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Scientists' goal to see shower of cosmic rays

SALT LAKE CITY (UPI) — When a cosmic ray ends its trillion mile trip through space by colliding with the earth's atmosphere, the fallout flashes across the sky with all the intensity of a 100 watt light bulb.

The shower of tiny particles cascades to the earth several miles below at nearly the speed of light, striking the ground 60- to 70-millionths of a second after the subatomic space traveler first crashed into an air molecule.

A 100 watt light at more than 186,000 miles a second is dimmer than the stars or the glow of the night sky behind it —even in unpopulated and remote regions like the western Utah desert.

But the Bonneville Salt Flats and similar spots far from urban civilization are the only places where physicists studying high energy particles and the origins of cosmic rays can get a glimpse of the collisions.

A team of University of Utah scientists has received a National Science Foundation grant of $280,000 to start work on a unique astrophysics observatory located on the bone-white desert best known as an auto speedway.

The observatory will consist of 80 dish-shaped mirrors on the outside of a large geodesic dome. A dozen photo-multiplier tubes suspended over each mirror—about 1,000 over the entire structure—will be attached to a computer.

The structure, which won't be finished for three to five years, is nicknamed "fly's eye" because of its resemblance to the compound eyes of a fly.

It will operate only on dark nights when there is no interference from moon light. Although cosmic rays are dimmer than the stars or glow of the night sky, the background is steady while the rays are moving rapidly.

"So we'll look for changes in the light intensity," said Dr. Haven Bergeson, associate professor of physics and one of three principal investigators on the project.

Bergeson said the array of mirrors on "fly's eye" will permit detection of higher energy particles than current cosmic ray counters, allowing the analysis of more events, and will also give a picture of the ray's angle of descent, its energy and its distance away.

The experiments will be in two basic areas, high energy particle physics and astrophysics.

High energy physics—the study of the interactions between subatomic particles fired down atomic smashers into target particles at nearly the speed of light—is limited by the energies accelerators can produce, Bergeson said.

"We will be able to detect interactions in the atmosphere involving cosmic rays with energies 100,000 times higher than accelerator particles," he said in an interview.

"A number of theories on interactions have been developed that fit data produced with accelerators," Bergeson said. "But they give different predictions for reactions at higher energies."

"Although our measurements will be fairly crude compared to those obtained in accelerators, they will be precise enough to determine between conflicting theories," he added.