

## Diffuse PeV neutrino emission from Ultra-Luminous Infrared Galaxies

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The origins of the reported two PeV neutrinos (by Ice- Cube Collaboration) are highly controversial so far. Ultra-luminous infrared galaxies (ULIRGs) are the most luminous and intense starburst galaxies in the Universe. Both their star-formation rate (SFR) and gas surface mass density are very high, implying a high supernovae rate and an efficient energy conversion of energetic protons. A small fraction of these supernovae is the so-called hypernovae with a typical kinetic energy  $\sim 10^{52}$  erg and a shock velocity  $\geq 10^9$  cm s<sup>-1</sup>. The strong shocks driven by hypernovae are able to accelerate cosmic ray protons up to  $10^{17}$  eV. These energetic protons lose a good fraction of their energy through proton-proton collision when ejected into very dense interstellar medium, and as a result, produce high energy neutrinos ( $\leq 5$  PeV). Recent deep infrared surveys provide solid constraints on the number density of ULIRGs across a wide redshift range  $0 < z < 2.3$ , allowing us to derive the flux of diffuse neutrinos from hypernovae. We find that at PeV energies, the diffuse neutrinos contributed by ULIRGs are comparable with the atmosphere neutrinos with the flux of  $2 \times 10^{-9}$  GeV cm<sup>-2</sup> s<sup>-1</sup> sr<sup>-1</sup>, by assuming the injected power law cosmic ray spectrum with the index of -2. Such a component may be detected in 20 years by the IceCube full configuration.

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