Answer on Question #38745

Physics – Relativity

Question:

On the ground Albert and Isaac inspect the new spaceship their university has purchased. They find it nice and spacious measuring 25 m in length. Later in the day Isaac takes off in the new spaceship to explore the galaxy. After the spaceship has reached cruisespeed, Albert find that its length has contracted to 10 m. What is the speed of the spaceship?

Solution:

Initial length $\ell_0 = 25\ m$, length during motion is $\ell = 10\ m$.

$$\ell = \ell_0\sqrt{1 - v^2/c^2} \Rightarrow v = c\sqrt{1 - \ell^2/\ell_0^2} = 300\,000\,\frac{km}{s}\sqrt{1 - 10^2/25^2} \approx 275\,000\,\frac{km}{s}$$

Answer:

$$275\,000\,\frac{km}{s}$$