1-14. ① $E = E_2 - E_1 = 10.2ev$, $P = \dfrac{E}{c} = m_H \cdot v$, $v = \dfrac{E_2 - E_1}{m_H \cdot c} \approx 3.25m/s$

② $E_k = \dfrac{1}{2} m_H \cdot v^2 = 8.84 \times 10^{-27} J$, $\dfrac{E_k}{E} = 5.4 \times 10^{-9}$

1-15. ① $\lambda = \dfrac{h}{\sqrt{2E \cdot m_e}} \approx 1.23 \times 10^{-10} m$

② $\lambda = \dfrac{h}{\sqrt{2Em}} \approx 9.06 \times 10^{-11} m$

③ $\lambda = \dfrac{h}{P} = \dfrac{h}{\sqrt{3kTm}} \approx 1.25 \times 10^{-9} m$

1-16. $m_0 c^2 = \dfrac{1}{2} \cdot \dfrac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \cdot c^2 \Rightarrow \dfrac{v}{c} = \dfrac{\sqrt{3}}{2}$, $v = \dfrac{\sqrt{3}}{2} c = 2.6 \times 10^8 m/s$

$\lambda = \dfrac{h}{\frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \cdot v} \approx 1.40 \times 10^{-14} m$
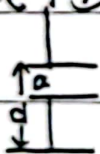
1-18. $\lambda = \Delta x \cdot \sin\varphi$, $P = \dfrac{h}{\lambda}$, $E_k = \dfrac{P^2}{2m_0} = \dfrac{h^2}{2m_0 \lambda^2} \approx 609 eV$

1. $E_k = \dfrac{3}{2} kT$, $\lambda = \dfrac{h}{P} = \dfrac{h}{\sqrt{3kTm_0}} = 5.03 \times 10^{-10} m$

2. $\sin\varphi = \dfrac{\lambda}{\Delta x} = 5.41 \times 10^{-6}$, $d = D \cdot \tan\varphi \approx D \cdot \sin\varphi \approx 2.7 \times 10^{-5} m$

3. 考虑干涉: $d\sin\varphi = \dfrac{\lambda}{2}$, $D \cdot \tan\varphi \approx D \cdot \sin\varphi = \dfrac{D \cdot \lambda}{2d} \approx 1 \times 10^{-5} m$

$P = \dfrac{h}{\lambda}$

补: $\Delta P = h \cdot \dfrac{1}{\Delta x} = 6.63 \times 10^{-23} kg \cdot m/s$

$E = E_k + m_e c^2$, $\Delta E = \Delta E_k = \Delta\left(\dfrac{P^2}{2m_e}\right) = \dfrac{P}{m_e} \Delta P = \sqrt{\dfrac{2E_k}{m_e}} \Delta P = 1.24 \times 10^{-15} J$

9.8