



Contribution ID: 18

Type: **not specified**

Towards a Megaton MeV Neutrino Detector

Monday, 13 May 2013 17:15 (15 minutes)

The observation of neutrinos from SN1987A has spawned hundreds of publications, underlining the importance that SNe and neutrinos play in cosmology, astrophysics and particle physics. Routine observation of supernova neutrinos would allow to address a multitude of phenomena such as the overall SN rate, the intrinsic mechanism of SNe or the absolute neutrino masses as well as allow to early trigger follow-up observations by other instruments. Alas, current neutrino detectors fall short of the required effective volume of several megatons at MeV energies to reach beyond our own galaxy, limiting the expectation for observing a neutrino burst from a SN to once every few decades.

I will discuss a possible hyper-dense extension of the IceCube detector at the South Pole, that allows to observe neutrinos from SNe at a rate of more than once per year, given that large-area photosensors with sufficiently low self-noise rates are available. I will present a first study for such a sensor based on wavelength shifters with promising results.

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Session Classification: Neutrino Astrophysics I

Track Classification: Neutrino Astrophysics Parallel