

The Latest Discoveries in High Energy Neutrino Astrophysics

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Current knowledge of the Universe is based on information carried by electromagnetic radiation, gravitational waves, neutrinos, and cosmic rays. For over a century, scientists have observed cosmic rays, but the understanding of their place of production is limited. As a product of cosmic ray interaction, neutrinos can shed light on the extreme part of the Universe. IceCube Neutrino Observatory has been leading neutrino astronomy research over the last ten years and is the only observatory with the exposure to detect high-energy neutrinos beyond Earth's atmosphere. This presentation will highlight the IceCube observations, including new recent results. Despite the exiting times, with IceCube operating alone and limited by the South Pole location and cubic-km scale, the neutrino astronomy efforts have yet to advance the field past infancy. It is clear that more observatories and larger telescopes, ultimately linked via a global network, are needed to advance fundamental discoveries in astro and particle physics. In this direction, a new opportunity has emerged over the last years to construct a new large volume neutrino telescope, the Pacific Ocean Neutrino Experiment (P-ONE), which will be based for the first time, within an existing oceanographic infrastructure. I will summarize how we have established a scientific relationship with Ocean Networks Canada to pioneer their global network as a testbed infrastructure and identified the optimal location and prepared the ground for the first case deployment.

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