

Wednesday, September 9, 2020

Example: Doppler Shift.

A tie fighter attacks you at $v = 0.1c$ with its green $\lambda = 530 \text{ nm}$ laser cannon.

Q: what color do you see for the lasers?

↳ blue shifted

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

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

$$= -0.1 \times 530$$

$$= -53 \text{ nm}$$

$$\Rightarrow \lambda' = \lambda + \Delta\lambda = 530 + (-53) = 477 \text{ nm} \rightarrow \text{blue}$$

wavelength of observer
(i.e. that you see)

\Rightarrow You see the laser's light as blue at $\lambda' = 477 \text{ nm}$