

Chapter 43 Matter as a Wave (Examples) (SM05)

Example 1: What is the wavelength of a 10 eV electron?

Example 2: What is the wavelength of a 45.1 m/s (100 mph) fastball? (mass = 0.14 kg)

Example 3: Find the minimum energy of the electron if an electron microscope is to have a resolution of 5 nm. (Assume the electron's wavelength equals the resolution.)

Example 4: For a hydrogen atom's electron  $\Delta x < 0.106$  nm. What is uncertainty in the electron's momentum?

Example 5: A ball of mass 5 gram has a speed of  $30.0$  m/s  $\pm 0.1$  m/s. What is the minimum uncertainty in its location?

Example 6: What is the minimum uncertainty in the energy of an electron trapped inside a nucleus? ( $\Delta x < 1.20 \times 10^{-15}$  m)