**ADVANCED DYNAMICS — PHY 4241/5227**

**SOLUTIONS – SET 13**

Problem 46: The equation for the redshift is

$$\begin{aligned}
\lambda' &= \lambda\sqrt{\frac{1+\beta}{1-\beta}} \\
\left(\frac{\lambda'}{\lambda}\right)^2 &= \frac{1+\beta}{1-\beta} \\
\left(\frac{\lambda'}{\lambda}\right)^2 - \beta\left(\frac{\lambda'}{\lambda}\right)^2 &= 1+\beta \\
\left(\frac{\lambda'}{\lambda}\right)^2 - 1 &= \beta\left[1+\left(\frac{\lambda'}{\lambda}\right)^2\right] \\
\beta &= \frac{(\lambda'/\lambda)^2-1}{(\lambda'/\lambda)^2+1}
\end{aligned}$$

With $\lambda' = 729.2$ and $\lambda = 364.56$ we find

$$\beta = \frac{v}{c} = 0.6\,.$$