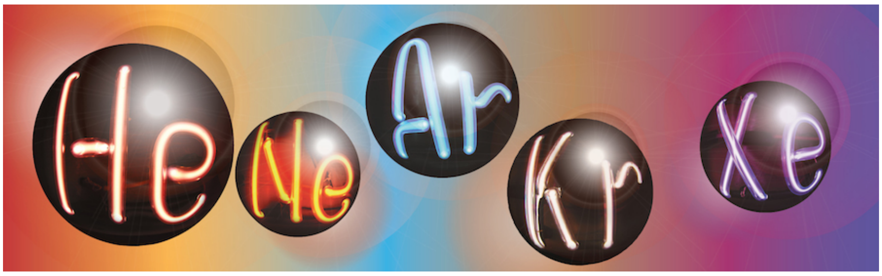

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Prediction of supernova neutrino signals by detectors and its future challenges

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Supernova neutrinos produced during a core-collapse of a massive star, carries 99% of the energy produced during the violent phenomenon. These neutrinos are weakly interacting massive particles, and can provide useful information for both particle physics (neutrino oscillations parameters) and astrophysics (explosion mechanism) that can be used to explore physics beyond the standard model. Neutrinos escape from the supernova core hours before the light, so a neutrino signal providing information about supernova direction can enable early observation. The current generation of detectors, like, Super-Kamiokande (Super-K), LVD, Borexino, KamLAND, and IceCube, as well as HALO, Daya Bay and NOvA, have ability to detect only a few orders of magnitude of events and the next generation, like, Hyper-Kamiokande (Hyper-K), DUNE, and JUNO will have yet another order of magnitude in reach, as well as richer flavor sensitivity. This work will present a monte carlo based study using the SNOwGLoBES package, that is used to estimate the event rate using folded fluxes, cross-sections, and detector smearing to determine mean expected neutrino interaction signals in multiple current and future detectors. A study is carried out for the calculation of core-collapse neutrino event rates in realistic detectors for different flux models, effects of different parameters on flux and its variation with time. This work will also discuss the future challenges and technology needed to advance neutrino astronomy.

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