04	3.59E-04	3.59E-04	3.61E-04	3.64E-04	3.69E-04	3.74E-04	3.81E-04	3.89E-04	3.98E-04
190	4.77E-04	4.71E-04	4.66E-04	4.62E-04	4.59E-04	4.57E-04	4.57E-04	4.57E-04	4.59E-04	4.62E-04	4.66E-04	4.72E-04
210	5.16E-04	5.08E-04	5.02E-04	4.97E-04	4.92E-04	4.89E-04	4.88E-04	4.87E-04	4.88E-04	4.90E-04	4.93E-04	4.97E-04
220	5.35E-04	5.27E-04	5.20E-04	5.14E-04	5.09E-04	5.06E-04	5.03E-04	5.02E-04	5.02E-04	5.03E-04	5.06E-04	5.09E-04
290	6.69E-04	6.57E-04	6.46E-04	6.36E-04	6.27E-04	6.19E-04	6.12E-04	6.07E-04	6.02E-04	5.99E-04	5.98E-04	5.97E-04
400	8.81E-04	8.62E-04	8.45E-04	8.28E-04	8.12E-04	7.98E-04	7.85E-04	7.72E-04	7.61E-04	7.52E-04	7.43E-04	7.36E-04
500	1.07E-03	1.05E-03	1.03E-03	1.00E-03	9.82E-04	9.61E-04	9.42E-04	9.24E-04	9.07E-04	8.91E-04	8.76E-04	8.63E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S81** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 37.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.38E-04	1.40E-04										
20	1.54E-04	1.60E-04	1.62E-04									
40	1.82E-04	1.87E-04	1.95E-04	2.03E-04	2.06E-04							
50	1.95E-04	2.00E-04	2.07E-04	2.16E-04	2.25E-04	2.28E-04						
90	2.52E-04	2.51E-04	2.53E-04	2.57E-04	2.64E-04	2.73E-04	2.86E-04	3.00E-04	3.13E-04	3.18E-04	3.18E-04	3.18E-04
130	3.10E-04	3.03E-04	2.99E-04	2.98E-04	3.00E-04	3.04E-04	3.11E-04	3.20E-04	3.32E-04	3.47E-04	3.65E-04	3.85E-04
190	3.97E-04	3.83E-04	3.71E-04	3.62E-04	3.55E-04	3.51E-04	3.50E-04	3.51E-04	3.55E-04	3.62E-04	3.71E-04	3.84E-04
210	4.26E-04	4.09E-04	3.95E-04	3.83E-04	3.74E-04	3.67E-04	3.63E-04	3.62E-04	3.63E-04	3.67E-04	3.74E-04	3.83E-04
220	4.41E-04	4.23E-04	4.07E-04	3.94E-04	3.83E-04	3.75E-04	3.70E-04	3.67E-04	3.67E-04	3.70E-04	3.75E-04	3.83E-04
290	5.45E-04	5.17E-04	4.92E-04	4.69E-04	4.49E-04	4.32E-04	4.17E-04	4.05E-04	3.95E-04	3.89E-04	3.84E-04	3.83E-04
400	7.08E-04	6.67E-04	6.27E-04	5.90E-04	5.56E-04	5.23E-04	4.94E-04	4.67E-04	4.43E-04	4.21E-04	4.02E-04	3.85E-04
500	8.58E-04	8.04E-04	7.51E-04	7.01E-04	6.53E-04	6.08E-04	5.65E-04	5.25E-04	4.87E-04	4.52E-04	4.19E-04	3.89E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S82** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture, 50.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.37E-04	1.40E-04										
20	1.48E-04	1.58E-04	1.62E-04									
40	1.63E-04	1.73E-04	1.87E-04	2.01E-04	2.06E-04							
50	1.71E-04	1.78E-04	1.90E-04	2.07E-04	2.23E-04	2.28E-04						
90	2.02E-04	2.01E-04	2.03E-04	2.11E-04	2.23E-04	2.40E-04	2.61E-04	2.87E-04	3.10E-04	3.17E-04	3.18E-04	3.18E-04
130	2.36E-04	2.24E-04	2.18E-04	2.16E-04	2.18E-04	2.26E-04	2.38E-04	2.54E-04	2.76E-04	3.02E-04	3.32E-04	3.68E-04
190	2.87E-04	2.62E-04	2.42E-04	2.25E-04	2.14E-04	2.07E-04	2.04E-04	2.07E-04	2.14E-04	2.25E-04	2.42E-04	2.63E-04
210	3.05E-04	2.75E-04	2.50E-04	2.29E-04	2.13E-04	2.01E-04	1.94E-04	1.91E-04	1.93E-04	2.00E-04	2.12E-04	2.28E-04
220	3.13E-04	2.82E-04	2.54E-04	2.31E-04	2.12E-04	1.98E-04	1.89E-04	1.84E-04	1.83E-04	1.88E-04	1.97E-04	2.11E-04
290	3.76E-04	3.29E-04	2.85E-04	2.46E-04	2.11E-04	1.81E-04	1.55E-04	1.34E-04	1.17E-04	1.04E-04	9.63E-05	9.31E-05
400	4.77E-04	4.06E-04	3.38E-04	2.75E-04	2.16E-04	1.62E-04	1.13E-04	6.92E-05	3.28E-05	1.83E-05	4.30E-05	7.35E-05
500	5.71E-04	4.78E-04	3.89E-04	3.05E-04	2.26E-04	1.54E-04	8.93E-05	4.11E-05	4.99E-05	1.08E-04	1.73E-04	2.34E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S83** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture, 63.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.35E-04	1.40E-04										
20	1.40E-04	1.56E-04	1.61E-04	1.62E-04								
40	1.40E-04	1.55E-04	1.77E-04	1.98E-04	2.06E-04							
50	1.40E-04	1.51E-04	1.70E-04	1.95E-04	2.20E-04	2.28E-04						
90	1.41E-04	1.38E-04	1.42E-04	1.54E-04	1.72E-04	1.98E-04	2.31E-04	2.70E-04	3.06E-04	3.17E-04	3.18E-04	3.18E-04
130	1.44E-04	1.28E-04	1.17E-04	1.14E-04	1.18E-04	1.29E-04	1.47E-04	1.72E-04	2.05E-04	2.45E-04	2.92E-04	3.45E-04
190	1.54E-04	1.17E-04	8.52E-05	6.06E-05	4.26E-05	3.13E-05	2.67E-05	2.91E-05	3.88E-05	5.61E-05	8.08E-05	1.13E-04
210	1.58E-04	1.14E-04	7.65E-05	4.57E-05	2.22E-05	8.78E-06	1.18E-05	1.58E-05	1.38E-05	5.63E-06	1.27E-05	3.66E-05
220	1.60E-04	1.13E-04	7.25E-05	3.92E-05	1.50E-05	1.48E-05	2.85E-05	3.75E-05	3.94E-05	3.39E-05	2.10E-05	3.25E-06
290	1.78E-04	1.11E-04	5.46E-05	2.73E-05	6.59E-05	1.19E-04	1.65E-04	2.03E-04	2.31E-04	2.51E-04	2.64E-04	2.69E-04
400	2.14E-04	1.22E-04	6.25E-05	9.84E-05	1.98E-04	2.99E-04	3.90E-04	4.69E-04	5.39E-04	5.99E-04	6.51E-04	6.96E-04
500	2.52E-04	1.43E-04	9.59E-05	1.80E-04	3.25E-04	4.67E-04	5.97E-04	7.14E-04	8.20E-04	9.16E-04	1.00E-03	1.09E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S84** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture, 75.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.33E-04	1.39E-04	1.40E-04									
20	1.31E-04	1.53E-04	1.61E-04	1.62E-04								
40	1.12E-04	1.33E-04	1.64E-04	1.95E-04	2.06E-04							
50	1.03E-04	1.19E-04	1.46E-04	1.81E-04	2.16E-04	2.28E-04						
90	6.94E-05	6.55E-05	7.11E-05	8.67E-05	1.12E-04	1.48E-04	1.94E-04	2.50E-04	3.00E-04	3.17E-04	3.18E-04	3.18E-04
130	4.32E-05	2.01E-05	7.47E-06	5.47E-06	4.15E-06	1.59E-05	4.05E-05	7.58E-05	1.21E-04	1.77E-04	2.43E-04	3.19E-04
190	3.40E-05	4.82E-05	9.62E-05	1.36E-04	1.64E-04	1.81E-04	1.87E-04	1.82E-04	1.67E-04	1.42E-04	1.07E-04	6.16E-05
210	4.11E-05	7.12E-05	1.32E-04	1.83E-04	2.22E-04	2.48E-04	2.64E-04	2.69E-04	2.65E-04	2.49E-04	2.24E-04	1.89E-04
220	4.60E-05	8.31E-05	1.50E-04	2.07E-04	2.50E-04	2.82E-04	3.03E-04	3.13E-04	3.13E-04	3.03E-04	2.83E-04	2.53E-04
290	9.19E-05	1.71E-04	2.78E-04	3.72E-04	4.52E-04	5.19E-04	5.75E-04	6.20E-04	6.55E-04	6.80E-04	6.95E-04	7.00E-04
400	1.80E-04	3.16E-04	4.83E-04	6.35E-04	7.70E-04	8.92E-04	1.00E-03	1.10E-03	1.19E-03	1.27E-03	1.34E-03	1.40E-03
500	2.67E-04	4.50E-04	6.71E-04	8.74E-04	1.06E-03	1.23E-03	1.39E-03	1.54E-03	1.68E-03	1.81E-03	1.93E-03	2.04E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S85** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 88.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.30E-04	1.39E-04	1.40E-04									
20	1.20E-04	1.50E-04	1.61E-04	1.62E-04								
40	8.09E-05	1.09E-04	1.50E-04	1.91E-04	2.05E-04	2.06E-04						
50	6.18E-05	8.36E-05	1.18E-04	1.65E-04	2.12E-04	2.28E-04						
90	1.47E-05	1.44E-05	8.01E-06	1.21E-05	4.54E-05	9.27E-05	1.53E-04	2.27E-04	2.94E-04	3.17E-04	3.18E-04	3.18E-04
130	8.40E-05	1.13E-04	1.33E-04	1.40E-04	1.33E-04	1.12E-04	7.86E-05	3.17E-05	2.79E-05	1.02E-04	1.89E-04	2.89E-04
190	2.00E-04	2.68E-04	3.28E-04	3.73E-04	4.05E-04	4.24E-04	4.30E-04	4.22E-04	4.02E-04	3.68E-04	3.20E-04	2.60E-04
210	2.40E-04	3.20E-04	3.93E-04	4.51E-04	4.97E-04	5.29E-04	5.47E-04	5.52E-04	5.45E-04	5.25E-04	4.91E-04	4.43E-04
220	2.59E-04	3.46E-04	4.25E-04	4.91E-04	5.42E-04	5.81E-04	6.06E-04	6.18E-04	6.17E-04	6.03E-04	5.76E-04	5.35E-04
290	3.99E-04	5.29E-04	6.54E-04	7.65E-04	8.62E-04	9.46E-04	1.02E-03	1.07E-03	1.12E-03	1.15E-03	1.17E-03	1.18E-03
400	6.20E-04	8.18E-04	1.01E-03	1.20E-03	1.36E-03	1.52E-03	1.66E-03	1.79E-03	1.91E-03	2.02E-03	2.11E-03	2.19E-03
500	8.22E-04	1.08E-03	1.34E-03	1.59E-03	1.82E-03	2.04E-03	2.25E-03	2.45E-03	2.63E-03	2.80E-03	2.96E-03	3.11E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S86** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 100.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.27E-04	1.39E-04	1.40E-04									
20	1.08E-04	1.47E-04	1.61E-04	1.62E-04								
40	4.70E-05	8.28E-05	1.34E-04	1.87E-04	2.05E-04	2.06E-04						
50	1.79E-05	4.45E-05	8.79E-05	1.48E-04	2.07E-04	2.27E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04
90	1.03E-04	1.06E-04	9.64E-05	7.00E-05	2.71E-05	3.19E-05	1.08E-04	2.01E-04	2.87E-04	3.17E-04	3.18E-04	3.18E-04
130	2.26E-04	2.61E-04	2.84E-04	2.90E-04	2.80E-04	2.53E-04	2.10E-04	1.50E-04	7.38E-05	1.89E-05	1.29E-04	2.55E-04
190	4.14E-04	4.95E-04	5.67E-04	6.22E-04	6.61E-04	6.84E-04	6.90E-04	6.80E-04	6.54E-04	6.11E-04	5.51E-04	4.74E-04
210	4.77E-04	5.74E-04	6.61E-04	7.33E-04	7.88E-04	8.27E-04	8.50E-04	8.57E-04	8.47E-04	8.21E-04	7.78E-04	7.18E-04
220	5.08E-04	6.13E-04	7.08E-04	7.88E-04	8.52E-04	8.99E-04	9.30E-04	9.45E-04	9.44E-04	9.26E-04	8.91E-04	8.40E-04
290	7.28E-04	8.87E-04	1.04E-03	1.18E-03	1.30E-03	1.40E-03	1.49E-03	1.56E-03	1.62E-03	1.66E-03	1.69E-03	1.69E-03
400	1.07E-03	1.32E-03	1.56E-03	1.79E-03	2.00E-03	2.19E-03	2.37E-03	2.54E-03	2.69E-03	2.82E-03	2.93E-03	3.03E-03
500	1.39E-03	1.71E-03	2.03E-03	2.34E-03	2.63E-03	2.91E-03	3.17E-03	3.42E-03	3.65E-03	3.87E-03	4.07E-03	4.25E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S87** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 113.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.24E-04	1.39E-04	1.40E-04									
20	9.46E-05	1.43E-04	1.61E-04	1.62E-04								
40	1.17E-05	5.43E-05	1.17E-04	1.82E-04	2.05E-04	2.06E-04						
50	3.08E-05	3.56E-06	5.55E-05	1.28E-04	2.01E-04	2.27E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04
90	2.00E-04	2.04E-04	1.91E-04	1.58E-04	1.05E-04	3.25E-05	6.01E-05	1.73E-04	2.79E-04	3.16E-04	3.18E-04	3.18E-04
130	3.72E-04	4.13E-04	4.40E-04	4.47E-04	4.34E-04	4.01E-04	3.48E-04	2.75E-04	1.82E-04	6.89E-05	6.45E-05	2.18E-04
190	6.30E-04	7.28E-04	8.14E-04	8.80E-04	9.27E-04	9.55E-04	9.62E-04	9.50E-04	9.18E-04	8.65E-04	7.93E-04	7.00E-04
210	7.16E-04	8.33E-04	9.38E-04	1.02E-03	1.09E-03	1.14E-03	1.17E-03	1.18E-03	1.16E-03	1.13E-03	1.08E-03	1.01E-03
220	7.60E-04	8.86E-04	1.00E-03	1.10E-03	1.17E-03	1.23E-03	1.27E-03	1.29E-03	1.29E-03	1.26E-03	1.22E-03	1.16E-03
290	1.06E-03	1.25E-03	1.44E-03	1.60E-03	1.75E-03	1.88E-03	1.99E-03	2.08E-03	2.14E-03	2.19E-03	2.22E-03	2.23E-03
400	1.54E-03	1.83E-03	2.12E-03	2.40E-03	2.66E-03	2.89E-03	3.11E-03	3.31E-03	3.49E-03	3.65E-03	3.80E-03	3.92E-03
500	1.97E-03	2.36E-03	2.75E-03	3.12E-03	3.48E-03	3.82E-03	4.14E-03	4.44E-03	4.72E-03	4.98E-03	5.23E-03	5.45E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S88** Variation in electron beam radius through its flight, for different lens positions with a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 126.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.20E-04	1.39E-04	1.40E-04									
20	8.06E-05	1.39E-04	1.61E-04	1.62E-04								
40	2.70E-05	2.46E-05	9.86E-05	1.76E-04	2.05E-04	2.06E-04						
50	8.09E-05	4.02E-05	2.17E-05	1.07E-04	1.95E-04	2.27E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04	2.28E-04
90	2.99E-04	3.03E-04	2.88E-04	2.48E-04	1.86E-04	9.99E-05	9.72E-06	1.43E-04	2.70E-04	3.16E-04	3.18E-04	3.18E-04
130	5.19E-04	5.68E-04	5.98E-04	6.06E-04	5.91E-04	5.52E-04	4.90E-04	4.04E-04	2.94E-04	1.60E-04	1.79E-04	1.79E-04
190	8.48E-04	9.64E-04	1.06E-03	1.14E-03	1.20E-03	1.23E-03	1.24E-03	1.23E-03	1.19E-03	1.13E-03	9.30E-04	9.30E-04
210	9.58E-04	1.10E-03	1.22E-03	1.32E-03	1.40E-03	1.46E-03	1.49E-03	1.50E-03	1.49E-03	1.45E-03	1.30E-03	1.30E-03
220	1.01E-03	1.16E-03	1.30E-03	1.41E-03	1.50E-03	1.57E-03	1.62E-03	1.64E-03	1.63E-03	1.61E-03	1.49E-03	1.49E-03
290	1.40E-03	1.63E-03	1.84E-03	2.04E-03	2.21E-03	2.36E-03	2.49E-03	2.60E-03	2.68E-03	2.74E-03	2.78E-03	2.78E-03
400	2.00E-03	2.35E-03	2.70E-03	3.02E-03	3.33E-03	3.61E-03	3.87E-03	4.10E-03	4.32E-03	4.51E-03	4.82E-03	4.82E-03
500	2.55E-03	3.02E-03	3.48E-03	3.92E-03	4.34E-03	4.74E-03	5.12E-03	5.47E-03	5.81E-03	6.12E-03	6.67E-03	6.67E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S89** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 0.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.59E-05	6.59E-05	6.59E-05	6.59E-05	6.59E-05	6.59E-05	6.59E-05	6.59E-05	6.59E-05	6.59E-05	6.59E-05	6.59E-05
20	8.04E-05	8.04E-05	8.04E-05	8.04E-05	8.04E-05	8.04E-05	8.04E-05	8.04E-05	8.04E-05	8.04E-05	8.04E-05	8.04E-05
40	1.10E-04	1.10E-04	1.10E-04	1.10E-04	1.10E-04	1.10E-04	1.10E-04	1.10E-04	1.10E-04	1.10E-04	1.10E-04	1.10E-04
50	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04	1.24E-04
90	1.83E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04
130	2.43E-04	2.43E-04	2.43E-04	2.43E-04	2.43E-04	2.43E-04	2.43E-04	2.43E-04	2.43E-04	2.43E-04	2.43E-04	2.43E-04
190	3.32E-04	3.32E-04	3.32E-04	3.32E-04	3.32E-04	3.32E-04	3.32E-04	3.32E-04	3.32E-04	3.32E-04	3.32E-04	3.32E-04
210	3.62E-04	3.62E-04	3.62E-04	3.62E-04	3.62E-04	3.62E-04	3.62E-04	3.62E-04	3.62E-04	3.62E-04	3.62E-04	3.62E-04
220	3.77E-04	3.77E-04	3.77E-04	3.77E-04	3.77E-04	3.77E-04	3.77E-04	3.77E-04	3.77E-04	3.77E-04	3.77E-04	3.77E-04
290	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04	4.82E-04
400	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04	6.47E-04
500	7.97E-04	7.97E-04	7.97E-04	7.97E-04	7.97E-04	7.97E-04	7.97E-04	7.97E-04	7.97E-04	7.97E-04	7.97E-04	7.97E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S90** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 12.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.58E-05	6.59E-05										
20	8.01E-05	8.03E-05	8.04E-05									
40	1.09E-04	1.09E-04	1.09E-04	1.10E-04								
50	1.23E-04	1.23E-04	1.24E-04									
90	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.82E-04	1.82E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04
130	2.40E-04	2.39E-04	2.40E-04	2.40E-04	2.41E-04	2.42E-04						
190	3.27E-04	3.27E-04	3.26E-04	3.25E-04	3.26E-04							
210	3.57E-04	3.56E-04	3.55E-04	3.54E-04	3.54E-04	3.53E-04	3.53E-04	3.53E-04	3.53E-04	3.53E-04	3.53E-04	3.54E-04
220	3.71E-04	3.70E-04	3.70E-04	3.69E-04	3.68E-04	3.68E-04	3.67E-04	3.67E-04	3.67E-04	3.67E-04	3.67E-04	3.68E-04
290	4.74E-04	4.73E-04	4.72E-04	4.71E-04	4.69E-04	4.69E-04	4.68E-04	4.67E-04	4.67E-04	4.66E-04	4.66E-04	4.66E-04
400	6.36E-04	6.34E-04	6.32E-04	6.30E-04	6.29E-04	6.27E-04	6.26E-04	6.24E-04	6.23E-04	6.22E-04	6.21E-04	6.20E-04
500	7.84E-04	7.81E-04	7.79E-04	7.76E-04	7.74E-04	7.72E-04	7.69E-04	7.67E-04	7.66E-04	7.64E-04	7.62E-04	7.61E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S91** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 25.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.56E-05	6.59E-05										
20	7.93E-05	8.01E-05	8.04E-05									
40	1.06E-04	1.07E-04	1.08E-04	1.09E-04	1.10E-04							
50	1.20E-04	1.20E-04	1.21E-04	1.23E-04	1.24E-04							
90	1.75E-04	1.74E-04	1.74E-04	1.74E-04	1.75E-04	1.76E-04	1.78E-04	1.81E-04	1.83E-04	1.83E-04	1.83E-04	1.83E-04
130	2.30E-04	2.28E-04	2.27E-04	2.26E-04	2.26E-04	2.26E-04	2.27E-04	2.29E-04	2.31E-04	2.33E-04	2.36E-04	2.39E-04
190	3.13E-04	3.10E-04	3.07E-04	3.05E-04	3.03E-04	3.02E-04	3.01E-04	3.01E-04	3.01E-04	3.02E-04	3.04E-04	3.05E-04
210	3.40E-04	3.37E-04	3.34E-04	3.31E-04	3.29E-04	3.27E-04	3.26E-04	3.25E-04	3.25E-04	3.25E-04	3.26E-04	3.28E-04
220	3.54E-04	3.50E-04	3.47E-04	3.44E-04	3.42E-04	3.40E-04	3.38E-04	3.37E-04	3.37E-04	3.37E-04	3.38E-04	3.39E-04
290	4.51E-04	4.46E-04	4.41E-04	4.36E-04	4.32E-04	4.28E-04	4.25E-04	4.22E-04	4.20E-04	4.19E-04	4.17E-04	4.17E-04
400	6.04E-04	5.96E-04	5.89E-04	5.81E-04	5.74E-04	5.68E-04	5.62E-04	5.56E-04	5.51E-04	5.47E-04	5.43E-04	5.39E-04
500	7.44E-04	7.33E-04	7.23E-04	7.13E-04	7.04E-04	6.95E-04	6.86E-04	6.78E-04	6.71E-04	6.64E-04	6.57E-04	6.51E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S92** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 37.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.53E-05	6.59E-05										
20	7.80E-05	7.97E-05	8.04E-05									
40	1.02E-04	1.04E-04	1.06E-04	1.09E-04	1.10E-04							
50	1.14E-04	1.15E-04	1.17E-04	1.20E-04	1.23E-04	1.24E-04						
90	1.64E-04	1.62E-04	1.62E-04	1.63E-04	1.65E-04	1.68E-04	1.72E-04	1.77E-04	1.82E-04	1.83E-04	1.83E-04	1.83E-04
130	2.13E-04	2.10E-04	2.07E-04	2.06E-04	2.05E-04	2.06E-04	2.08E-04	2.11E-04	2.15E-04	2.21E-04	2.27E-04	2.34E-04
190	2.88E-04	2.81E-04	2.76E-04	2.71E-04	2.67E-04	2.64E-04	2.63E-04	2.63E-04	2.63E-04	2.65E-04	2.68E-04	2.72E-04
210	3.13E-04	3.05E-04	2.98E-04	2.92E-04	2.88E-04	2.84E-04	2.81E-04	2.80E-04	2.79E-04	2.80E-04	2.82E-04	2.85E-04
220	3.26E-04	3.17E-04	3.10E-04	3.03E-04	2.98E-04	2.94E-04	2.90E-04	2.88E-04	2.87E-04	2.88E-04	2.89E-04	2.91E-04
290	4.14E-04	4.01E-04	3.90E-04	3.80E-04	3.70E-04	3.62E-04	3.55E-04	3.49E-04	3.44E-04	3.40E-04	3.38E-04	3.36E-04
400	5.52E-04	5.34E-04	5.16E-04	5.00E-04	4.85E-04	4.70E-04	4.57E-04	4.45E-04	4.34E-04	4.23E-04	4.15E-04	4.07E-04
500	6.78E-04	6.55E-04	6.32E-04	6.10E-04	5.89E-04	5.69E-04	5.50E-04	5.32E-04	5.15E-04	5.00E-04	4.85E-04	4.72E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S93** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 50.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.49E-05	6.57E-05	6.59E-05									
20	7.62E-05	7.91E-05	8.03E-05	8.04E-05								
40	9.67E-05	9.90E-05	1.03E-04	1.08E-04	1.10E-04							
50	1.07E-04	1.08E-04	1.12E-04	1.17E-04	1.22E-04	1.24E-04						
90	1.49E-04	1.46E-04	1.46E-04	1.47E-04	1.51E-04	1.56E-04	1.63E-04	1.72E-04	1.81E-04	1.83E-04	1.83E-04	1.83E-04
130	1.91E-04	1.84E-04	1.80E-04	1.78E-04	1.77E-04	1.78E-04	1.82E-04	1.87E-04	1.94E-04	2.03E-04	2.15E-04	2.28E-04
190	2.55E-04	2.42E-04	2.32E-04	2.24E-04	2.17E-04	2.13E-04	2.10E-04	2.09E-04	2.11E-04	2.14E-04	2.19E-04	2.26E-04
210	2.76E-04	2.62E-04	2.50E-04	2.39E-04	2.31E-04	2.24E-04	2.20E-04	2.17E-04	2.16E-04	2.18E-04	2.21E-04	2.26E-04
220	2.87E-04	2.71E-04	2.59E-04	2.47E-04	2.38E-04	2.30E-04	2.24E-04	2.21E-04	2.19E-04	2.19E-04	2.22E-04	2.26E-04
290	3.62E-04	3.40E-04	3.20E-04	3.02E-04	2.86E-04	2.71E-04	2.58E-04	2.48E-04	2.39E-04	2.32E-04	2.28E-04	2.25E-04
400	4.80E-04	4.47E-04	4.18E-04	3.89E-04	3.62E-04	3.36E-04	3.13E-04	2.91E-04	2.72E-04	2.54E-04	2.39E-04	2.25E-04
500	5.88E-04	5.46E-04	5.07E-04	4.68E-04	4.31E-04	3.96E-04	3.63E-04	3.32E-04	3.03E-04	2.75E-04	2.50E-04	2.26E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S94** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 63.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.44E-05	6.58E-05	6.59E-05									
20	7.39E-05	7.86E-05	8.03E-05	8.04E-05								
40	8.96E-05	9.35E-05	1.00E-04	1.07E-04	1.10E-04							
50	9.75E-05	9.99E-05	1.05E-04	1.13E-04	1.21E-04	1.24E-04						
90	1.30E-04	1.26E-04	1.25E-04	1.27E-04	1.33E-04	1.41E-04	1.52E-04	1.66E-04	1.79E-04	1.83E-04	1.83E-04	1.83E-04
130	1.63E-04	1.53E-04	1.46E-04	1.42E-04	1.41E-04	1.43E-04	1.48E-04	1.57E-04	1.68E-04	1.82E-04	1.99E-04	2.19E-04
190	2.13E-04	1.94E-04	1.78E-04	1.65E-04	1.55E-04	1.48E-04	1.44E-04	1.43E-04	1.45E-04	1.49E-04	1.58E-04	1.69E-04
210	2.29E-04	2.08E-04	1.89E-04	1.73E-04	1.60E-04	1.50E-04	1.42E-04	1.38E-04	1.37E-04	1.39E-04	1.44E-04	1.52E-04
220	2.38E-04	2.15E-04	1.94E-04	1.77E-04	1.62E-04	1.50E-04	1.42E-04	1.36E-04	1.33E-04	1.34E-04	1.37E-04	1.43E-04
290	2.97E-04	2.64E-04	2.33E-04	2.05E-04	1.80E-04	1.57E-04	1.38E-04	1.22E-04	1.08E-04	9.77E-05	9.03E-05	8.59E-05
400	3.91E-04	3.42E-04	2.95E-04	2.51E-04	2.09E-04	1.71E-04	1.35E-04	1.03E-04	7.31E-05	4.68E-05	2.38E-05	6.16E-06
500	4.76E-04	4.13E-04	3.52E-04	2.93E-04	2.37E-04	1.85E-04	1.35E-04	8.93E-05	4.79E-05	1.48E-05	2.70E-05	6.64E-05

