Astronomers using the VERITAS telescopes to detect some of the highest-energy photons in the Universe need your help! These photons are gamma-rays that originate in astrophysical environments like the expanding blast waves thrown out by supernova explosions, or from powerful streams of material that flow from the cores of active galaxies at speeds close to that of light. Muons (a particle like an electron, only heavier) are a prominent background contaminant when observing very-high-energy gamma rays on earth. They leave a distinctive ring-like shape making them obvious to the human eye, but incomplete or truncated rings can appear very gamma-ray-like to automatic analysis algorithms. We need your help to identify camera images that contain muon rings so we can teach computers to better identify such images and efficiently filter out those pesky muons that are masquerading as gamma rays.

Find out more at Muon Hunters
VERITAS Video

Videos on youtube can be found [here].

Media

Here are copies of the new (2011) signs posted outside the FLWO Visitors Center close to the T1 telescope (click on the figures for full-size versions):
Observing Gamma Rays

Miles overhead, very-high-energy gamma rays enter the atmosphere and collide with all of molecules. These collisions produce a shower of secondary particles that move towards the ground at nearly the speed of light. The VERITAS gamma-ray image is the faint blue/white glow emitted by these “air showers.” This pulsar of Cherenkov light lasts only a few milliseconds or a second.

The telescope in front of you is one of four in an array. Using these telescopes rather than just one removes the direction and energy of each gamma ray to be determined more accurately and to reject numerous charged particles that act like noise in the observation.

Each telescope views the air shower from a different perspective and the resulting images have different orientations. The position is thereby of a gamma-ray source can be determined from the intersections of lines drawn through each image.

The complete spectrum of visible and invisible light extends far out on both sides of visible light from radio waves to gamma rays. VERITAS studies invisible very-high-energy gamma rays, which travel far from their sources more energy than visible light.

Gamma-ray astronomy has opened a new window on the universe. Thanks to gamma-ray telescopes such as VERITAS, scientists have been able to study sources very-high-energy invisible light produced in the most extreme environments in the Universe near objects such as black holes, supernovae, and starburst galaxies.

Gamma Ray Astronomy

The Crab Nebula is a supernova remnant produced by a stellar explosion seen in 1054 AD. Light entered the array. A supernova remnant is a remnant of a supernova explosion, and the supernova remnant produces gamma rays. The Crab Nebula is a source of gamma rays that shine bright and is used to calibrate the VERITAS instruments.

Young stars are very bright and can produce lines of light. Gamma-ray astronomers study these lines to determine the age of a young star. The emission between these two and the surrounding gas may produce gamma rays.

Starburst galaxies, like the M82, have very many new stars that can produce lines of light. The energy of these lines is used to study and understand the interaction of high-energy charged particles. These charged particles produce gamma rays that are detected here on Earth.

The gamma rays produced are much shorter than the lines of light. The energy of the light is much lower than the energy of the gamma rays. Gamma rays are detected on Earth using a large telescope.
Links

If you have any questions on astronomy or astrophysics in general please follow one of these links

- NASA - Ask an astrophysicist
- Ask an astrophysicist - specialising in cosmic-ray, gamma-ray and X-ray astrophysics
- Ask an astronomer
- McDonald's Observatory ask an astronomer
- Curious about astronomy ask an astronomer
- Cool cosmos ask an astronomer
- Ask an astronomer @ UCBerkely
- Lick Observatory ask an astronomer
- NRAO ask an astronomer
- Harvard CfA resources for amateur astronomers
- Phil Plait's Bad Astronomy page