

Space Scientists Refute Theory Of Cosmic Ray Origin

Thursday, April 26, 2012

<http://www.asianscientist.com/in-the-lab/icecube-collaboration-neutrino-observatory-cosmic-ray-origin-2012/>

AsianScientist (Apr. 26, 2012) - An international group of researchers who call themselves the IceCube Collaboration has produced surprising results about one of the most enduring mysteries in physics - the origin of cosmic rays.

First discovered 100 years ago, cosmic rays are electrically charged particles, such as protons, that strike Earth from all directions, with energies up to 100 million times higher than those created in man-made accelerators.

Physicists have focused their interest on two potential sources of cosmic rays: the massive black holes at the center of active galaxies, and the exploding fireballs observed by astronomers as gamma ray bursts (GRBs).

The IceCube Neutrino Observatory observes neutrinos, which are believed to accompany cosmic ray production, by detecting the faint blue light produced in neutrino interactions in ice.

In a paper published in the journal *Nature*, the IceCube collaboration describes a search for neutrinos emitted from 300 GRBs observed between May 2008 and April 2010.

GRBs, the universe's most powerful explosions, appear briefly about once per day, and are so bright that they can be seen from halfway across the visible Universe.

Surprisingly, the team found no evidence of neutrinos - a result that contradicts 15 years of predictions.

"This is the most important result so far from the IceCube observatory. Gamma ray bursts don't seem to make neutrinos as we previously thought, which means they probably aren't making cosmic rays either," said IceCube consortium member Dr. Gary Hill of the University of Adelaide.

Although the team has taken a major step towards ruling out one of the leading predictions in GRBs, they still have not discovered where cosmic rays come from.

"The unexpected absence of neutrinos from GRBs has forced a re-evaluation of the theory for production of cosmic rays and neutrinos in a GRB fireball and possibly the theory that high-energy cosmic rays are generated in fireballs," said IceCube spokesperson and University of Maryland physics professor Greg Sullivan.

The article can be found at: [IceCube Collaboration \(2012\) An absence of neutrinos associated with](#)

[cosmic-ray acceleration in \$\gamma\$ -ray bursts.](#)

Source: [University of Adelaide](#); Photo: S. Swardy, University of Chicago/NASA.

Disclaimer: This article does not necessarily reflect the views of AsianScientist or its staff.