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S95** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 75.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.38E-05	6.58E-05	6.57E-05	6.59E-05								
20	7.11E-05	7.78E-05	8.01E-05	8.04E-05								
40	8.11E-05	8.66E-05	9.58E-05	1.06E-04	1.09E-04	1.10E-04						
50	8.62E-05	8.96E-05	9.68E-05	1.09E-04	1.20E-04	1.24E-04						
90	1.07E-04	1.02E-04	1.01E-04	1.04E-04	1.11E-04	1.23E-04	1.39E-04	1.59E-04	1.77E-04	1.83E-04	1.83E-04	1.83E-04
130	1.29E-04	1.16E-04	1.05E-04	1.00E-04	9.86E-05	1.02E-04	1.09E-04	1.20E-04	1.36E-04	1.56E-04	1.81E-04	2.09E-04
190	1.63E-04	1.37E-04	1.14E-04	9.57E-05	8.13E-05	7.11E-05	6.51E-05	6.34E-05	6.60E-05	7.30E-05	8.43E-05	1.00E-04
210	1.75E-04	1.44E-04	1.17E-04	9.47E-05	7.61E-05	6.16E-05	5.12E-05	4.51E-05	4.33E-05	4.57E-05	5.26E-05	6.38E-05
220	1.80E-04	1.48E-04	1.19E-04	9.43E-05	7.35E-05	5.69E-05	4.45E-05	3.62E-05	3.21E-05	3.23E-05	3.69E-05	4.58E-05
290	2.21E-04	1.75E-04	1.31E-04	9.27E-05	5.81E-05	2.84E-05	6.77E-06	2.07E-05	4.17E-05	5.83E-05	7.02E-05	7.74E-05
400	2.87E-04	2.18E-04	1.54E-04	9.49E-05	4.35E-05	1.73E-05	6.17E-05	1.17E-04	1.66E-04	2.08E-04	2.45E-04	2.77E-04
500	3.47E-04	2.59E-04	1.76E-04	1.01E-04	4.15E-05	4.68E-05	1.27E-04	2.09E-04	2.82E-04	3.46E-04	4.06E-04	4.59E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S96** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 88.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.30E-05	6.58E-05	6.57E-05	6.59E-05								
20	6.78E-05	7.69E-05	8.01E-05	8.04E-05								
40	7.14E-05	7.87E-05	9.11E-05	1.05E-04	1.09E-04	1.10E-04						
50	7.33E-05	7.77E-05	8.74E-05	1.03E-04	1.19E-04	1.24E-04						
90	8.17E-05	7.47E-05	7.28E-05	7.70E-05	8.67E-05	1.02E-04	1.23E-04	1.50E-04	1.75E-04	1.83E-04	1.83E-04	1.83E-04
130	9.14E-05	7.30E-05	5.96E-05	5.21E-05	5.01E-05	5.38E-05	6.33E-05	7.86E-05	9.98E-05	1.27E-04	1.59E-04	1.98E-04
190	1.08E-04	7.29E-05	4.33E-05	1.97E-05	4.29E-06	1.33E-05	2.22E-05	2.53E-05	2.23E-05	1.35E-05	1.46E-06	2.16E-05
210	1.13E-04	7.35E-05	3.90E-05	1.20E-05	1.44E-05	3.54E-05	5.10E-05	6.02E-05	6.31E-05	6.00E-05	5.10E-05	3.61E-05
220	1.16E-04	7.39E-05	3.72E-05	9.52E-06	2.19E-05	4.68E-05	6.57E-05	7.78E-05	8.37E-05	8.35E-05	7.73E-05	6.53E-05
290	1.38E-04	7.86E-05	2.94E-05	2.71E-05	8.06E-05	1.29E-04	1.70E-04	2.02E-04	2.29E-04	2.49E-04	2.63E-04	2.71E-04
400	1.75E-04	9.15E-05	3.61E-05	8.35E-05	1.78E-04	2.61E-04	3.35E-04	4.00E-04	4.58E-04	5.10E-04	5.56E-04	5.95E-04
500	2.10E-04	1.07E-04	5.45E-05	1.39E-04	2.69E-04	3.82E-04	4.86E-04	5.80E-04	6.66E-04	7.47E-04	8.22E-04	8.91E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S97** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 100.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.21E-05	6.57E-05	6.59E-05									
20	6.41E-05	7.58E-05	8.02E-05	8.04E-05								
40	6.05E-05	6.98E-05	8.60E-05	1.03E-04	1.09E-04	1.10E-04						
50	5.88E-05	6.45E-05	7.71E-05	9.68E-05	1.17E-04	1.24E-04						
90	5.36E-05	4.43E-05	4.20E-05	4.70E-05	5.94E-05	7.91E-05	1.06E-04	1.41E-04	1.72E-04	1.83E-04	1.83E-04	1.83E-04
130	5.07E-05	2.71E-05	1.07E-05	2.58E-06	3.21E-06	1.95E-06	1.31E-05	3.24E-05	5.93E-05	9.37E-05	1.36E-04	1.84E-04
190	5.11E-05	1.35E-05	3.29E-05	6.94E-05	9.64E-05	1.15E-04	1.25E-04	1.28E-04	1.24E-04	1.12E-04	9.23E-05	6.55E-05
210	5.24E-05	1.46E-05	4.86E-05	9.39E-05	1.29E-04	1.54E-04	1.72E-04	1.83E-04	1.85E-04	1.81E-04	1.69E-04	1.49E-04
220	5.32E-05	1.62E-05	5.67E-05	1.06E-04	1.45E-04	1.74E-04	1.96E-04	2.10E-04	2.16E-04	2.15E-04	2.07E-04	1.91E-04
290	6.23E-05	3.75E-05	1.15E-04	1.93E-04	2.58E-04	3.13E-04	3.60E-04	4.00E-04	4.32E-04	4.57E-04	4.74E-04	4.84E-04
400	8.43E-05	8.31E-05	2.09E-04	3.31E-04	4.36E-04	5.32E-04	6.20E-04	6.99E-04	7.72E-04	8.37E-04	8.95E-04	9.45E-04
500	1.09E-04	1.28E-04	2.96E-04	4.57E-04	5.99E-04	7.32E-04	8.55E-04	9.72E-04	1.08E-03	1.18E-03	1.28E-03	1.36E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S98** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 113.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.13E-05	6.57E-05	6.57E-05	6.59E-05								
20	6.02E-05	7.47E-05	8.00E-05	8.04E-05								
40	4.88E-05	6.01E-05	7.99E-05	1.02E-04	1.09E-04	1.10E-04						
50	4.33E-05	5.00E-05	6.54E-05	8.99E-05	1.15E-04	1.24E-04						
90	2.43E-05	1.21E-05	8.86E-06	1.46E-05	2.97E-05	5.40E-05	8.75E-05	1.30E-04	1.69E-04	1.83E-04	1.83E-04	1.83E-04
130	1.69E-05	2.26E-05	4.55E-05	5.87E-05	6.23E-05	5.65E-05	4.15E-05	1.75E-05	1.55E-05	5.78E-05	1.09E-04	1.70E-04
190	3.67E-05	7.98E-05	1.32E-04	1.73E-04	2.03E-04	2.25E-04	2.37E-04	2.40E-04	2.33E-04	2.18E-04	1.94E-04	1.61E-04
210	4.65E-05	9.95E-05	1.61E-04	2.11E-04	2.51E-04	2.81E-04	3.02E-04	3.14E-04	3.17E-04	3.11E-04	2.95E-04	2.71E-04
220	5.17E-05	1.09E-04	1.76E-04	2.30E-04	2.74E-04	3.09E-04	3.35E-04	3.51E-04	3.58E-04	3.57E-04	3.46E-04	3.26E-04
290	9.02E-05	1.80E-04	2.78E-04	3.64E-04	4.40E-04	5.06E-04	5.63E-04	6.11E-04	6.50E-04	6.80E-04	7.01E-04	7.13E-04
400	1.55E-04	2.92E-04	4.40E-04	5.75E-04	7.01E-04	8.16E-04	9.22E-04	1.02E-03	1.11E-03	1.19E-03	1.26E-03	1.32E-03
500	2.15E-04	3.94E-04	5.88E-04	7.68E-04	9.38E-04	1.10E-03	1.25E-03	1.39E-03	1.53E-03	1.65E-03	1.77E-03	1.87E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S99** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150 µm anode aperture, 126.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.02E-05	6.57E-05	6.57E-05	6.59E-05								
20	5.58E-05	7.33E-05	8.00E-05	8.04E-05								
40	3.61E-05	4.96E-05	7.34E-05	9.97E-05	1.09E-04	1.10E-04						
50	2.67E-05	3.45E-05	5.31E-05	8.24E-05	1.13E-04	1.24E-04						
90	1.44E-05	2.29E-05	2.68E-05	1.97E-05	1.91E-06	2.71E-05	6.73E-05	1.18E-04	1.66E-04	1.83E-04	1.83E-04	1.83E-04
130	5.06E-05	8.28E-05	1.08E-04	1.23E-04	1.26E-04	1.19E-04	1.00E-04	7.13E-05	3.13E-05	1.95E-05	8.14E-05	1.54E-04
190	1.11E-04	1.75E-04	2.32E-04	2.79E-04	3.15E-04	3.40E-04	3.54E-04	3.57E-04	3.49E-04	3.31E-04	3.02E-04	2.62E-04
210	1.31E-04	2.05E-04	2.74E-04	3.31E-04	3.78E-04	4.13E-04	4.38E-04	4.52E-04	4.56E-04	4.48E-04	4.30E-04	4.00E-04
220	1.42E-04	2.21E-04	2.94E-04	3.58E-04	4.09E-04	4.50E-04	4.80E-04	5.00E-04	5.09E-04	5.07E-04	4.94E-04	4.70E-04
290	2.14E-04	3.29E-04	4.39E-04	5.40E-04	6.30E-04	7.08E-04	7.76E-04	8.34E-04	8.80E-04	9.16E-04	9.41E-04	9.56E-04
400	3.29E-04	5.00E-04	6.68E-04	8.28E-04	9.76E-04	1.11E-03	1.24E-03	1.36E-03	1.46E-03	1.56E-03	1.65E-03	1.72E-03
500	4.35E-04	6.55E-04	8.76E-04	1.09E-03	1.29E-03	1.48E-03	1.66E-03	1.83E-03	2.00E-03	2.15E-03	2.29E-03	2.41E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S100** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 0.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04
20	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04
40	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04	2.47E-04
50	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04
90	4.11E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04
130	5.43E-04	5.43E-04	5.43E-04	5.43E-04	5.43E-04	5.43E-04	5.43E-04	5.43E-04	5.43E-04	5.43E-04	5.43E-04	5.43E-04
190	7.41E-04	7.41E-04	7.41E-04	7.41E-04	7.41E-04	7.41E-04	7.41E-04	7.41E-04	7.41E-04	7.41E-04	7.41E-04	7.41E-04
210	8.07E-04	8.07E-04	8.07E-04	8.07E-04	8.07E-04	8.07E-04	8.07E-04	8.07E-04	8.07E-04	8.07E-04	8.07E-04	8.07E-04
220	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04
290	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03
400	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03
500	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S101** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 12.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04
20	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04	1.82E-04
40	2.46E-04	2.46E-04	2.47E-04									
50	2.78E-04	2.78E-04	2.78E-04	2.79E-04	2.80E-04							
90	4.07E-04	4.06E-04	4.06E-04	4.06E-04	4.07E-04	4.08E-04	4.09E-04	4.10E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04
130	5.36E-04	5.35E-04	5.34E-04	5.34E-04	5.34E-04	5.34E-04	5.34E-04	5.35E-04	5.36E-04	5.37E-04	5.39E-04	5.41E-04
190	7.30E-04	7.28E-04	7.26E-04	7.25E-04	7.24E-04	7.24E-04	7.23E-04	7.23E-04	7.23E-04	7.24E-04	7.25E-04	7.26E-04
210	7.95E-04	7.92E-04	7.90E-04	7.89E-04	7.88E-04	7.87E-04	7.86E-04	7.86E-04	7.86E-04	7.86E-04	7.86E-04	7.87E-04
220	8.27E-04	8.24E-04	8.22E-04	8.21E-04	8.20E-04	8.18E-04	8.18E-04	8.17E-04	8.17E-04	8.17E-04	8.17E-04	8.18E-04
290	1.05E-03	1.05E-03	1.05E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.04E-03	1.03E-03	1.03E-03	1.03E-03
400	1.41E-03	1.40E-03	1.40E-03	1.40E-03	1.39E-03	1.39E-03	1.39E-03	1.38E-03	1.38E-03	1.38E-03	1.38E-03	1.37E-03
500	1.74E-03	1.73E-03	1.72E-03	1.72E-03	1.71E-03	1.71E-03	1.70E-03	1.70E-03	1.69E-03	1.69E-03	1.69E-03	1.68E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S102** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture, 25.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04	1.49E-04
20	1.80E-04	1.81E-04	1.82E-04									
40	2.40E-04	2.41E-04	2.44E-04	2.46E-04	2.47E-04							
50	2.70E-04	2.71E-04	2.73E-04	2.76E-04	2.79E-04	2.80E-04						
90	3.91E-04	3.90E-04	3.90E-04	3.91E-04	3.93E-04	3.96E-04	4.00E-04	4.05E-04	4.10E-04	4.11E-04	4.11E-04	4.11E-04
130	5.13E-04	5.09E-04	5.07E-04	5.06E-04	5.05E-04	5.06E-04	5.08E-04	5.11E-04	5.15E-04	5.21E-04	5.27E-04	5.35E-04
190	6.95E-04	6.89E-04	6.83E-04	6.78E-04	6.75E-04	6.72E-04	6.71E-04	6.70E-04	6.71E-04	6.73E-04	6.76E-04	6.80E-04
210	7.56E-04	7.49E-04	7.42E-04	7.36E-04	7.31E-04	7.28E-04	7.25E-04	7.24E-04	7.23E-04	7.24E-04	7.26E-04	7.29E-04
220	7.87E-04	7.79E-04	7.71E-04	7.65E-04	7.59E-04	7.55E-04	7.52E-04	7.50E-04	7.49E-04	7.50E-04	7.51E-04	7.54E-04
290	1.00E-03	9.88E-04	9.77E-04	9.67E-04	9.57E-04	9.49E-04	9.42E-04	9.36E-04	9.32E-04	9.28E-04	9.26E-04	9.24E-04
400	1.34E-03	1.32E-03	1.30E-03	1.28E-03	1.27E-03	1.25E-03	1.24E-03	1.23E-03	1.22E-03	1.21E-03	1.20E-03	1.19E-03
500	1.64E-03	1.62E-03	1.59E-03	1.57E-03	1.55E-03	1.53E-03	1.51E-03	1.50E-03	1.48E-03	1.46E-03	1.45E-03	1.44E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S103** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 37.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.48E-04	1.49E-04										
20	1.77E-04	1.81E-04	1.82E-04									
40	2.31E-04	2.34E-04	2.40E-04	2.45E-04	2.47E-04							
50	2.58E-04	2.60E-04	2.64E-04	2.71E-04	2.78E-04	2.80E-04						
90	3.67E-04	3.64E-04	3.63E-04	3.65E-04	3.69E-04	3.76E-04	3.86E-04	3.97E-04	4.08E-04	4.11E-04	4.11E-04	4.11E-04
130	4.76E-04	4.68E-04	4.62E-04	4.59E-04	4.59E-04	4.61E-04	4.65E-04	4.72E-04	4.81E-04	4.93E-04	5.07E-04	5.24E-04
190	6.40E-04	6.25E-04	6.12E-04	6.01E-04	5.93E-04	5.87E-04	5.84E-04	5.84E-04	5.86E-04	5.90E-04	5.97E-04	6.06E-04
210	6.95E-04	6.77E-04	6.61E-04	6.48E-04	6.38E-04	6.30E-04	6.24E-04	6.21E-04	6.20E-04	6.22E-04	6.27E-04	6.33E-04
220	7.22E-04	7.03E-04	6.86E-04	6.72E-04	6.60E-04	6.51E-04	6.44E-04	6.40E-04	6.38E-04	6.38E-04	6.42E-04	6.47E-04
290	9.14E-04	8.86E-04	8.61E-04	8.38E-04	8.18E-04	8.00E-04	7.84E-04	7.71E-04	7.60E-04	7.52E-04	7.46E-04	7.43E-04
400	1.22E-03	1.17E-03	1.14E-03	1.10E-03	1.07E-03	1.03E-03	1.00E-03	9.77E-04	9.53E-04	9.31E-04	9.12E-04	8.95E-04
500	1.49E-03	1.44E-03	1.39E-03	1.34E-03	1.29E-03	1.25E-03	1.20E-03	1.17E-03	1.13E-03	1.09E-03	1.06E-03	1.03E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S104** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 50.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.47E-04	1.49E-04										
20	1.73E-04	1.79E-04	1.82E-04									
40	2.18E-04	2.24E-04	2.34E-04	2.44E-04	2.47E-04							
50	2.41E-04	2.44E-04	2.52E-04	2.64E-04	2.76E-04	2.80E-04						
90	3.33E-04	3.27E-04	3.26E-04	3.30E-04	3.37E-04	3.49E-04	3.66E-04	3.87E-04	4.05E-04	4.11E-04	4.11E-04	4.11E-04
130	4.25E-04	4.11E-04	4.01E-04	3.96E-04	3.94E-04	3.98E-04	4.05E-04	4.17E-04	4.34E-04	4.55E-04	4.80E-04	5.09E-04
190	5.63E-04	5.36E-04	5.13E-04	4.95E-04	4.81E-04	4.71E-04	4.65E-04	4.64E-04	4.67E-04	4.75E-04	4.87E-04	5.03E-04
210	6.10E-04	5.78E-04	5.51E-04	5.28E-04	5.09E-04	4.95E-04	4.85E-04	4.80E-04	4.79E-04	4.82E-04	4.90E-04	5.01E-04
220	6.33E-04	5.99E-04	5.70E-04	5.45E-04	5.24E-04	5.07E-04	4.95E-04	4.88E-04	4.84E-04	4.85E-04	4.91E-04	5.01E-04
290	7.95E-04	7.46E-04	7.02E-04	6.61E-04	6.25E-04	5.93E-04	5.66E-04	5.43E-04	5.24E-04	5.10E-04	5.00E-04	4.94E-04
400	1.05E-03	9.78E-04	9.09E-04	8.45E-04	7.85E-04	7.29E-04	6.78E-04	6.31E-04	5.88E-04	5.49E-04	5.15E-04	4.86E-04
500	1.28E-03	1.19E-03	1.10E-03	1.01E-03	9.31E-04	8.53E-04	7.80E-04	7.11E-04	6.47E-04	5.86E-04	5.30E-04	4.79E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S105** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 63.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.47E-04	1.49E-04										
20	1.68E-04	1.78E-04	1.82E-04									
40	2.03E-04	2.11E-04	2.26E-04	2.42E-04	2.47E-04							
50	2.20E-04	2.25E-04	2.37E-04	2.55E-04	2.74E-04	2.80E-04						
90	2.90E-04	2.81E-04	2.80E-04	2.85E-04	2.97E-04	3.16E-04	3.41E-04	3.73E-04	4.02E-04	4.11E-04	4.11E-04	4.11E-04
130	3.61E-04	3.39E-04	3.24E-04	3.15E-04	3.14E-04	3.19E-04	3.30E-04	3.49E-04	3.74E-04	4.06E-04	4.45E-04	4.90E-04
190	4.68E-04	4.25E-04	3.90E-04	3.61E-04	3.39E-04	3.24E-04	3.16E-04	3.14E-04	3.19E-04	3.30E-04	3.49E-04	3.74E-04
210	5.04E-04	4.54E-04	4.12E-04	3.77E-04	3.48E-04	3.26E-04	3.11E-04	3.02E-04	3.00E-04	3.05E-04	3.17E-04	3.35E-04
220	5.22E-04	4.69E-04	4.23E-04	3.85E-04	3.53E-04	3.27E-04	3.08E-04	2.96E-04	2.91E-04	2.93E-04	3.01E-04	3.16E-04
290	6.47E-04	5.70E-04	5.02E-04	4.40E-04	3.84E-04	3.35E-04	2.93E-04	2.57E-04	2.28E-04	2.06E-04	1.91E-04	1.82E-04
400	8.45E-04	7.31E-04	6.26E-04	5.27E-04	4.35E-04	3.50E-04	2.71E-04	1.99E-04	1.34E-04	7.66E-05	2.70E-05	1.80E-05
500	1.02E-03	8.78E-04	7.40E-04	6.08E-04	4.83E-04	3.66E-04	2.55E-04	1.52E-04	6.03E-05	2.62E-05	1.10E-04	1.96E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S106** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 75.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.45E-04	1.49E-04										
