What's up in Astronomy By Eric Erickson

Offered Title: What is the Speed of Light?

First, we have reader question to answer.

Q. Why are all the planets round or spherical? -R. Horsey

A. The spherical shape is due to forces of attraction (gravity) and the spinning forces (centrifugal) of a rotating body. When a body spins, its mass tends to even out along the axis of spin. Whether a body becomes spherical depends on its size, mass, composition (gas, rock, ice etc.), and rotation rate. Many stars and planets, due to their rapid rotation, are slightly oblong, flattened at their poles.

– M. de Kiewiet/E. Erickson

The speed of light (c) has been thought to be the ultimate standard in science. Since Albert Einstein first defined it as the absolute limit of speed, it has been used to measure the great distances in our universe. The speed of light is the speed of photons. In a vacuum, photons travel at 299,792,458 meters/second. By international agreement the length of one meter is now the distance light travels in 1/299,792,458 second. Photons are the particles of light energy and are thought to be massless. In theory, only massless particles can attain light speed.

It is known that light (photons) speed is decreased in certain matrixes such as water and glass, based on their refractive index. Light speed variability has been a topic of study ever since Einstein predicted it in his equations. The variations I will be discussing below are different from refraction, however, one of the proposed mechanisms has similarity as it refers to a refractive index for gravitational fields.

In 1907, Einstein's equations revealed that the speed of light might be variable. His equations indicated that light speed is reduced by gravitational fields. Physicist Max Born, in the early 1920s also predicted the decreased magnitude of light speed in gravitational fields.

Robert Dicke in the 1950s came up with a model of light speed where the wavelength as well as frequency of light changes in gravitational fields due to a proposed refractive index. Dicke also proposed that the speed of light decreases with time, as the universe's horizon expands, and more mass contributes to the refraction index. This prediction however has not been observed…yet.

Since then, starting in the 1980s, several individual and team efforts have proposed a much higher speed of light in the early universe vs what we experience today. These newer theories serve to provide an alternative to cosmic inflation theory, explaining how the early universe apparently expanded so quickly and greatly (much faster than the speed of light) in a very short time.

The above snippets are tantalizing but very incomplete and taken out of very complex contexts, the theories. Fascinating, but not verified yet.

The speed of light is safe, for now.

What's in the Sky?

June 16; after sunset; west: A thin waxing crescent Moon and Venus share the sky. In between them is the Beehive Cluster (M44). Use binoculars.