

70. We use the transverse Doppler shift formula, Eq. 38-34: $f = f_0 \sqrt{1 - \beta^2}$, or

$$\frac{1}{\lambda} = \frac{1}{\lambda_0} \sqrt{1 - \beta^2} .$$

We solve for $\lambda - \lambda_0$:

$$\lambda - \lambda_0 = \lambda_0 \left(\frac{1}{\sqrt{1 - \beta^2}} - 1 \right) = (589.00 \text{ nm}) \left[\frac{1}{\sqrt{1 - (0.100)^2}} - 1 \right] = +2.97 \text{ nm} .$$