20	1.62E-04	1.76E-04	1.82E-04									
40	1.83E-04	1.95E-04	2.17E-04	2.39E-04	2.47E-04							
50	1.94E-04	2.01E-04	2.18E-04	2.45E-04	2.71E-04	2.80E-04						
90	2.39E-04	2.27E-04	2.25E-04	2.32E-04	2.49E-04	2.75E-04	3.11E-04	3.56E-04	3.97E-04	4.11E-04	4.11E-04	4.11E-04
130	2.84E-04	2.53E-04	2.32E-04	2.20E-04	2.17E-04	2.24E-04	2.41E-04	2.67E-04	3.03E-04	3.49E-04	4.04E-04	4.68E-04
190	3.53E-04	2.93E-04	2.44E-04	2.03E-04	1.72E-04	1.50E-04	1.38E-04	1.35E-04	1.42E-04	1.59E-04	1.85E-04	2.20E-04
210	3.76E-04	3.07E-04	2.48E-04	1.98E-04	1.57E-04	1.26E-04	1.04E-04	9.18E-05	8.90E-05	9.57E-05	1.12E-04	1.38E-04
220	3.88E-04	3.14E-04	2.50E-04	1.95E-04	1.50E-04	1.14E-04	8.76E-05	7.04E-05	6.27E-05	6.45E-05	7.59E-05	9.70E-05
290	4.70E-04	3.63E-04	2.67E-04	1.80E-04	1.03E-04	3.74E-05	1.99E-05	7.11E-05	1.15E-04	1.50E-04	1.73E-04	1.87E-04
400	6.00E-04	4.42E-04	2.96E-04	1.62E-04	4.71E-05	6.82E-05	1.91E-04	3.06E-04	4.07E-04	4.96E-04	5.73E-04	6.40E-04
500	7.18E-04	5.15E-04	3.26E-04	1.53E-04	3.70E-05	1.73E-04	3.55E-04	5.23E-04	6.74E-04	8.12E-04	9.38E-04	1.05E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S107** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 88.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.44E-04	1.49E-04										
20	1.54E-04	1.74E-04	1.82E-04									
40	1.61E-04	1.77E-04	2.06E-04	2.36E-04	2.47E-04							
50	1.65E-04	1.75E-04	1.97E-04	2.32E-04	2.67E-04	2.80E-04						
90	1.80E-04	1.64E-04	1.61E-04	1.71E-04	1.93E-04	2.29E-04	2.77E-04	3.37E-04	3.92E-04	4.11E-04	4.11E-04	4.11E-04
130	1.97E-04	1.55E-04	1.27E-04	1.11E-04	1.07E-04	1.17E-04	1.39E-04	1.74E-04	2.22E-04	2.83E-04	3.56E-04	4.42E-04
190	2.24E-04	1.45E-04	7.93E-05	2.72E-05	1.38E-05	4.35E-05	6.16E-05	6.64E-05	5.80E-05	3.66E-05	2.86E-06	4.46E-05
210	2.33E-04	1.42E-04	6.53E-05	8.98E-06	5.19E-05	9.75E-05	1.29E-04	1.47E-04	1.52E-04	1.43E-04	1.21E-04	8.67E-05
220	2.38E-04	1.41E-04	5.88E-05	1.27E-05	7.21E-05	1.25E-04	1.63E-04	1.88E-04	1.99E-04	1.96E-04	1.81E-04	1.53E-04
290	2.73E-04	1.35E-04	2.74E-05	9.85E-05	2.17E-04	3.18E-04	4.03E-04	4.73E-04	5.29E-04	5.71E-04	6.01E-04	6.17E-04
400	3.31E-04	1.36E-04	5.68E-05	2.51E-04	4.50E-04	6.24E-04	7.81E-04	9.22E-04	1.05E-03	1.16E-03	1.26E-03	1.35E-03
500	3.86E-04	1.45E-04	1.16E-04	3.92E-04	6.62E-04	9.03E-04	1.13E-03	1.33E-03	1.52E-03	1.70E-03	1.86E-03	2.01E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S108** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 100.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.42E-04	1.49E-04										
20	1.46E-04	1.72E-04	1.82E-04									
40	1.36E-04	1.57E-04	1.94E-04	2.33E-04	2.47E-04							
50	1.32E-04	1.44E-04	1.73E-04	2.18E-04	2.64E-04	2.80E-04						
90	1.15E-04	9.49E-05	9.08E-05	1.03E-04	1.32E-04	1.77E-04	2.38E-04	3.15E-04	3.86E-04	4.11E-04	4.11E-04	4.11E-04
130	1.02E-04	4.90E-05	1.35E-05	8.12E-06	1.30E-05	2.66E-06	2.55E-05	7.00E-05	1.31E-04	2.09E-04	3.03E-04	4.12E-04
190	8.97E-05	1.80E-05	9.88E-05	1.75E-04	2.32E-04	2.70E-04	2.92E-04	2.96E-04	2.85E-04	2.56E-04	2.12E-04	1.51E-04
210	8.81E-05	3.30E-05	1.38E-04	2.32E-04	3.06E-04	3.61E-04	3.98E-04	4.19E-04	4.24E-04	4.12E-04	3.83E-04	3.39E-04
220	8.77E-05	4.21E-05	1.58E-04	2.61E-04	3.42E-04	4.06E-04	4.52E-04	4.81E-04	4.93E-04	4.90E-04	4.69E-04	4.33E-04
290	9.35E-05	1.14E-04	2.99E-04	4.62E-04	6.01E-04	7.22E-04	8.25E-04	9.11E-04	9.81E-04	1.03E-03	1.07E-03	1.09E-03
400	1.25E-04	2.36E-04	5.22E-04	7.78E-04	1.01E-03	1.22E-03	1.41E-03	1.59E-03	1.75E-03	1.89E-03	2.02E-03	2.13E-03
500	1.66E-04	3.51E-04	7.25E-04	1.07E-03	1.38E-03	1.67E-03	1.95E-03	2.20E-03	2.44E-03	2.67E-03	2.88E-03	3.07E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S109** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 113.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.39E-04	1.49E-04										
20	1.37E-04	1.69E-04	1.82E-04									
40	1.09E-04	1.35E-04	1.80E-04	2.29E-04	2.47E-04							
50	9.60E-05	1.12E-04	1.47E-04	2.03E-04	2.59E-04	2.79E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04
90	4.74E-05	2.08E-05	1.51E-05	2.95E-05	6.46E-05	1.20E-04	1.96E-04	2.91E-04	3.80E-04	4.10E-04	4.11E-04	4.11E-04
130	3.17E-05	6.57E-05	1.14E-04	1.41E-04	1.47E-04	1.33E-04	9.75E-05	4.24E-05	3.25E-05	1.28E-04	2.44E-04	3.79E-04
190	9.47E-05	2.03E-04	3.14E-04	4.02E-04	4.69E-04	5.14E-04	5.40E-04	5.45E-04	5.30E-04	4.94E-04	4.39E-04	3.63E-04
210	1.20E-04	2.50E-04	3.81E-04	4.90E-04	5.76E-04	6.42E-04	6.87E-04	7.12E-04	7.17E-04	7.02E-04	6.67E-04	6.12E-04
220	1.34E-04	2.73E-04	4.15E-04	5.33E-04	6.30E-04	7.05E-04	7.61E-04	7.96E-04	8.11E-04	8.06E-04	7.81E-04	7.36E-04
290	2.28E-04	4.36E-04	6.50E-04	8.39E-04	1.01E-03	1.15E-03	1.28E-03	1.38E-03	1.47E-03	1.53E-03	1.58E-03	1.60E-03
400	3.80E-04	6.94E-04	1.02E-03	1.32E-03	1.60E-03	1.85E-03	2.09E-03	2.31E-03	2.50E-03	2.68E-03	2.83E-03	2.97E-03
500	5.20E-04	9.29E-04	1.36E-03	1.76E-03	2.13E-03	2.49E-03	2.83E-03	3.14E-03	3.44E-03	3.72E-03	3.97E-03	4.21E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S110** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400 µm anode aperture, 126.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.37E-04	1.49E-04										
20	1.26E-04	1.66E-04	1.81E-04	1.82E-04								
40	8.05E-05	1.12E-04	1.66E-04	2.25E-04	2.47E-04							
50	5.80E-05	7.66E-05	1.19E-04	1.86E-04	2.54E-04	2.79E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04	2.80E-04
90	3.80E-05	5.93E-05	6.61E-05	4.84E-05	6.67E-06	5.95E-05	1.50E-04	2.65E-04	3.73E-04	4.10E-04	4.11E-04	4.11E-04
130	1.27E-04	1.99E-04	2.54E-04	2.84E-04	2.90E-04	2.72E-04	2.30E-04	1.63E-04	7.25E-05	4.21E-05	1.81E-04	3.44E-04
190	2.67E-04	4.10E-04	5.37E-04	6.39E-04	7.18E-04	7.72E-04	8.02E-04	8.07E-04	7.89E-04	7.47E-04	6.80E-04	5.89E-04
210	3.15E-04	4.80E-04	6.31E-04	7.58E-04	8.60E-04	9.38E-04	9.92E-04	1.02E-03	1.03E-03	1.01E-03	9.67E-04	9.01E-04
220	3.38E-04	5.15E-04	6.78E-04	8.17E-04	9.31E-04	1.02E-03	1.09E-03	1.13E-03	1.15E-03	1.14E-03	1.11E-03	1.06E-03
290	5.04E-04	7.62E-04	1.01E-03	1.23E-03	1.43E-03	1.60E-03	1.75E-03	1.88E-03	1.98E-03	2.06E-03	2.12E-03	2.15E-03
400	7.66E-04	1.15E-03	1.53E-03	1.88E-03	2.21E-03	2.52E-03	2.80E-03	3.06E-03	3.30E-03	3.51E-03	3.70E-03	3.86E-03
500	1.00E-03	1.50E-03	2.00E-03	2.48E-03	2.93E-03	3.35E-03	3.76E-03	4.14E-03	4.49E-03	4.83E-03	5.13E-03	5.42E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S111** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 0.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05
20	7.13E-05	7.13E-05	7.13E-05	7.13E-05	7.13E-05	7.13E-05	7.13E-05	7.13E-05	7.13E-05	7.13E-05	7.13E-05	7.13E-05
40	9.14E-05	9.14E-05	9.14E-05	9.14E-05	9.14E-05	9.14E-05	9.14E-05	9.14E-05	9.14E-05	9.14E-05	9.14E-05	9.14E-05
50	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	1.42E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04
130	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.84E-04
190	2.46E-04	2.46E-04	2.46E-04	2.46E-04	2.46E-04	2.46E-04	2.46E-04	2.46E-04	2.46E-04	2.46E-04	2.46E-04	2.46E-04
210	2.67E-04	2.67E-04	2.67E-04	2.67E-04	2.67E-04	2.67E-04	2.67E-04	2.67E-04	2.67E-04	2.67E-04	2.67E-04	2.67E-04
220	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04	2.77E-04
290	3.51E-04	3.51E-04	3.51E-04	3.51E-04	3.51E-04	3.51E-04	3.51E-04	3.51E-04	3.51E-04	3.51E-04	3.51E-04	3.51E-04
400	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04
500	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S112** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 12.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05	6.14E-05
20	7.11E-05	7.13E-05										
40	9.06E-05	9.08E-05	9.11E-05	9.13E-05	9.14E-05							
50	1.00E-04	1.01E-04	1.01E-04	1.01E-04	1.01E-04	1.02E-04						
90	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.41E-04	1.41E-04	1.41E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04
130	1.81E-04	1.80E-04	1.80E-04	1.80E-04	1.80E-04	1.80E-04	1.81E-04	1.81E-04	1.81E-04	1.82E-04	1.82E-04	1.83E-04
190	2.41E-04	2.41E-04	2.41E-04	2.40E-04	2.41E-04							
210	2.62E-04	2.61E-04	2.61E-04	2.60E-04								
220	2.72E-04	2.71E-04	2.71E-04	2.70E-04								
290	3.44E-04	3.43E-04	3.42E-04	3.41E-04	3.41E-04	3.40E-04	3.39E-04	3.39E-04	3.39E-04	3.39E-04	3.38E-04	3.38E-04
400	4.57E-04	4.55E-04	4.54E-04	4.53E-04	4.52E-04	4.51E-04	4.50E-04	4.49E-04	4.48E-04	4.47E-04	4.47E-04	4.46E-04
500	5.60E-04	5.58E-04	5.57E-04	5.55E-04	5.53E-04	5.52E-04	5.50E-04	5.49E-04	5.48E-04	5.47E-04	5.46E-04	5.45E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S113** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 25.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.12E-05	6.14E-05										
20	7.03E-05	7.11E-05	7.13E-05									
40	8.83E-05	8.90E-05	9.01E-05	9.10E-05	9.14E-05							
50	9.74E-05	9.79E-05	9.88E-05	1.00E-04	1.01E-04	1.01E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	1.34E-04	1.34E-04	1.34E-04	1.35E-04	1.36E-04	1.37E-04	1.38E-04	1.40E-04	1.42E-04	1.42E-04	1.42E-04	1.42E-04
130	1.71E-04	1.71E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.71E-04	1.72E-04	1.74E-04	1.76E-04	1.78E-04	1.81E-04
190	2.28E-04	2.26E-04	2.24E-04	2.23E-04	2.22E-04	2.22E-04	2.21E-04	2.22E-04	2.22E-04	2.23E-04	2.24E-04	2.26E-04
210	2.47E-04	2.44E-04	2.42E-04	2.41E-04	2.40E-04	2.39E-04	2.38E-04	2.38E-04	2.38E-04	2.39E-04	2.39E-04	2.41E-04
220	2.56E-04	2.54E-04	2.52E-04	2.50E-04	2.48E-04	2.47E-04	2.47E-04	2.46E-04	2.46E-04	2.46E-04	2.47E-04	2.48E-04
290	3.22E-04	3.19E-04	3.16E-04	3.13E-04	3.10E-04	3.08E-04	3.06E-04	3.04E-04	3.03E-04	3.02E-04	3.01E-04	3.01E-04
400	4.27E-04	4.22E-04	4.17E-04	4.12E-04	4.08E-04	4.03E-04	4.00E-04	3.96E-04	3.93E-04	3.90E-04	3.87E-04	3.85E-04
500	5.23E-04	5.16E-04	5.09E-04	5.03E-04	4.97E-04	4.91E-04	4.85E-04	4.80E-04	4.75E-04	4.70E-04	4.66E-04	4.62E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S114** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 37.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.09E-05	6.14E-05										
20	6.91E-05	7.07E-05	7.13E-05									
40	8.45E-05	8.61E-05	8.84E-05	9.06E-05	9.14E-05							
50	9.23E-05	9.35E-05	9.55E-05	9.81E-05	1.01E-04	1.01E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	1.24E-04	1.24E-04	1.24E-04	1.25E-04	1.27E-04	1.30E-04	1.33E-04	1.37E-04	1.41E-04	1.42E-04	1.42E-04	1.42E-04
130	1.56E-04	1.54E-04	1.53E-04	1.53E-04	1.53E-04	1.54E-04	1.56E-04	1.59E-04	1.62E-04	1.66E-04	1.71E-04	1.77E-04
190	2.05E-04	2.01E-04	1.98E-04	1.95E-04	1.93E-04	1.92E-04	1.91E-04	1.91E-04	1.92E-04	1.94E-04	1.97E-04	2.00E-04
210	2.21E-04	2.17E-04	2.12E-04	2.09E-04	2.06E-04	2.04E-04	2.03E-04	2.02E-04	2.03E-04	2.04E-04	2.06E-04	2.08E-04
220	2.30E-04	2.25E-04	2.20E-04	2.16E-04	2.13E-04	2.10E-04	2.09E-04	2.08E-04	2.08E-04	2.08E-04	2.10E-04	2.12E-04
290	2.87E-04	2.80E-04	2.73E-04	2.66E-04	2.60E-04	2.55E-04	2.51E-04	2.47E-04	2.44E-04	2.42E-04	2.41E-04	2.40E-04
400	3.79E-04	3.67E-04	3.56E-04	3.45E-04	3.35E-04	3.26E-04	3.17E-04	3.09E-04	3.02E-04	2.95E-04	2.90E-04	2.85E-04
500	4.63E-04	4.48E-04	4.32E-04	4.18E-04	4.04E-04	3.91E-04	3.78E-04	3.66E-04	3.55E-04	3.45E-04	3.35E-04	3.26E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S115** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 50.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.05E-05	6.14E-05										
20	6.74E-05	7.03E-05	7.13E-05									
40	7.92E-05	8.21E-05	8.61E-05	9.00E-05	9.13E-05	9.14E-05						
50	8.53E-05	8.74E-05	9.08E-05	9.55E-05	1.00E-04	1.01E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	1.10E-04	1.09E-04	1.10E-04	1.12E-04	1.15E-04	1.20E-04	1.26E-04	1.34E-04	1.40E-04	1.42E-04	1.42E-04	1.42E-04
130	1.35E-04	1.32E-04	1.30E-04	1.29E-04	1.30E-04	1.32E-04	1.35E-04	1.40E-04	1.46E-04	1.53E-04	1.62E-04	1.72E-04
190	1.74E-04	1.67E-04	1.61E-04	1.56E-04	1.52E-04	1.50E-04	1.49E-04	1.50E-04	1.52E-04	1.55E-04	1.59E-04	1.65E-04
210	1.87E-04	1.79E-04	1.71E-04	1.65E-04	1.60E-04	1.56E-04	1.54E-04	1.53E-04	1.54E-04	1.56E-04	1.59E-04	1.63E-04
220	1.94E-04	1.85E-04	1.76E-04	1.70E-04	1.64E-04	1.60E-04	1.57E-04	1.55E-04	1.55E-04	1.56E-04	1.58E-04	1.62E-04
290	2.40E-04	2.26E-04	2.13E-04	2.02E-04	1.92E-04	1.82E-04	1.75E-04	1.68E-04	1.63E-04	1.59E-04	1.57E-04	1.56E-04
400	3.13E-04	2.93E-04	2.73E-04	2.54E-04	2.36E-04	2.20E-04	2.04E-04	1.90E-04	1.78E-04	1.66E-04	1.56E-04	1.48E-04
500	3.81E-04	3.54E-04	3.28E-04	3.02E-04	2.78E-04	2.55E-04	2.33E-04	2.12E-04	1.93E-04	1.75E-04	1.58E-04	1.42E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S116** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 63.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	6.01E-05	6.14E-05										
20	6.53E-05	6.97E-05	7.13E-05									
40	7.28E-05	7.70E-05	8.32E-05	8.92E-05	9.13E-05	9.14E-05						
50	7.66E-05	7.98E-05	8.50E-05	9.22E-05	9.91E-05	1.01E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	9.25E-05	9.15E-05	9.26E-05	9.57E-05	1.01E-04	1.08E-04	1.17E-04	1.29E-04	1.39E-04	1.42E-04	1.42E-04	1.42E-04
130	1.09E-04	1.04E-04	1.01E-04	9.98E-05	1.01E-04	1.04E-04	1.09E-04	1.16E-04	1.25E-04	1.37E-04	1.50E-04	1.66E-04
190	1.35E-04	1.24E-04	1.15E-04	1.07E-04	1.02E-04	9.83E-05	9.69E-05	9.76E-05	1.00E-04	1.05E-04	1.12E-04	1.22E-04
210	1.44E-04	1.31E-04	1.20E-04	1.10E-04	1.02E-04	9.69E-05	9.33E-05	9.18E-05	9.25E-05	9.52E-05	1.00E-04	1.07E-04
220	1.49E-04	1.35E-04	1.22E-04	1.12E-04	1.03E-04	9.62E-05	9.16E-05	8.90E-05	8.86E-05	9.02E-05	9.40E-05	9.99E-05
290	1.81E-04	1.60E-04	1.40E-04	1.23E-04	1.07E-04	9.27E-05	8.07E-05	7.07E-05	6.27E-05	5.67E-05	5.28E-05	5.09E-05
400	2.33E-04	2.02E-04	1.71E-04	1.43E-04	1.16E-04	9.14E-05	6.88E-05	4.83E-05	3.02E-05	1.51E-05	7.79E-06	1.63E-05
500	2.82E-04	2.41E-04	2.01E-04	1.63E-04	1.27E-04	9.42E-05	6.37E-05	3.72E-05	1.86E-05	2.43E-05	5.01E-05	7.88E-05

