

1. If we want to observe an object 2.5 angstrom in size using photons, what is the minimum energy of the photons? If we try to observe the object using electrons instead of photons (as in the electron microscopes), what is the minimum energy of the electrons? (you may neglect special relativity)
2. Suppose we can measure the moment of an object with 25% error. When the object is a) a ball with 5000 kg mass moving at 2m/s; b). an electron moving at a speed of 0.6c (hence relativistic). In these two cases, what are the uncertainties in measuring the location of the objects?
3. A particle with mass m is confined on a line with length L . With uncertainty principle, estimate the minimum energy of the particle.
4. Consider a wavefunction $\psi(x) = Ae^{-(x+1)^2}$. What is the value of the constant A ? What is the average location of the particle described by this wavefunction? What is its average momentum?