

729.

**Problem 50.11 (RHK)**

*A nonrelativistic particle is moving three times as fast as an electron. The ratio of their de Broglie wavelengths, particle to electron, is  $1.814 \times 10^{-4}$ . By calculating its mass, we have to identify the particle.*

**Solution:**

Let the particle's mass be  $m$ . From the data of the problem, we write the following relation:

$$\frac{\lambda_{particle}}{\lambda_{electron}} = \frac{h}{3mv} \times \frac{m_e v}{h} = 1.813 \times 10^{-4},$$

and

$$\begin{aligned} \therefore m &= \frac{m_e}{3 \times 1.813 \times 10^{-4}} = \frac{0.511}{3 \times 1.813 \times 10^{-4}} \text{ MeV c}^{-2} \\ &= 939.5 \text{ MeV c}^{-2}. \end{aligned}$$

The particle is a neutron.