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S117** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 75.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.95E-05	6.14E-05										
20	6.26E-05	6.90E-05	7.13E-05									
40	6.48E-05	7.08E-05	7.97E-05	8.83E-05	9.13E-05	9.14E-05						
50	6.60E-05	7.06E-05	7.80E-05	8.83E-05	9.81E-05	1.01E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	7.16E-05	7.03E-05	7.17E-05	7.61E-05	8.34E-05	9.36E-05	1.07E-04	1.23E-04	1.37E-04	1.42E-04	1.42E-04	1.42E-04
130	7.83E-05	7.11E-05	6.65E-05	6.48E-05	6.60E-05	7.02E-05	7.74E-05	8.75E-05	1.01E-04	1.17E-04	1.36E-04	1.58E-04
190	9.02E-05	7.45E-05	6.11E-05	5.05E-05	4.25E-05	3.74E-05	3.53E-05	3.60E-05	3.98E-05	4.66E-05	5.65E-05	6.95E-05
210	9.46E-05	7.61E-05	6.00E-05	4.65E-05	3.56E-05	2.76E-05	2.23E-05	1.99E-05	2.04E-05	2.40E-05	3.06E-05	4.04E-05
220	9.68E-05	7.71E-05	5.95E-05	4.46E-05	3.24E-05	2.30E-05	1.63E-05	1.24E-05	1.13E-05	1.31E-05	1.80E-05	2.60E-05
290	1.14E-04	8.49E-05	5.85E-05	3.54E-05	1.67E-05	1.07E-05	2.45E-05	4.05E-05	5.39E-05	6.36E-05	7.00E-05	7.30E-05
400	1.43E-04	1.01E-04	6.40E-05	3.46E-05	2.74E-05	5.66E-05	9.65E-05	1.32E-04	1.64E-04	1.91E-04	2.15E-04	2.35E-04
500	1.72E-04	1.20E-04	7.48E-05	4.58E-05	5.66E-05	1.08E-04	1.66E-04	2.19E-04	2.67E-04	3.09E-04	3.48E-04	3.83E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S118** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 88.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.88E-05	6.13E-05	6.14E-05									
20	5.95E-05	6.81E-05	7.12E-05	7.13E-05								
40	5.57E-05	6.38E-05	7.56E-05	8.72E-05	9.13E-05	9.14E-05						
50	5.39E-05	6.00E-05	6.99E-05	8.36E-05	9.68E-05	1.01E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	4.78E-05	4.60E-05	4.78E-05	5.36E-05	6.33E-05	7.70E-05	9.47E-05	1.16E-04	1.36E-04	1.42E-04	1.42E-04	1.42E-04
130	4.37E-05	3.41E-05	2.78E-05	2.53E-05	2.66E-05	3.20E-05	4.15E-05	5.50E-05	7.25E-05	9.41E-05	1.20E-04	1.49E-04
190	4.18E-05	2.23E-05	8.55E-06	1.18E-05	2.28E-05	3.07E-05	3.42E-05	3.35E-05	2.86E-05	1.97E-05	6.82E-06	1.01E-05
210	4.22E-05	2.05E-05	1.02E-05	2.35E-05	4.01E-05	5.25E-05	6.02E-05	6.36E-05	6.26E-05	5.76E-05	4.85E-05	3.54E-05
220	4.26E-05	2.01E-05	1.27E-05	2.98E-05	4.90E-05	6.35E-05	7.33E-05	7.87E-05	7.98E-05	7.68E-05	6.96E-05	5.85E-05
290	4.88E-05	2.53E-05	3.97E-05	7.76E-05	1.13E-04	1.42E-04	1.66E-04	1.86E-04	2.01E-04	2.12E-04	2.19E-04	2.21E-04
400	6.67E-05	5.07E-05	9.31E-05	1.57E-04	2.17E-04	2.68E-04	3.14E-04	3.56E-04	3.92E-04	4.25E-04	4.54E-04	4.79E-04
500	8.84E-05	8.10E-05	1.45E-04	2.32E-04	3.12E-04	3.84E-04	4.49E-04	5.11E-04	5.67E-04	6.20E-04	6.68E-04	7.13E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S119** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 100.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.79E-05	6.13E-05	6.14E-05									
20	5.60E-05	6.72E-05	7.12E-05	7.13E-05								
40	4.55E-05	5.59E-05	7.09E-05	8.59E-05	9.12E-05	9.14E-05						
50	4.04E-05	4.82E-05	6.09E-05	7.84E-05	9.54E-05	1.01E-04	1.01E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	2.20E-05	1.94E-05	2.15E-05	2.87E-05	4.10E-05	5.85E-05	8.11E-05	1.09E-04	1.34E-04	1.42E-04	1.42E-04	1.42E-04
130	1.10E-05	7.15E-06	1.41E-05	1.78E-05	1.64E-05	9.76E-06	2.23E-06	1.89E-05	4.12E-05	6.88E-05	1.01E-04	1.39E-04
190	2.47E-05	4.52E-05	7.13E-05	9.12E-05	1.05E-04	1.14E-04	1.17E-04	1.15E-04	1.08E-04	9.56E-05	7.84E-05	5.61E-05
210	3.30E-05	5.96E-05	9.12E-05	1.16E-04	1.35E-04	1.49E-04	1.57E-04	1.60E-04	1.58E-04	1.51E-04	1.39E-04	1.21E-04
220	3.75E-05	6.68E-05	1.01E-04	1.29E-04	1.50E-04	1.66E-04	1.77E-04	1.83E-04	1.83E-04	1.79E-04	1.69E-04	1.54E-04
290	7.13E-05	1.19E-04	1.72E-04	2.17E-04	2.56E-04	2.90E-04	3.18E-04	3.41E-04	3.59E-04	3.73E-04	3.81E-04	3.84E-04
400	1.29E-04	2.04E-04	2.85E-04	3.58E-04	4.24E-04	4.85E-04	5.40E-04	5.91E-04	6.37E-04	6.78E-04	7.14E-04	7.45E-04
500	1.84E-04	2.82E-04	3.88E-04	4.86E-04	5.77E-04	6.62E-04	7.42E-04	8.18E-04	8.89E-04	9.56E-04	1.02E-03	1.07E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S120** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 113.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.71E-05	6.13E-05	6.14E-05									
20	5.23E-05	6.61E-05	7.12E-05	7.13E-05								
40	3.45E-05	4.72E-05	6.58E-05	8.45E-05	9.12E-05	9.14E-05						
50	2.58E-05	3.54E-05	5.10E-05	7.26E-05	9.38E-05	1.01E-04	1.01E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	8.32E-06	9.17E-06	6.74E-06	2.21E-06	1.68E-05	3.83E-05	6.62E-05	1.00E-04	1.31E-04	1.42E-04	1.42E-04	1.42E-04
130	4.05E-05	5.46E-05	6.47E-05	6.84E-05	6.56E-05	5.67E-05	4.16E-05	2.02E-05	7.22E-06	4.11E-05	8.15E-05	1.28E-04
190	9.43E-05	1.26E-04	1.55E-04	1.77E-04	1.92E-04	2.02E-04	2.05E-04	2.02E-04	1.93E-04	1.78E-04	1.56E-04	1.29E-04
210	1.13E-04	1.50E-04	1.85E-04	2.13E-04	2.34E-04	2.50E-04	2.60E-04	2.63E-04	2.60E-04	2.51E-04	2.36E-04	2.14E-04
220	1.22E-04	1.62E-04	2.00E-04	2.31E-04	2.55E-04	2.74E-04	2.87E-04	2.93E-04	2.94E-04	2.88E-04	2.76E-04	2.57E-04
290	1.87E-04	2.47E-04	3.06E-04	3.58E-04	4.04E-04	4.45E-04	4.79E-04	5.07E-04	5.29E-04	5.45E-04	5.54E-04	5.58E-04
400	2.91E-04	3.82E-04	4.73E-04	5.58E-04	6.37E-04	7.12E-04	7.80E-04	8.42E-04	8.98E-04	9.49E-04	9.93E-04	1.03E-03
500	3.86E-04	5.04E-04	6.25E-04	7.41E-04	8.50E-04	9.55E-04	1.05E-03	1.15E-03	1.23E-03	1.32E-03	1.39E-03	1.46E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S121** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150 µm anode aperture, 126.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	5.60E-05	6.12E-05	6.14E-05									
20	4.81E-05	6.49E-05	7.11E-05	7.13E-05								
40	2.26E-05	3.79E-05	6.02E-05	8.29E-05	9.11E-05	9.14E-05						
50	1.04E-05	2.17E-05	4.04E-05	6.63E-05	9.20E-05	1.01E-04	1.01E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04	1.02E-04
90	3.94E-05	4.17E-05	3.81E-05	2.71E-05	8.82E-06	1.68E-05	5.02E-05	9.10E-05	1.29E-04	1.42E-04	1.42E-04	1.42E-04
130	9.12E-05	1.07E-04	1.18E-04	1.22E-04	1.18E-04	1.07E-04	8.83E-05	6.24E-05	2.91E-05	1.16E-05	6.01E-05	1.16E-04
190	1.71E-04	2.07E-04	2.39E-04	2.65E-04	2.83E-04	2.94E-04	2.98E-04	2.94E-04	2.83E-04	2.65E-04	2.39E-04	2.05E-04
210	1.97E-04	2.40E-04	2.80E-04	3.13E-04	3.38E-04	3.57E-04	3.68E-04	3.71E-04	3.68E-04	3.57E-04	3.39E-04	3.13E-04
220	2.10E-04	2.57E-04	3.00E-04	3.37E-04	3.66E-04	3.88E-04	4.03E-04	4.10E-04	4.10E-04	4.03E-04	3.89E-04	3.66E-04
290	3.04E-04	3.74E-04	4.42E-04	5.04E-04	5.59E-04	6.07E-04	6.47E-04	6.81E-04	7.07E-04	7.26E-04	7.38E-04	7.42E-04
400	4.52E-04	5.58E-04	6.66E-04	7.68E-04	8.62E-04	9.51E-04	1.03E-03	1.11E-03	1.17E-03	1.23E-03	1.29E-03	1.33E-03
500	5.86E-04	7.26E-04	8.69E-04	1.01E-03	1.14E-03	1.26E-03	1.38E-03	1.49E-03	1.60E-03	1.70E-03	1.79E-03	1.87E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S122** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 0.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04
20	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04
40	2.07E-04	2.07E-04	2.07E-04	2.07E-04	2.07E-04	2.07E-04	2.07E-04	2.07E-04	2.07E-04	2.07E-04	2.07E-04	2.07E-04
50	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04	2.29E-04
90	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04
130	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04	4.10E-04
190	5.46E-04	5.46E-04	5.46E-04	5.46E-04	5.46E-04	5.46E-04	5.46E-04	5.46E-04	5.46E-04	5.46E-04	5.46E-04	5.46E-04
210	5.91E-04	5.91E-04	5.91E-04	5.91E-04	5.91E-04	5.91E-04	5.91E-04	5.91E-04	5.91E-04	5.91E-04	5.91E-04	5.91E-04
220	6.14E-04	6.14E-04	6.14E-04	6.14E-04	6.14E-04	6.14E-04	6.14E-04	6.14E-04	6.14E-04	6.14E-04	6.14E-04	6.14E-04
290	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04	7.73E-04
400	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03	1.02E-03
500	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03	1.25E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S123** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 12.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04
20	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04	1.62E-04
40	2.05E-04	2.06E-04	2.06E-04	2.07E-04								
50	2.27E-04	2.27E-04	2.28E-04	2.28E-04	2.29E-04							
90	3.14E-04	3.14E-04	3.15E-04	3.15E-04	3.15E-04	3.16E-04	3.17E-04	3.18E-04	3.19E-04	3.19E-04	3.19E-04	3.19E-04
130	4.02E-04	4.02E-04	4.02E-04	4.02E-04	4.02E-04	4.02E-04	4.03E-04	4.03E-04	4.04E-04	4.05E-04	4.07E-04	4.08E-04
190	5.35E-04	5.34E-04	5.33E-04	5.33E-04	5.32E-04	5.32E-04	5.32E-04	5.32E-04	5.32E-04	5.33E-04	5.33E-04	5.34E-04
210	5.79E-04	5.78E-04	5.77E-04	5.76E-04	5.76E-04	5.75E-04	5.75E-04	5.75E-04	5.75E-04	5.75E-04	5.76E-04	5.76E-04
220	6.01E-04	6.00E-04	5.99E-04	5.98E-04	5.97E-04	5.97E-04	5.96E-04	5.96E-04	5.96E-04	5.96E-04	5.97E-04	5.97E-04
290	7.57E-04	7.55E-04	7.53E-04	7.51E-04	7.50E-04	7.49E-04	7.48E-04	7.47E-04	7.46E-04	7.46E-04	7.45E-04	7.45E-04
400	1.00E-03	9.98E-04	9.95E-04	9.93E-04	9.90E-04	9.88E-04	9.86E-04	9.84E-04	9.82E-04	9.80E-04	9.79E-04	9.78E-04
500	1.22E-03	1.22E-03	1.22E-03	1.21E-03	1.21E-03	1.21E-03	1.20E-03	1.20E-03	1.20E-03	1.19E-03	1.19E-03	1.19E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S124** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 25.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04
20	1.60E-04	1.62E-04										
40	2.00E-04	2.01E-04	2.04E-04	2.06E-04	2.07E-04							
50	2.20E-04	2.21E-04	2.23E-04	2.26E-04	2.28E-04	2.29E-04						
90	3.00E-04	3.00E-04	3.01E-04	3.02E-04	3.04E-04	3.07E-04	3.10E-04	3.14E-04	3.18E-04	3.19E-04	3.19E-04	3.19E-04
130	3.81E-04	3.80E-04	3.79E-04	3.78E-04	3.79E-04	3.80E-04	3.82E-04	3.85E-04	3.88E-04	3.92E-04	3.97E-04	4.03E-04
190	5.03E-04	4.99E-04	4.96E-04	4.93E-04	4.92E-04	4.91E-04	4.90E-04	4.91E-04	4.92E-04	4.94E-04	4.96E-04	5.00E-04
210	5.44E-04	5.39E-04	5.35E-04	5.32E-04	5.29E-04	5.28E-04	5.26E-04	5.26E-04	5.26E-04	5.28E-04	5.30E-04	5.32E-04
220	5.64E-04	5.59E-04	5.55E-04	5.51E-04	5.48E-04	5.46E-04	5.45E-04	5.44E-04	5.44E-04	5.45E-04	5.46E-04	5.48E-04
290	7.07E-04	7.00E-04	6.93E-04	6.86E-04	6.81E-04	6.76E-04	6.72E-04	6.68E-04	6.65E-04	6.64E-04	6.62E-04	6.62E-04
400	9.33E-04	9.21E-04	9.10E-04	8.99E-04	8.89E-04	8.80E-04	8.72E-04	8.64E-04	8.57E-04	8.51E-04	8.46E-04	8.41E-04
500	1.14E-03	1.12E-03	1.11E-03	1.09E-03	1.08E-03	1.07E-03	1.05E-03	1.04E-03	1.03E-03	1.02E-03	1.01E-03	1.00E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S125** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 37.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.39E-04	1.40E-04										
20	1.57E-04	1.61E-04	1.62E-04									
40	1.91E-04	1.95E-04	2.00E-04	2.05E-04	2.07E-04							
50	2.08E-04	2.11E-04	2.16E-04	2.22E-04	2.27E-04	2.29E-04						
90	2.77E-04	2.77E-04	2.78E-04	2.80E-04	2.85E-04	2.91E-04	2.99E-04	3.08E-04	3.16E-04	3.19E-04	3.19E-04	3.19E-04
130	3.46E-04	3.43E-04	3.40E-04	3.40E-04	3.41E-04	3.43E-04	3.48E-04	3.54E-04	3.62E-04	3.71E-04	3.82E-04	3.95E-04
190	4.51E-04	4.42E-04	4.35E-04	4.29E-04	4.25E-04	4.23E-04	4.22E-04	4.23E-04	4.25E-04	4.30E-04	4.36E-04	4.43E-04
210	4.86E-04	4.76E-04	4.67E-04	4.59E-04	4.53E-04	4.49E-04	4.47E-04	4.46E-04	4.47E-04	4.49E-04	4.54E-04	4.60E-04
220	5.04E-04	4.92E-04	4.82E-04	4.74E-04	4.67E-04	4.62E-04	4.59E-04	4.57E-04	4.57E-04	4.59E-04	4.63E-04	4.68E-04
290	6.27E-04	6.10E-04	5.94E-04	5.79E-04	5.67E-04	5.56E-04	5.46E-04	5.39E-04	5.33E-04	5.28E-04	5.26E-04	5.25E-04
400	8.20E-04	7.95E-04	7.69E-04	7.46E-04	7.24E-04	7.03E-04	6.84E-04	6.67E-04	6.52E-04	6.38E-04	6.26E-04	6.16E-04
500	9.97E-04	9.63E-04	9.29E-04	8.97E-04	8.67E-04	8.38E-04	8.11E-04	7.85E-04	7.61E-04	7.39E-04	7.18E-04	6.99E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S126** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 50.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.38E-04	1.40E-04										
20	1.53E-04	1.60E-04	1.62E-04									
40	1.79E-04	1.86E-04	1.95E-04	2.04E-04	2.07E-04							
50	1.92E-04	1.97E-04	2.05E-04	2.16E-04	2.26E-04	2.29E-04						
90	2.45E-04	2.44E-04	2.46E-04	2.51E-04	2.59E-04	2.69E-04	2.83E-04	3.00E-04	3.14E-04	3.19E-04	3.19E-04	3.19E-04
130	2.98E-04	2.92E-04	2.88E-04	2.86E-04	2.88E-04	2.93E-04	3.00E-04	3.11E-04	3.25E-04	3.42E-04	3.61E-04	3.84E-04
190	3.79E-04	3.64E-04	3.51E-04	3.41E-04	3.33E-04	3.29E-04	3.27E-04	3.29E-04	3.34E-04	3.41E-04	3.52E-04	3.66E-04
210	4.07E-04	3.88E-04	3.72E-04	3.59E-04	3.48E-04	3.41E-04	3.37E-04	3.35E-04	3.37E-04	3.41E-04	3.49E-04	3.60E-04
220	4.20E-04	4.00E-04	3.83E-04	3.68E-04	3.56E-04	3.47E-04	3.41E-04	3.38E-04	3.38E-04	3.41E-04	3.48E-04	3.57E-04
290	5.16E-04	4.86E-04	4.58E-04	4.33E-04	4.10E-04	3.91E-04	3.74E-04	3.61E-04	3.50E-04	3.43E-04	3.38E-04	3.36E-04
400	6.67E-04	6.21E-04	5.77E-04	5.35E-04	4.97E-04	4.61E-04	4.28E-04	3.98E-04	3.71E-04	3.46E-04	3.25E-04	3.07E-04
500	8.05E-04	7.45E-04	6.86E-04	6.30E-04	5.76E-04	5.26E-04	4.78E-04	4.33E-04	3.91E-04	3.52E-04	3.16E-04	2.83E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S127** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 63.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.37E-04	1.40E-04										
20	1.48E-04	1.59E-04	1.62E-04									
40	1.64E-04	1.74E-04	1.88E-04	2.02E-04	2.07E-04							
50	1.72E-04	1.80E-04	1.92E-04	2.08E-04	2.24E-04	2.29E-04						
90	2.05E-04	2.03E-04	2.06E-04	2.13E-04	2.25E-04	2.42E-04	2.63E-04	2.89E-04	3.11E-04	3.19E-04	3.19E-04	3.19E-04
130	2.38E-04	2.28E-04	2.21E-04	2.19E-04	2.22E-04	2.29E-04	2.41E-04	2.58E-04	2.79E-04	3.04E-04	3.35E-04	3.70E-04
190	2.90E-04	2.66E-04	2.45E-04	2.29E-04	2.18E-04	2.11E-04	2.09E-04	2.11E-04	2.19E-04	2.30E-04	2.47E-04	2.68E-04
210	3.07E-04	2.79E-04	2.54E-04	2.33E-04	2.17E-04	2.06E-04	1.99E-04	1.96E-04	1.99E-04	2.06E-04	2.17E-04	2.34E-04
220	3.16E-04	2.85E-04	2.58E-04	2.35E-04	2.17E-04	2.03E-04	1.94E-04	1.89E-04	1.89E-04	1.94E-04	2.03E-04	2.17E-04
290	3.78E-04	3.32E-04	2.88E-04	2.50E-04	2.15E-04	1.85E-04	1.60E-04	1.39E-04	1.23E-04	1.11E-04	1.03E-04	1.01E-04
400	4.76E-04	4.07E-04	3.39E-04	2.76E-04	2.17E-04	1.64E-04	1.14E-04	7.05E-05	3.27E-05	1.30E-05	3.74E-05	6.70E-05
500	5.68E-04	4.76E-04	3.87E-04	3.03E-04	2.24E-04	1.50E-04	8.39E-05	3.23E-05	4.46E-05	1.05E-04	1.68E-04	2.27E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S128** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 75.6 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.35E-04	1.40E-04										
20	1.42E-04	1.57E-04	1.62E-04									
40	1.46E-04	1.60E-04	1.80E-04	2.00E-04	2.07E-04							
50	1.48E-04	1.59E-04	1.76E-04	1.99E-04	2.21E-04	2.29E-04						
90	1.57E-04	1.55E-04	1.59E-04	1.69E-04	1.86E-04	2.09E-04	2.39E-04	2.76E-04	3.08E-04	3.19E-04	3.19E-04	3.19E-04
130	1.67E-04	1.52E-04	1.43E-04	1.40E-04	1.43E-04	1.53E-04	1.70E-04	1.94E-04	2.24E-04	2.60E-04	3.03E-04	3.53E-04
190	1.84E-04	1.50E-04	1.21E-04	9.89E-05	8.26E-05	7.26E-05	6.92E-05	7.22E-05	8.19E-05	9.83E-05	1.21E-04	1.51E-04
210	1.91E-04	1.50E-04	1.15E-04	8.64E-05	6.37E-05	4.73E-05	3.72E-05	3.34E-05	3.61E-05	4.54E-05	6.15E-05	8.43E-05
220	1.94E-04	1.51E-04	1.12E-04	8.05E-05	5.47E-05	3.53E-05	2.21E-05	1.51E-05	1.42E-05	1.96E-05	3.20E-05	5.12E-05
290	2.18E-04	1.54E-04	9.58E-05	4.58E-05	1.52E-05	4.48E-05	8.46E-05	1.18E-04	1.44E-04	1.63E-04	1.74E-04	1.79E-04
400	2.60E-04	1.67E-04	8.37E-05	3.61E-05	9.29E-05	1.82E-04	2.66E-04	3.39E-04	4.03E-04	4.59E-04	5.07E-04	5.48E-04
500	3.01E-04	1.84E-04	8.68E-05	7.26E-05	1.83E-04	3.13E-04	4.34E-04	5.42E-04	6.40E-04	7.29E-04	8.11E-04	8.84E-04

