Solution

Calculate the wavelength of

a. an electron that has been accelerated from rest across a 3-Volt potential difference ($m_e = 9.11\times10^{-31}$ kg).

b. Ditto for a proton ($m_p = 1.67\times10^{-27}$ kg).

c. a major league fastball ($m_{baseball} = 0.15$ kg, v = 50 m/s).

a. $E = e\cdot V = 4.8\times10^{-19}$ J
$p = \sqrt{(2m_eE)} = 9.35\times10^{-25}$ kg m/s
$\lambda = h/p = 7.1\times10^{-10}$ m = 0.71 nm

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b. $p = \sqrt{(2m_pE)} = 4.00\times10^{-23}$ kg m/s
$\lambda = h/p = 1.7\times10^{-11}$ m

E is the same.
Mass is bigger $\Rightarrow$ λ is smaller.

c. $p = mv = 7.5$ kg m/s
$\lambda = h/p = 8.8\times10^{-35}$ m

SI units were designed to be convenient for macroscopic objects.

QM wave effects are negligible in the motion of macroscopic objects. 10^{-35} m is many orders of magnitude smaller than any distance that has ever been measured (10^{-19} m, at Fermilab).