$$T = h\nu \frac{\gamma(1-\cos\varphi)}{1+\gamma(1-\cos\varphi)} \qquad \varphi = \pi \qquad \cos(\pi) = -1$$

$$= h\nu \frac{2\gamma}{1+2\gamma} \qquad \gamma = \frac{h\nu}{m_e c}$$

$$= m_e c \frac{2\gamma^2}{1+2\gamma}$$

$$T = h\Delta\nu$$

$$\Delta\nu = \frac{m_e c}{h} \frac{2\gamma^2}{1+2\gamma} \qquad \lambda_c = \frac{c}{\Delta\nu} \; ?$$

$$= \frac{c}{\nu^2}\Delta\nu \; ?$$

$$\frac{c}{\Delta\nu} = c \cdot \frac{h}{m_e c} \frac{1+2\gamma}{2\gamma^2}$$

$$\frac{h}{m} \frac{1+\frac{h\nu}{mc}}{2\left(\frac{h\nu}{mc}\right)^2} = \frac{h}{2m}\left(\frac{mc}{h\nu}\right)^2 \frac{mc+h\nu}{mc}$$

$$= \frac{mc^2}{2h\nu^2} \frac{mc+h\nu}{mc}$$

$$= \frac{c}{2h\nu^2}(mc+h\nu)$$

$$\frac{c}{\nu^2}\Delta\nu = \frac{c}{\nu^2} \frac{m_e c}{h} \frac{2\gamma^2}{1+2\gamma} = \frac{c}{\nu^2} \frac{mc}{h} \frac{2\left(\frac{h\nu}{mc}\right)^2}{\frac{mc+2h\nu}{mc}}$$

$$= \frac{c}{\nu^2} \frac{mc}{h} \frac{mc}{mc+2h\nu} \; 2 \frac{h^2\nu^2}{m^2c^2}$$