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S129** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 88.2 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.34E-04	1.40E-04										
20	1.35E-04	1.55E-04	1.62E-04									
40	1.25E-04	1.44E-04	1.71E-04	1.97E-04	2.07E-04							
50	1.20E-04	1.35E-04	1.58E-04	1.89E-04	2.19E-04	2.29E-04						
90	1.02E-04	9.92E-05	1.04E-04	1.18E-04	1.41E-04	1.72E-04	2.12E-04	2.61E-04	3.04E-04	3.19E-04	3.19E-04	3.19E-04
130	8.66E-05	6.63E-05	5.36E-05	4.93E-05	5.38E-05	6.71E-05	8.93E-05	1.20E-04	1.60E-04	2.09E-04	2.67E-04	3.33E-04
190	7.02E-05	2.80E-05	1.52E-05	4.41E-05	6.86E-05	8.38E-05	8.93E-05	8.56E-05	7.29E-05	5.13E-05	2.09E-05	1.81E-05
210	6.69E-05	2.15E-05	3.43E-05	7.66E-05	1.11E-04	1.36E-04	1.50E-04	1.55E-04	1.51E-04	1.38E-04	1.16E-04	8.58E-05
220	6.56E-05	2.04E-05	4.50E-05	9.32E-05	1.33E-04	1.62E-04	1.81E-04	1.90E-04	1.91E-04	1.82E-04	1.65E-04	1.38E-04
290	6.49E-05	4.66E-05	1.27E-04	2.12E-04	2.85E-04	3.46E-04	3.96E-04	4.36E-04	4.67E-04	4.89E-04	5.02E-04	5.07E-04
400	8.67E-05	1.22E-04	2.64E-04	4.04E-04	5.26E-04	6.36E-04	7.35E-04	8.23E-04	9.03E-04	9.73E-04	1.03E-03	1.09E-03
500	1.21E-04	1.99E-04	3.91E-04	5.79E-04	7.47E-04	9.01E-04	1.04E-03	1.18E-03	1.30E-03	1.41E-03	1.52E-03	1.61E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S130** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 100.8 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.32E-04	1.40E-04										
20	1.27E-04	1.53E-04	1.62E-04									
40	1.02E-04	1.26E-04	1.60E-04	1.95E-04	2.06E-04	2.07E-04						
50	8.93E-05	1.08E-04	1.37E-04	1.77E-04	2.15E-04	2.29E-04						
90	4.24E-05	3.80E-05	4.40E-05	6.14E-05	9.01E-05	1.30E-04	1.81E-04	2.43E-04	3.00E-04	3.19E-04	3.19E-04	3.19E-04
130	1.63E-05	2.57E-05	4.31E-05	4.96E-05	4.44E-05	2.78E-05	1.69E-06	3.91E-05	9.00E-05	1.52E-04	2.26E-04	3.10E-04
190	7.14E-05	1.27E-04	1.81E-04	2.22E-04	2.51E-04	2.67E-04	2.73E-04	2.67E-04	2.49E-04	2.21E-04	1.81E-04	1.30E-04
210	9.45E-05	1.62E-04	2.28E-04	2.80E-04	3.20E-04	3.48E-04	3.64E-04	3.69E-04	3.63E-04	3.46E-04	3.17E-04	2.77E-04
220	1.06E-04	1.80E-04	2.51E-04	3.09E-04	3.55E-04	3.88E-04	4.10E-04	4.21E-04	4.20E-04	4.08E-04	3.85E-04	3.51E-04
290	1.91E-04	3.04E-04	4.16E-04	5.13E-04	5.98E-04	6.70E-04	7.31E-04	7.80E-04	8.19E-04	8.46E-04	8.62E-04	8.67E-04
400	3.28E-04	5.02E-04	6.76E-04	8.35E-04	9.80E-04	1.11E-03	1.24E-03	1.35E-03	1.45E-03	1.53E-03	1.61E-03	1.68E-03
500	4.55E-04	6.83E-04	9.14E-04	1.13E-03	1.33E-03	1.52E-03	1.69E-03	1.86E-03	2.02E-03	2.16E-03	2.29E-03	2.42E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S131** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 113.4 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.30E-04	1.40E-04										
20	1.18E-04	1.50E-04	1.62E-04									
40	7.65E-05	1.06E-04	1.49E-04	1.91E-04	2.06E-04	2.07E-04						
50	5.59E-05	7.87E-05	1.15E-04	1.64E-04	2.12E-04	2.29E-04						
90	2.50E-05	2.75E-05	2.03E-05	1.75E-06	3.54E-05	8.46E-05	1.48E-04	2.24E-04	2.94E-04	3.18E-04	3.19E-04	3.19E-04
130	1.05E-04	1.36E-04	1.57E-04	1.63E-04	1.55E-04	1.33E-04	9.81E-05	4.89E-05	1.36E-05	9.04E-05	1.81E-04	2.85E-04
190	2.32E-04	3.03E-04	3.64E-04	4.11E-04	4.44E-04	4.64E-04	4.69E-04	4.61E-04	4.40E-04	4.04E-04	3.55E-04	2.92E-04
210	2.74E-04	3.58E-04	4.33E-04	4.94E-04	5.41E-04	5.74E-04	5.93E-04	5.99E-04	5.91E-04	5.69E-04	5.34E-04	4.84E-04
220	2.95E-04	3.86E-04	4.68E-04	5.36E-04	5.89E-04	6.29E-04	6.55E-04	6.68E-04	6.67E-04	6.52E-04	6.23E-04	5.81E-04
290	4.45E-04	5.82E-04	7.11E-04	8.26E-04	9.27E-04	1.02E-03	1.09E-03	1.15E-03	1.20E-03	1.23E-03	1.25E-03	1.26E-03
400	6.81E-04	8.89E-04	1.09E-03	1.28E-03	1.46E-03	1.62E-03	1.77E-03	1.91E-03	2.03E-03	2.14E-03	2.23E-03	2.32E-03
500	8.96E-04	1.17E-03	1.44E-03	1.70E-03	1.94E-03	2.17E-03	2.39E-03	2.60E-03	2.79E-03	2.97E-03	3.13E-03	3.28E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

