7 Electrons, travelling at speed v in a vacuum, are incident on a very thin carbon film, as illustrated in Fig. 7.1.

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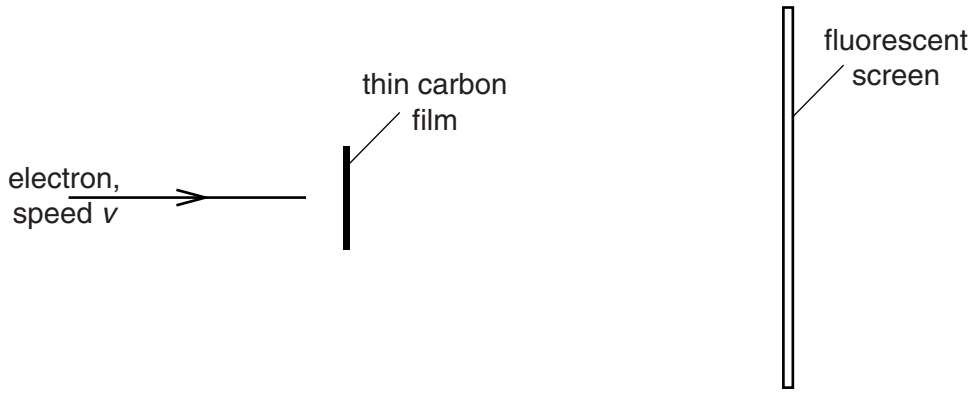

Fig. 7.1

The emergent electrons are incident on a fluorescent screen.
A series of concentric rings is observed on the screen.

(a) Suggest why the observed rings provide evidence for the wave nature of particles.

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.....[2]

(b) The initial speed of the electrons is increased. State and explain the effect, if any, on the radii of the rings observed on the screen.

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.....[3]

(c) A proton and an electron are each accelerated from rest through the same potential difference.
Determine the ratio

$$\frac{\text{de Broglie wavelength of the proton}}{\text{de Broglie wavelength of the electron}}.$$

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ratio = ...[4]