

- How fast and in what direction must galaxy A be moving if an absorption line found at wavelength 550 nm (green) for a stationary galaxy is shifted to 450 nm (blue) (a "blue-shift") for galaxy A ? $\beta = 0.198$

- How fast and in what direction is galaxy B moving if it shows the same line shifted to 700 nm (red) (a "red shift")? $\beta = 0.237$

Two spaceships approach each other, each moving with the same speed as measured by a stationary observer on the Earth. Their relative speed is $0.70c$,

- Determine the velocities of each spaceship as measured by the stationary observer on Earth. $\pm 0.41c$

As seen from Earth, two spaceships A and B are approaching along perpendicular directions.

- If A is observed by a stationary Earth observer to have velocity $u_y = -0.90c$ and B to have velocity $u_x = +0.90c$, determine the speed of ship A as measured by the pilot of ship B. $0.98c$