**Table S132** Variation in electron beam radius through its flight, for different lens positions with a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400 µm anode aperture, 126.0 mT magnetic field strength<sup>a</sup>

Electron flight distance / mm	Lens position from anode / mm											
	10	20	30	40	50	60	70	80	90	100	110	120
10	1.27E-04	1.40E-04										
20	1.09E-04	1.48E-04	1.62E-04									
40	4.95E-05	8.50E-05	1.36E-04	1.88E-04	2.06E-04	2.07E-04						
50	2.07E-05	4.74E-05	9.04E-05	1.50E-04	2.08E-04	2.29E-04						
90	9.68E-05	1.01E-04	9.15E-05	6.53E-05	2.28E-05	3.60E-05	1.12E-04	2.04E-04	2.89E-04	3.18E-04	3.19E-04	3.19E-04
130	2.17E-04	2.53E-04	2.76E-04	2.82E-04	2.72E-04	2.46E-04	2.03E-04	1.44E-04	6.78E-05	2.42E-05	1.33E-04	2.58E-04
190	3.98E-04	4.82E-04	5.53E-04	6.09E-04	6.48E-04	6.70E-04	6.77E-04	6.67E-04	6.41E-04	5.98E-04	5.39E-04	4.63E-04
210	4.59E-04	5.58E-04	6.46E-04	7.17E-04	7.73E-04	8.12E-04	8.35E-04	8.42E-04	8.32E-04	8.06E-04	7.63E-04	7.04E-04
220	4.89E-04	5.96E-04	6.92E-04	7.72E-04	8.36E-04	8.83E-04	9.14E-04	9.29E-04	9.27E-04	9.09E-04	8.75E-04	8.24E-04
290	7.02E-04	8.64E-04	1.02E-03	1.15E-03	1.27E-03	1.38E-03	1.47E-03	1.54E-03	1.60E-03	1.64E-03	1.66E-03	1.67E-03
400	1.04E-03	1.29E-03	1.53E-03	1.75E-03	1.96E-03	2.16E-03	2.34E-03	2.50E-03	2.65E-03	2.78E-03	2.89E-03	2.99E-03
500	1.34E-03	1.67E-03	1.99E-03	2.30E-03	2.59E-03	2.87E-03	3.13E-03	3.37E-03	3.60E-03	3.82E-03	4.01E-03	4.20E-03

<sup>a</sup> Values are the root mean square radius of the electron beam in metres.

