The emission angle is given in (13.50)

$$\theta_c = \cos^{-1}\left(\frac{1}{\beta\sqrt{\epsilon}}\right) = \cos^{-1}\left(\frac{1}{\beta n}\right) \tag{1}$$

We can express β in terms of kinetic energy T,

$$\beta = \sqrt{1-\frac{1}{\gamma^2}} = \sqrt{1-\frac{1}{\left(\frac{T}{mc^2}+1\right)^2}} = \frac{\sqrt{T\,(T+2mc^2)}}{T+mc^2} \tag{2}$$

Plugging the numbers, we get

$$\begin{aligned}
\text{electron with } T = 1\text{MeV}: &\qquad \beta = 0.94 &\qquad \theta_c = 44.9^\circ\\
\text{proton with } T = 500\text{MeV}: &\qquad \beta = 0.76 &\qquad \theta_c = 28.4^\circ\\
\text{proton with } T = 5\text{GeV}: &\qquad \beta = 0.99 &\qquad \theta_c = 47.5^\circ
\end{aligned}$$

From Frank-Tamm formula (13.48), we have

$$\frac{dW}{dx} = \frac{q^2}{c^2}\int_{\epsilon(\omega)>1/\beta^2} \omega\left[1-\frac{1}{\beta^2\epsilon(\omega)}\right]d\omega \qquad \Longrightarrow \qquad \frac{d}{dx}\left(\frac{dW}{d\omega}\right) = \frac{q^2}{c^2}\left[1-\frac{1}{\beta^2\epsilon(\omega)}\right]\omega \qquad \text{for } \epsilon(\omega) > 1/\beta^2$$

Each quanta carries energy $\hbar\omega$, the above becomes

$$\frac{d}{dx}\left(\frac{dW/\hbar\omega}{d\omega}\right) = \frac{d}{dx}\left(\frac{dN}{d\omega}\right) = \frac{q^2}{\hbar c^2}\left[1-\frac{1}{\beta^2\epsilon(\omega)}\right] \tag{3}$$

Converting the derivative to be with respect to the wavelength, via $\omega = 2\pi c/\lambda$, we have

$$\frac{d}{dx}\left(\frac{dN}{d\lambda}\right) = \frac{d}{dx}\left(\frac{dN/d\lambda}{d\omega/d\lambda}\right) \qquad \Longrightarrow \qquad \frac{d}{dx}\left(\frac{dN}{d\lambda}\right) = -\frac{2\pi c}{\lambda^2}\frac{q^2}{\hbar c^2}\left[1-\frac{1}{\beta^2\epsilon(\omega)}\right] \tag{4}$$

Integrating in the range of wavelength gives emitted photons per unit length

$$\frac{dN}{dx} = 2\pi\left(\frac{q^2}{\hbar c}\right)\left[1-\frac{1}{\beta^2\epsilon(\omega)}\right]\left(\frac{1}{\lambda_1}-\frac{1}{\lambda_2}\right) \approx \frac{2\pi}{137}\left(1-\frac{1}{\beta^2 1.5^2}\right)\left(\frac{1}{\lambda_1}-\frac{1}{\lambda_2}\right) \tag{5}$$

The numerical results are shown below.

$$\begin{aligned}
\text{electron with } T = 1\text{MeV}: &\qquad \frac{dN}{dx} \approx 190/\text{cm}\\
\text{proton with } T = 500\text{MeV}: &\qquad \frac{dN}{dx} \approx 86/\text{cm}\\
\text{proton with } T = 5\text{GeV}: &\qquad \frac{dN}{dx} \approx 208/\text{cm}
\end{aligned}$$