26.6 已知：$T=3K$

求：ν_m, P

解：$\nu_m = C_\nu T = 5.88\times10^{10}\times3 = 1.764\times10^{11}\,Hz$

$P = M\cdot4\pi R^2 = 4\pi\sigma T^4R^2 = 4\pi\times5.67\times10^{-8}\times3^4\times(6400\times10^3)^2 = 2.364\times10^9\,W$

26.11 已知：逸出功 $A=4.2eV$，$\lambda=200\,nm=200\times10^{-9}$

求：最大动能 $E_{k,m}$，截止电压 U_c，铝的红限波长λ。

解：(1) $E_{k,m} = h\nu - A = h\cdot\frac{c}{\lambda} - A = 6.63\times10^{-34}\times\frac{3\times10^8}{200\times10^{-9}}\times\frac{1}{1.6\times10^{-19}} - 4.2 = 2.0\,eV$

(2) $U_c = E_{km}/e = \frac{2.0}{1} = 2.0V$

(3) $\lambda_0 = \frac{c}{\nu_0} = \frac{hc}{A} = \frac{6.63\times10^{-34}\times3\times10^8}{4.2\times1.6\times10^{-19}} = 2.96\times10^{-7}\,m$.

26.15 已知：$E_0=0.6MeV$，$\lambda=1.2\lambda_0$

求：反冲电子动能 E_e.

解：$E=\frac{hc}{\lambda}=\frac{hc}{1.2\lambda_0}=\frac{E_0}{1.2}$，$E_e = E_0-\frac{E_0}{1.2}=\frac{E_0}{6}=\frac{0.6}{6}=0.1\,MeV$

26.22 已知：$m = m_0/\sqrt{1-V^2/c^2}$，$\nu=\frac{E}{h}=\frac{mc^2}{h}$，$\lambda=\frac{h}{p}=\frac{h}{mV}$，$V_g=\frac{d\omega}{dk}=\frac{d\nu}{d(\frac{1}{\lambda})}$

求证：$V_g=V$

解：由 $d\nu = d\frac{mc^2}{h} = \frac{c^2}{h}dm$，$d(\frac{1}{\lambda}) = d(\frac{mV}{h}) = \frac{Vdm+mdV}{h}$ 知

$$V_g = \frac{d\nu}{d(\frac{1}{\lambda})} = \frac{C^2}{h}\cdot\frac{h\,dm}{Vdm+mdV} = \frac{c^2\frac{dm}{dV}}{V\frac{dm}{dV}+m}$$

代入 $m=\frac{m_0}{\sqrt{1-V^2/c^2}}$，$\frac{dm}{dV}=\frac{m_0V}{c^2(1-\frac{V^2}{c^2})^{\frac{3}{2}}}$ 有

$$V_g = \frac{C^2\cdot\frac{m_0V}{C^2(1-\frac{V^2}{C^2})^{\frac{3}{2}}}}{V\cdot\frac{m_0V}{C^2(1-\frac{V^2}{C^2})^{\frac{3}{2}}}+\frac{m_0}{(1-V^2/C^2)^{\frac{1}{2}}}} = \frac{V}{\frac{V^2}{C^2}+1-\frac{V^2}{C^2}} = V$$

26.30 证明：质量m的粒子在边长a的立方体运动，零点能 $E_{min}=\frac{3\hbar^2}{8ma^2}$

证：取 $\Delta x=a$，有 $\Delta P_x \geq \frac{\hbar}{2\Delta x} = \frac{\hbar}{2a}$

取 $p_x\approx\Delta P_x$，有 $p_x\geq\frac{\hbar}{2a}$

同理可得 $p_y\geq\frac{\hbar}{2a}$，$p_z=\frac{\hbar}{2a}$

故 $E_{min}=\frac{P_{min}^2}{2m}=\frac{P_{x,min}^2+P_{y,min}^2+P_{z,min}^2}{2m}=\frac{3\hbar^2}{8ma^2}$