Monday, February 16, 2026

Example: Doppler Shift

A tie fighter attacks you at $v = 0.1 c$ with its green laser cannon (at $\lambda = 530 \, nm$).

Q: what color do you see for the lasers?
↳ blue shifted

$$-\frac{\Delta\lambda}{\lambda} = \frac{v}{c} \implies \Delta\lambda = -\frac{v}{c}\lambda$$

$$\frac{0.1\,c}{c} = 0.1$$

$$= -0.1 \times 530 \, nm$$

$$= -53 \, nm$$

$$\implies \lambda' = \lambda + \Delta\lambda = 530 + (-53)$$

Wavelength seen by observer

$$= 477 \, nm \longrightarrow blue$$

$\implies$ You see the laser's light as blue at $\lambda' = 477 \, nm$