

Spring 2018 Colloquium

Department of Physics & Astronomy, TAMU-Commerce

Mar 22, Thursday, 4-5 PM in Science Building 127

(coffee and cookies will be served at 3:50 PM)

Astrophysics, Particle physics

Astrophysical Neutrinos:

What do they tell us about cosmic accelerators?

Dr. Spencer Klein

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Dr. Klein earned his BA in 1982 from the University of California, San Diego, and his PhD from Stanford University in 1988 for dissertation work on 29 GeV e^+e^- collisions. From there, he moved into astroparticle physics, with postdocs at Boston University, on MACRO [Monopole, Astrophysics and Cosmic-Ray Observatory] and UC Santa Cruz on Cygnus, Milagro and the Landau-Pomeranchuk Effect. In 1994, he moved to Lawrence Berkeley National Lab, to work on heavy-ion collisions with the STAR detector at RHIC, where he is currently a senior scientist; he also has an appointment as a research physicist at UC Berkeley. His current interests include neutrino astroparticle physics with IceCube and ARIANNA, and ultra-peripheral collisions with STAR and ALICE. He has a blog, <http://antarcticaneutrinos.blogspot.com/>.

Abstract

The existence of cosmic-rays with energies well above 10^{20} electron volts (16 Joules) is a long-standing mystery; producing them requires either enormously powerful astrophysical accelerators, or something exotic. One way to shed light on cosmic-rays accelerators is to search for their signal in another channel - neutrinos! The IceCube detector has observed a diffuse flux of astrophysical neutrinos, extending to energies well above 1 PeV (10^{15} eV). This flux has been observed by multiple analyses using independent datasets, with high significance. This flux is near the maximum predicted ("Waxman-Bahcall bound") from astrophysical accelerators. Most popular source models, involving gamma-ray bursts, active galactic nuclei (galactic centers containing supermassive black holes), and even star-forming galaxies are disfavored to varying degrees. In this talk, I will discuss the IceCube results in the context of cosmic-ray physics and give the status of different classes of source models. I will conclude by discussing some possible future experiments.