## Electron beam pulse duration

Here we present the electron beam FWHM pulse duration for various electron gun and magnetic lens properties, as detailed sequentially below.

**Table S133** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 150  $\mu\text{m}$  anode aperture.<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	9.38E-13	9.40E-13	9.46E-13	9.55E-13	9.75E-13	1.02E-12	1.11E-12	1.25E-12	1.24E-12	1.21E-12	1.18E-12
2	9.38E-13	9.40E-13	9.45E-13	9.55E-13	9.71E-13	1.01E-12	1.13E-12	1.22E-12	1.20E-12	1.16E-12	1.13E-12
3	9.38E-13	9.40E-13	9.44E-13	9.50E-13	9.66E-13	9.97E-13	1.11E-12	1.16E-12	1.15E-12	1.13E-12	1.09E-12
4	9.38E-13	9.39E-13	9.42E-13	9.48E-13	9.59E-13	9.83E-13	1.07E-12	1.09E-12	1.10E-12	1.09E-12	1.05E-12
5	9.38E-13	9.39E-13	9.40E-13	9.46E-13	9.52E-13	9.70E-13	1.03E-12	1.05E-12	1.05E-12	1.05E-12	1.03E-12
6	9.38E-13	9.39E-13	9.40E-13	9.42E-13	9.47E-13	9.60E-13	9.98E-13	1.02E-12	1.01E-12	1.00E-12	1.00E-12
7	9.38E-13	9.38E-13	9.39E-13	9.40E-13	9.43E-13	9.50E-13	9.75E-13	9.87E-13	9.89E-13	9.87E-13	9.89E-13
8	9.38E-13	9.38E-13	9.38E-13	9.39E-13	9.40E-13	9.42E-13	9.54E-13	9.66E-13	9.72E-13	9.71E-13	9.68E-13
9	9.38E-13	9.38E-13	9.38E-13	9.37E-13	9.38E-13	9.40E-13	9.42E-13	9.52E-13	9.55E-13	9.59E-13	9.58E-13
10	9.38E-13	9.38E-13	9.38E-13	9.37E-13	9.37E-13	9.38E-13	9.39E-13	9.41E-13	9.45E-13	9.46E-13	9.48E-13
11	9.38E-13	9.38E-13	9.37E-13	9.37E-13	9.38E-13	9.37E-13	9.38E-13	9.38E-13	9.39E-13	9.40E-13	9.42E-13
12	9.38E-13	9.38E-13	9.37E-13	9.37E-13	9.37E-13	9.37E-13	9.38E-13	9.38E-13	9.37E-13	9.38E-13	9.40E-13

<sup>a</sup> Values are the full-width half maximum of the electron beam duration in seconds.

**Table S134** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 45 kV acceleration voltage, 10 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	9.23E-13	9.26E-13	9.34E-13	9.50E-13	9.78E-13	1.04E-12	1.28E-12	1.53E-12	1.51E-12	1.44E-12	1.37E-12
2	9.23E-13	9.25E-13	9.31E-13	9.44E-13	9.68E-13	1.03E-12	1.35E-12	1.48E-12	1.43E-12	1.37E-12	1.31E-12
3	9.23E-13	9.25E-13	9.29E-13	9.39E-13	9.57E-13	1.01E-12	1.29E-12	1.34E-12	1.31E-12	1.27E-12	1.22E-12
4	9.23E-13	9.24E-13	9.28E-13	9.34E-13	9.48E-13	9.95E-13	1.20E-12	1.23E-12	1.21E-12	1.17E-12	1.16E-12
5	9.23E-13	9.24E-13	9.27E-13	9.31E-13	9.40E-13	9.73E-13	1.12E-12	1.14E-12	1.13E-12	1.11E-12	1.09E-12
6	9.23E-13	9.24E-13	9.25E-13	9.28E-13	9.34E-13	9.54E-13	1.05E-12	1.08E-12	1.07E-12	1.06E-12	1.05E-12
7	9.23E-13	9.23E-13	9.25E-13	9.27E-13	9.31E-13	9.40E-13	9.97E-13	1.03E-12	1.02E-12	1.02E-12	1.02E-12
8	9.23E-13	9.23E-13	9.24E-13	9.27E-13	9.28E-13	9.32E-13	9.56E-13	9.84E-13	9.92E-13	9.93E-13	9.94E-13
9	9.23E-13	9.24E-13	9.24E-13	9.25E-13	9.27E-13	9.27E-13	9.33E-13	9.53E-13	9.64E-13	9.66E-13	9.71E-13
10	9.23E-13	9.24E-13	9.25E-13	9.25E-13	9.25E-13	9.24E-13	9.27E-13	9.31E-13	9.40E-13	9.48E-13	9.53E-13
11	9.23E-13	9.24E-13	9.24E-13	9.25E-13	9.24E-13	9.24E-13	9.25E-13	9.26E-13	9.27E-13	9.32E-13	9.36E-13
12	9.23E-13	9.23E-13	9.25E-13	9.25E-13	9.25E-13	9.23E-13	9.25E-13	9.26E-13	9.26E-13	9.26E-13	9.28E-13

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

**Table S135** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 150  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.33E-12	1.37E-12	1.47E-12	1.49E-12	1.48E-12	1.45E-12	1.43E-12
2	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.33E-12	1.36E-12	1.45E-12	1.45E-12	1.46E-12	1.43E-12	1.42E-12
3	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.32E-12	1.35E-12	1.41E-12	1.41E-12	1.41E-12	1.39E-12	1.38E-12
4	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.34E-12	1.38E-12	1.38E-12	1.38E-12	1.37E-12	1.36E-12
5	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.32E-12	1.36E-12	1.37E-12	1.36E-12	1.36E-12	1.35E-12
6	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.34E-12	1.35E-12	1.33E-12	1.35E-12	1.35E-12
7	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.32E-12	1.33E-12	1.33E-12	1.33E-12	1.33E-12
8	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.32E-12	1.32E-12	1.32E-12	1.32E-12
9	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.31E-12	1.31E-12	1.31E-12
10	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12
11	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.29E-12	1.29E-12	1.30E-12	1.30E-12
12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.29E-12	1.30E-12	1.29E-12	1.30E-12

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

**Table S136** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 45 kV acceleration voltage, 15 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	1.30E-12	1.31E-12	1.31E-12	1.33E-12	1.37E-12	1.48E-12	1.74E-12	1.76E-12	1.70E-12	1.63E-12	1.58E-12
2	1.30E-12	1.30E-12	1.31E-12	1.32E-12	1.36E-12	1.45E-12	1.67E-12	1.66E-12	1.63E-12	1.58E-12	1.56E-12
3	1.30E-12	1.30E-12	1.31E-12	1.32E-12	1.34E-12	1.43E-12	1.58E-12	1.58E-12	1.56E-12	1.52E-12	1.50E-12
4	1.30E-12	1.30E-12	1.31E-12	1.31E-12	1.33E-12	1.40E-12	1.51E-12	1.51E-12	1.50E-12	1.47E-12	1.46E-12
5	1.30E-12	1.30E-12	1.31E-12	1.31E-12	1.32E-12	1.36E-12	1.45E-12	1.46E-12	1.45E-12	1.43E-12	1.43E-12
6	1.30E-12	1.30E-12	1.31E-12	1.31E-12	1.31E-12	1.34E-12	1.40E-12	1.42E-12	1.41E-12	1.40E-12	1.40E-12
7	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.31E-12	1.32E-12	1.36E-12	1.38E-12	1.38E-12	1.37E-12	1.37E-12
8	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.31E-12	1.31E-12	1.33E-12	1.35E-12	1.35E-12	1.35E-12	1.35E-12
9	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.31E-12	1.33E-12	1.33E-12	1.34E-12	1.33E-12
10	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.31E-12	1.32E-12	1.32E-12
11	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.31E-12	1.31E-12
12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12	1.30E-12

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

**Table S137** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 150  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	6.30E-13	6.31E-13	6.34E-13	6.38E-13	6.46E-13	6.62E-13	6.85E-13	7.38E-13	8.39E-13	8.62E-13	8.47E-13
2	6.30E-13	6.31E-13	6.33E-13	6.36E-13	6.43E-13	6.53E-13	6.77E-13	7.44E-13	8.31E-13	8.26E-13	8.12E-13
3	6.30E-13	6.30E-13	6.33E-13	6.36E-13	6.40E-13	6.49E-13	6.69E-13	7.40E-13	7.83E-13	7.81E-13	7.70E-13
4	6.30E-13	6.30E-13	6.32E-13	6.34E-13	6.37E-13	6.44E-13	6.61E-13	7.18E-13	7.45E-13	7.46E-13	7.54E-13
5	6.30E-13	6.30E-13	6.31E-13	6.33E-13	6.35E-13	6.40E-13	6.51E-13	6.91E-13	7.13E-13	7.11E-13	7.16E-13
6	6.30E-13	6.30E-13	6.31E-13	6.32E-13	6.34E-13	6.37E-13	6.44E-13	6.71E-13	6.86E-13	6.86E-13	6.85E-13
7	6.30E-13	6.30E-13	6.30E-13	6.31E-13	6.32E-13	6.35E-13	6.38E-13	6.52E-13	6.64E-13	6.65E-13	6.66E-13
8	6.30E-13	6.30E-13	6.30E-13	6.31E-13	6.32E-13	6.32E-13	6.35E-13	6.39E-13	6.50E-13	6.52E-13	6.52E-13
9	6.30E-13	6.30E-13	6.30E-13	6.30E-13	6.30E-13	6.31E-13	6.31E-13	6.33E-13	6.39E-13	6.42E-13	6.44E-13
10	6.30E-13	6.30E-13	6.30E-13	6.30E-13	6.29E-13	6.30E-13	6.30E-13	6.30E-13	6.32E-13	6.34E-13	6.35E-13
11	6.30E-13	6.30E-13	6.30E-13	6.29E-13	6.30E-13	6.29E-13	6.29E-13	6.29E-13	6.30E-13	6.30E-13	6.31E-13
12	6.30E-13	6.30E-13	6.30E-13	6.29E-13	6.30E-13	6.29E-13	6.29E-13	6.28E-13	6.29E-13	6.30E-13	6.31E-13

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

**Table S138** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 65 kV acceleration voltage, 10 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	6.21E-13	6.22E-13	6.24E-13	6.29E-13	6.39E-13	6.54E-13	6.91E-13	8.01E-13	1.01E-12	1.04E-12	1.01E-12
2	6.21E-13	6.21E-13	6.23E-13	6.28E-13	6.36E-13	6.50E-13	6.86E-13	8.60E-13	1.00E-12	9.91E-13	9.57E-13
3	6.21E-13	6.21E-13	6.23E-13	6.26E-13	6.32E-13	6.44E-13	6.76E-13	8.50E-13	9.13E-13	8.97E-13	8.72E-13
4	6.21E-13	6.21E-13	6.22E-13	6.24E-13	6.29E-13	6.37E-13	6.62E-13	7.95E-13	8.36E-13	8.32E-13	8.07E-13
5	6.21E-13	6.21E-13	6.22E-13	6.23E-13	6.26E-13	6.33E-13	6.50E-13	7.43E-13	7.73E-13	7.75E-13	7.63E-13
6	6.21E-13	6.21E-13	6.21E-13	6.22E-13	6.24E-13	6.28E-13	6.38E-13	6.98E-13	7.28E-13	7.29E-13	7.24E-13
7	6.21E-13	6.21E-13	6.21E-13	6.22E-13	6.23E-13	6.25E-13	6.29E-13	6.62E-13	6.89E-13	6.94E-13	6.93E-13
8	6.21E-13	6.21E-13	6.21E-13	6.21E-13	6.22E-13	6.22E-13	6.25E-13	6.36E-13	6.59E-13	6.67E-13	6.69E-13
9	6.21E-13	6.21E-13	6.21E-13	6.21E-13	6.21E-13	6.20E-13	6.23E-13	6.25E-13	6.36E-13	6.46E-13	6.49E-13
10	6.21E-13	6.21E-13	6.21E-13	6.20E-13	6.20E-13	6.21E-13	6.21E-13	6.22E-13	6.24E-13	6.29E-13	6.35E-13
11	6.21E-13	6.21E-13	6.21E-13	6.21E-13	6.20E-13	6.21E-13	6.21E-13	6.21E-13	6.21E-13	6.23E-13	6.23E-13
12	6.21E-13	6.21E-13	6.20E-13	6.21E-13	6.20E-13	6.21E-13	6.21E-13	6.21E-13	6.21E-13	6.22E-13	6.22E-13

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

**Table S139** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 150  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	8.86E-13	8.81E-13	8.90E-13	8.96E-13	9.04E-13	9.16E-13	9.44E-13	1.01E-12	1.04E-12	1.04E-12	1.02E-12
2	8.86E-13	8.86E-13	8.89E-13	8.94E-13	9.02E-13	9.11E-13	9.36E-13	9.98E-13	1.02E-12	1.02E-12	1.01E-12
3	8.86E-13	8.86E-13	8.88E-13	8.92E-13	8.94E-13	9.02E-13	9.22E-13	9.71E-13	9.81E-13	9.84E-13	9.82E-13
4	8.86E-13	8.86E-13	8.87E-13	8.90E-13	8.95E-13	9.03E-13	9.17E-13	9.55E-13	9.61E-13	9.59E-13	9.61E-13
5	8.86E-13	8.86E-13	8.86E-13	8.89E-13	8.92E-13	8.98E-13	9.06E-13	9.31E-13	9.42E-13	9.43E-13	9.41E-13
6	8.86E-13	8.86E-13	8.86E-13	8.87E-13	8.91E-13	8.93E-13	9.01E-13	9.14E-13	9.25E-13	9.29E-13	9.43E-13
7	8.86E-13	8.86E-13	8.86E-13	8.86E-13	8.88E-13	8.90E-13	8.95E-13	9.04E-13	9.11E-13	9.13E-13	9.16E-13
8	8.86E-13	8.86E-13	8.86E-13	8.86E-13	8.87E-13	8.89E-13	8.91E-13	8.94E-13	9.00E-13	9.01E-13	9.05E-13
9	8.86E-13	8.86E-13	8.86E-13	8.86E-13	8.86E-13	8.86E-13	8.88E-13	8.90E-13	8.92E-13	8.94E-13	8.96E-13
10	8.86E-13	8.86E-13	8.85E-13	8.85E-13	8.84E-13	8.85E-13	8.86E-13	8.88E-13	8.88E-13	8.92E-13	8.91E-13
11	8.86E-13	8.85E-13	8.85E-13	8.85E-13	8.84E-13	8.84E-13	8.85E-13	8.85E-13	8.87E-13	8.86E-13	8.87E-13
12	8.86E-13	8.85E-13	8.85E-13	8.85E-13	8.85E-13	8.84E-13	8.85E-13	8.85E-13	8.86E-13	8.86E-13	8.86E-13

