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 molecules. These collisions produce a shower of secondary particles that move towards the ground at nearly the speed of light. The VERTAS gamma-ray imaging telescope block is surrounded by three "air showers". This produces Cherenkov light lasting only a few nanoseconds of a second.

The telescope is fixed in front of you is one of four in an array. Using the telescope rather than just one enables 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 showers from a different perspective, and the resulting images have different orientations. The position is the sky of a gamma-ray source can be determined from the intersection 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. VERTAS studies invisible very-high-energy gamma rays with billions of times more energy than visible light.

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

The Crab Nebula is a supernova remnant produced by a stellar explosion seen in 1054 AD. This is a small, supermassive object composed of protons from which stream a highly energetic wind of charged particles. The neutron star in its center and the supernova remnant generate gamma rays. The Crab Nebula is a source of gamma rays in all energy bands and it is used to calibrate the VERTAS instruments.

Younger stars release very energetic light, and the interaction of this light with atomic nuclei in the interstellar medium produces ionizing radiation. This ionizing radiation excites the remaining gas, producing a cloud of highly energetic charged particles. These charged particles behave as gamma rays that can be observed here on Earth.

Starburst galaxies, the M82, form each year more stars than the Milky Way. When the wind of these young stars collides with the gas in the surrounding region, it produces a cloud of highly energetic charged particles. These charged particles behave as gamma rays that can be observed here on Earth.

The galaxy NGC 4038/39, a pair of interacting galaxies, is a brilliant example of how gamma-ray astronomy can reveal the most extreme environments in the universe.
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