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PLEnuM: A global and distributed monitoring system of high-energy astrophysical neutrinos

High-energy astrophysical neutrinos, discovered by IceCube, are now regularly observed.

Due to their low flux the observation rate remains small, such that open questions about high-energy neutrino astrophysics and particle physics remain limited by statistics at best, or unanswered at worst. Fortunately, this situation will improve in the next years: new neutrino telescopes will come online, which are currently under planning and construction. In order to answer open questions, we propose the Planetary Neutrino Monitoring System (PLEnuM), a concept for a global repository of high-energy neutrino observations. PLEnuM will reach up to four times the exposure available today by combining the exposures of current and future neutrino telescopes distributed around the world – IceCube, IceCube-Gen2, Baikal-GVD, KM3NeT, and P-ONE. Depending on the declination, spectral index and flavor, PLEnuM will improve the sensitivity to astrophysical neutrinos by up to two orders of magnitude. We present first estimates on the capability of PLEnuM to discover Galactic and extragalactic sources of astrophysical neutrinos and to characterize the diffuse flux of high-energy neutrinos in unprecedented detail.

Collaboration / Activity

IceCube, P-ONE, PLEnuM

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