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

**Table S140** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 65 kV acceleration voltage, 15 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	8.81E-13	8.83E-13	8.86E-13	8.93E-13	9.06E-13	9.30E-13	9.95E-13	1.17E-12	1.22E-12	1.19E-12	1.15E-12
2	8.81E-13	8.82E-13	8.85E-13	8.90E-13	9.00E-13	9.23E-13	9.81E-13	1.14E-12	1.16E-12	1.14E-12	1.11E-12
3	8.81E-13	8.82E-13	8.84E-13	8.88E-13	8.96E-13	9.13E-13	9.64E-13	1.08E-12	1.10E-12	1.08E-12	1.06E-12
4	8.81E-13	8.82E-13	8.83E-13	8.86E-13	8.91E-13	9.04E-13	9.43E-13	1.03E-12	1.04E-12	1.02E-12	1.01E-12
5	8.81E-13	8.82E-13	8.83E-13	8.85E-13	8.88E-13	8.96E-13	9.23E-13	9.85E-13	1.00E-12	9.90E-13	9.84E-13
6	8.81E-13	8.82E-13	8.83E-13	8.83E-13	8.86E-13	8.90E-13	9.05E-13	9.48E-13	9.62E-13	9.62E-13	9.56E-13
7	8.81E-13	8.81E-13	8.82E-13	8.83E-13	8.84E-13	8.86E-13	8.94E-13	9.20E-13	9.36E-13	9.39E-13	9.33E-13
8	8.81E-13	8.82E-13	8.82E-13	8.82E-13	8.83E-13	8.84E-13	8.87E-13	9.00E-13	9.14E-13	9.17E-13	9.17E-13
9	8.81E-13	8.81E-13	8.82E-13	8.82E-13	8.82E-13	8.83E-13	8.84E-13	8.86E-13	8.96E-13	9.01E-13	9.03E-13
10	8.81E-13	8.81E-13	8.81E-13	8.81E-13	8.82E-13	8.81E-13	8.82E-13	8.82E-13	8.83E-13	8.88E-13	8.91E-13
11	8.81E-13	8.81E-13	8.82E-13	8.81E-13	8.82E-13	8.81E-13	8.82E-13	8.81E-13	8.81E-13	8.83E-13	8.83E-13
12	8.81E-13	8.81E-13	8.82E-13	8.81E-13	8.82E-13	8.81E-13	8.81E-13	8.81E-13	8.79E-13	8.81E-13	8.81E-13

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

**Table S141** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 150  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	3.98E-13	3.99E-13	3.99E-13	4.00E-13	4.03E-13	4.07E-13	4.13E-13	4.23E-13	4.39E-13	4.78E-13	5.37E-13
2	3.98E-13	3.98E-13	3.99E-13	4.00E-13	4.04E-13	4.05E-13	4.10E-13	4.19E-13	4.36E-13	4.92E-13	5.31E-13
3	3.98E-13	3.98E-13	3.99E-13	3.99E-13	4.00E-13	4.03E-13	4.09E-13	4.16E-13	4.32E-13	4.83E-13	5.04E-13
4	3.98E-13	3.98E-13	3.99E-13	3.99E-13	4.00E-13	4.02E-13	4.05E-13	4.10E-13	4.26E-13	4.65E-13	4.76E-13
5	3.98E-13	3.98E-13	3.99E-13	3.99E-13	3.99E-13	4.00E-13	4.02E-13	4.07E-13	4.19E-13	4.44E-13	4.53E-13
6	3.98E-13	3.98E-13	3.98E-13	3.99E-13	3.99E-13	4.00E-13	4.01E-13	4.03E-13	4.11E-13	4.27E-13	4.37E-13
7	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.99E-13	3.99E-13	4.00E-13	4.01E-13	4.04E-13	4.15E-13	4.22E-13
8	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.99E-13	3.99E-13	3.99E-13	4.01E-13	4.05E-13	4.11E-13
9	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.99E-13	3.99E-13	4.04E-13
10	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.99E-13
11	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.97E-13	3.98E-13	3.98E-13	3.97E-13	3.97E-13	3.98E-13	3.98E-13
12	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.97E-13	3.97E-13	3.98E-13	3.98E-13

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

**Table S142** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 100 kV acceleration voltage, 10 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	3.92E-13	3.91E-13	3.93E-13	3.94E-13	3.97E-13	4.01E-13	4.08E-13	4.19E-13	4.44E-13	5.20E-13	6.32E-13
2	3.92E-13	3.92E-13	3.93E-13	3.94E-13	3.96E-13	3.99E-13	4.05E-13	4.15E-13	4.44E-13	5.75E-13	6.42E-13
3	3.92E-13	3.92E-13	3.92E-13	3.93E-13	3.95E-13	3.98E-13	4.01E-13	4.11E-13	4.42E-13	5.55E-13	5.87E-13
4	3.92E-13	3.92E-13	3.92E-13	3.93E-13	3.94E-13	3.96E-13	3.99E-13	4.06E-13	4.37E-13	5.15E-13	5.34E-13
5	3.92E-13	3.92E-13	3.92E-13	3.93E-13	3.93E-13	3.95E-13	3.97E-13	4.01E-13	4.25E-13	4.77E-13	4.93E-13
6	3.92E-13	3.92E-13	3.92E-13	3.92E-13	3.92E-13	3.93E-13	3.95E-13	3.98E-13	4.10E-13	4.48E-13	4.60E-13
7	3.92E-13	3.92E-13	3.92E-13	3.92E-13	3.92E-13	3.93E-13	3.93E-13	3.95E-13	3.99E-13	4.23E-13	4.36E-13
8	3.92E-13	3.92E-13	3.92E-13	3.92E-13	3.92E-13	3.92E-13	3.93E-13	3.93E-13	3.94E-13	4.04E-13	4.16E-13
9	3.92E-13	3.92E-13	3.91E-13	3.92E-13	3.92E-13	3.92E-13	3.92E-13	3.92E-13	3.93E-13	3.94E-13	4.02E-13
10	3.92E-13	3.92E-13	3.91E-13	3.92E-13	3.91E-13	3.92E-13	3.92E-13	3.92E-13	3.93E-13	3.93E-13	3.93E-13
11	3.92E-13	3.92E-13	3.91E-13	3.91E-13	3.92E-13	3.92E-13	3.91E-13	3.92E-13	3.92E-13	3.92E-13	3.92E-13
12	3.92E-13	3.91E-13	3.92E-13	3.91E-13	3.92E-13	3.92E-13	3.91E-13	3.92E-13	3.92E-13	3.92E-13	3.91E-13

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

**Table S143** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 150  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	5.62E-13	5.62E-13	5.63E-13	5.64E-13	5.67E-13	5.74E-13	5.81E-13	5.92E-13	6.17E-13	6.59E-13	6.68E-13
2	5.62E-13	5.62E-13	5.63E-13	5.63E-13	5.65E-13	5.70E-13	5.76E-13	5.85E-13	6.11E-13	6.43E-13	6.47E-13
3	5.62E-13	5.62E-13	5.62E-13	5.63E-13	5.64E-13	5.67E-13	5.72E-13	5.81E-13	6.04E-13	6.25E-13	6.31E-13
4	5.62E-13	5.62E-13	5.62E-13	5.63E-13	5.63E-13	5.65E-13	5.69E-13	5.76E-13	5.94E-13	6.10E-13	6.12E-13
5	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.63E-13	5.64E-13	5.66E-13	5.71E-13	5.83E-13	5.94E-13	5.99E-13
6	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.63E-13	5.63E-13	5.65E-13	5.66E-13	5.75E-13	5.84E-13	5.87E-13
7	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.63E-13	5.64E-13	5.68E-13	5.75E-13	5.79E-13
8	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.63E-13	5.64E-13	5.68E-13	5.72E-13
9	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.61E-13	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.63E-13	5.67E-13
10	5.62E-13	5.62E-13	5.62E-13	5.61E-13	5.61E-13	5.62E-13	5.62E-13	5.62E-13	5.62E-13	5.61E-13	5.62E-13
11	5.62E-13	5.62E-13	5.62E-13	5.61E-13	5.61E-13	5.62E-13	5.62E-13	5.62E-13	5.61E-13	5.61E-13	5.62E-13
12	5.62E-13	5.62E-13	5.61E-13	5.61E-13	5.61E-13	5.62E-13	5.62E-13	5.62E-13	5.61E-13	5.61E-13	5.62E-13

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

**Table S144** Variation in electron pulse duration at the sample position for various magnetic lens positions and currents for a 100 kV acceleration voltage, 15 mm photocathode to anode distance, 400  $\mu\text{m}$  anode aperture<sup>a</sup>

Lens distance from anode / cm	Magnetic lens field strength/ mT										
	0.0	12.6	25.2	37.8	50.4	63	75.6	88.2	100.8	113.4	126.0
1	5.58E-13	5.59E-13	5.60E-13	5.63E-13	5.67E-13	5.73E-13	5.83E-13	6.04E-13	6.64E-13	7.63E-13	7.80E-13
2	5.58E-13	5.59E-13	5.60E-13	5.62E-13	5.64E-13	5.69E-13	5.78E-13	5.96E-13	6.65E-13	7.36E-13	7.39E-13
3	5.58E-13	5.59E-13	5.60E-13	5.61E-13	5.63E-13	5.66E-13	5.73E-13	5.88E-13	6.50E-13	6.93E-13	6.96E-13
4	5.58E-13	5.59E-13	5.59E-13	5.60E-13	5.62E-13	5.65E-13	5.69E-13	5.80E-13	6.27E-13	6.59E-13	6.62E-13
5	5.58E-13	5.59E-13	5.59E-13	5.60E-13	5.61E-13	5.63E-13	5.66E-13	5.73E-13	6.04E-13	6.29E-13	6.37E-13
6	5.58E-13	5.58E-13	5.59E-13	5.59E-13	5.60E-13	5.61E-13	5.63E-13	5.67E-13	5.84E-13	6.06E-13	6.12E-13
7	5.58E-13	5.58E-13	5.59E-13	5.59E-13	5.59E-13	5.60E-13	5.61E-13	5.64E-13	5.70E-13	5.86E-13	5.94E-13
8	5.58E-13	5.58E-13	5.58E-13	5.59E-13	5.59E-13	5.59E-13	5.60E-13	5.61E-13	5.63E-13	5.72E-13	5.78E-13
9	5.58E-13	5.58E-13	5.58E-13	5.59E-13	5.59E-13	5.59E-13	5.59E-13	5.60E-13	5.61E-13	5.62E-13	5.66E-13
10	5.58E-13	5.58E-13	5.58E-13	5.59E-13	5.59E-13	5.58E-13	5.59E-13	5.59E-13	5.59E-13	5.59E-13	5.59E-13
11	5.58E-13	5.58E-13	5.59E-13	5.59E-13	5.59E-13	5.58E-13	5.59E-13	5.59E-13	5.59E-13	5.58E-13	5.58E-13
12	5.58E-13	5.58E-13	5.59E-13	5.58E-13	5.59E-13	5.58E-13	5.59E-13	5.59E-13	5.59E-13	5.58E-13	5.58E-13

<sup>a</sup> Values are the full-width half maximum of the electron beam's duration in seconds.

## Experimental resolution summary

Here we present a summary of the experimental resolution of the compact electron gun for various electron gun, magnetic lens properties (detailed further below), in an experiment where the pump and probe beams intersect at the sample perpendicular to one another.

**Table S145** Summary of results and experimental time-resolution for various focusing conditions for a 45 kV electron gun with a 10 mm photocathode to anode distance.

Energy	Photocathode-anode distance / mm	Aperture size / $\mu\text{m}$	Lens position / mm	Lens field strength/ mT	Focus type	Electron beam rms radius at sample / mm	Equivalent FWHM beam size / mm	Electron pulse duration / fs	Laser and sample width / mm	Time-resolution / fs	Electron beam rms radius at detector / mm	
45	10	150	12	-	0.0	Natural	0.244	0.341	938	0.350	2440	0.811
				37.8	Optimal detector focus	0.224	0.308	937	0.325	2289	0.077	
	10	400	12	9	37.8	Collimated	0.180	0.249	937	0.250	1866	0.176
				-	0.0	Natural	0.536	0.706	923	0.700	4605	1.749
45	10	400	8	37.8	Optimal detector focus	0.493	0.645	925	0.650	4286	0.113	
				37.8	Collimated	0.375	0.490	927	0.500	3348	0.407	

**Table S146** Summary of results and experimental time-resolution for various focusing conditions for a 45 kV electron gun with a 15 mm photocathode to anode distance

Energy	Photocathode-anode distance / mm	Aperture size / $\mu\text{m}$	Lens position / cm	Lens field strength/ mT	Focus type	Electron beam rms radius at sample / mm	Equivalent FWHM beam size / mm	Electron pulse duration / fs	Laser and sample width / mm	Time-resolution / fs	Electron beam rms radius at detector / mm	
45	15	150	12	-	0	Natural	0.187	0.263	1295	0.275	2192	0.600
				37.8	Optimal detector focus	0.172	0.241	1297	0.250	2067	0.040	
				8	37.8	Collimated	0.130	0.181	1296	0.200	1825	0.136
45	15	400	12	-	0	Natural	0.410	0.543	1303	0.550	3772	1.269
				37.8	Optimal detector focus	0.377	0.496	1303	0.500	3474	0.041	
				7	37.8	Collimated	0.268	0.354	1307	0.350	2610	0.283

**Table S147** Summary of results and experimental time-resolution for various focusing conditions for a 65 kV electron gun with a 10 mm photocathode to anode distance

Energy	Photocathode-anode distance / mm	Aperture size / $\mu\text{m}$	Lens position / cm	Lens field strength/ mT	Focus type	Electron beam rms radius at sample / mm	Equivalent FWHM beam size / mm	Electron pulse duration / fs	Laser and sample width / mm	Time-resolution / fs	Electron beam rms radius at detector / mm
65	10	150	10	-	0.0	Natural	0.242	0.335	630	0.350	2067
				50.4	Optimal detector focus	0.180	0.248	629	0.250	1547	0.018
				7	50.4	Collimated	0.146	0.202	632	0.200	1299
65	10	400	9	-	0.0	Natural	0.537	0.702	621	0.700	3996
				50.4	Optimal detector focus	0.368	0.479	621	0.475	2753	0.051
				3	63.0	Collimated	0.199	0.261	644	0.275	1676

**Table S148** Summary of results and experimental time-resolution for various focusing conditions for a 65 kV electron gun with a 15 mm photocathode to anode distance

Energy	Photocathode-anode distance / mm	Aperture size / $\mu\text{m}$	Lens position / cm	Lens field strength/ mT	Focus type	Electron beam rms radius at sample / mm	Equivalent FWHM beam size / mm	Electron pulse duration / fs	Laser and sample width / mm	Time-resolution / fs	Electron beam rms radius at detector / mm
65	15	150	-	0.0	Natural	0.185	0.259	886	0.275	1782	0.584
			9	50.4	Optimal detector focus	0.126	0.173	886	0.175	1330	0.026
			6	50.4	Collimated	0.104	0.143	891	0.150	1231	0.104
65	15	400	-	0.0	Natural	0.408	0.535	881	0.550	3218	1.252
			8	50.4	Optimal detector focus	0.254	0.334	883	0.350	2157	0.041
			5	50.4	Collimated	0.218	0.287	888	0.300	1908	0.226

**Table S149** Summary of results and experimental time-resolution for various focusing conditions for a 100 kV electron gun with a 10 mm photocathode to anode distance

Energy	Photocathode-anode distance / mm	Aperture size / $\mu\text{m}$	Lens position / cm	Lens field strength/ mT	Focus type	Electron beam rms radius at sample / mm	Equivalent FWHM beam size / mm	Electron pulse duration / fs	Laser and sample width / mm	Time-resolution / fs	Electron beam rms radius at detector / mm
100	10	150	10	-	0.0	Natural	0.243	0.335	398	0.350	1761
				63.0	Optimal detector focus	0.182	0.248	398	0.250	1296	0.015
				4	75.6	Collimated	0.100	0.137	399	0.150	840
100	10	400	10	-	0.0	Natural	0.543	0.707	392	0.725	3576
				63.0	Optimal detector focus	0.406	0.528	392	0.525	2614	0.026
				6	63.0	Collimated	0.319	0.415	393	0.425	2123

**Table S150** Summary of results and experimental time-resolution for various focusing conditions for a 100 kV electron gun with a 15 mm photocathode to anode distance

Energy	Photocathode-anode distance / mm	Aperture size / $\mu\text{m}$	Lens position / cm	Lens field strength/ mT	Focus type	Electron beam rms radius at sample / mm	Equivalent FWHM beam size / mm	Electron pulse duration / fs	Laser and sample width / mm	Time-resolution / fs	Electron beam rms radius at detector / mm
100	15	150	-	0.0	Natural	0.184	0.255	562	0.250	1359	0.572
			9	63.0	Optimal detector focus	0.125	0.173	562	0.175	1033	0.019
			11	50.4	Collimated	0.162	0.223	561	0.220	1226	0.158
100	15	400	-	0.0	Natural	0.410	0.535	558	0.550	2754	1.252
			8	63.0	Optimal detector focus	0.258	0.337	559	0.350	1805	0.032
			5	63.0	Collimated	0.222	0.291	563	0.300	1577	0.224