Homework #2, Due by email, Monday October 14th

1. a) Evaluate the "Scherzer" resolution as a function of voltage assuming a Cs of 1.5mm, voltages in the range 100-1000 kV, plotting your results. (Remember to use the correct relativistic wavelength, which you will need to calculate or look up.)

b) It is common to take a value of 0.1 for the Envelope as a cutoff for the resolution, what is often called the information limit. Ignoring convergence, with a focal spread of 10nm, plot the information limit for the same range of voltages as in part a).

c) Now add an energy spread of 80nm, and evaluate the information limit

Comment on the comparison of a), b) and c)

2. An early paper by Crewe and Salzman <https://www.sciencedirect.com/science/article/pii/0304399182900985> estimated the resolution that could be achieved. Taking the resolution as the inverse of the aperture size, compare the numbers they predicted with those for the ARM200 at Northwestern, and the Cornell NION UltraSTEM. How well did they do in forecasting?