# Special Relativity

## EINSTEIN'S 1ST POSTULATE

- The laws of physics are the same for observers in ALL inertial frames of reference.
- That is, the laws of physics are the same for a stationary and a moving observer, both witnessing the same event

***Example:***

Nadia is sitting at the dinner table when her 6.0 kg overstuffed turkey suddenly explodes into two equal halves. One piece moves 2.0 m/s [L] and the other travels 2.0 m/s [R]. At that very moment, Jerry walks by the table at 2.0 m/s [L]. What is the change in the kinetic energy of the turkey from both Nadia's and Jerry's points of view.

***Solution:***

*Nadia's stationary reference frame:*

Since the turkey was not moving before the explosion, the initial kinetic energy is zero.

*Jerry's moving reference frame:*

Since Jerry is moving 2.0 m/s [L], then relative to Jerry, the turkey is moving 2.0 m/s [R].

After the explosion, the 3.0 kg half going left has a speed of 0 m/s relative to Jerry, while the other half has a speed of 4.0 m/s [R], away from him.

## EINSTEIN'S 2ND POSTULATE

- The speed of light in a vacuum has the same value, *c*, in all inertial systems
- That is, the speed of light is absolute.

This has been corroborated experimentally. For example, electrons accelerated through a potential difference of 1 MV have a speed of 0.9411c. When the potential difference is increased to 4MV, their speed doesn't double as we might expect from Newtonian physics, but increases to 0.9936c; only a factor of 5.8%. This means that some of this energy must be converted into another form.