SUPERNOVA AND LOW-ENERGY TERRESTRIAL NEUTRINOS

Neutrinos produced in supernovae have energies around $\langle E_{\nu_{\mu,\tau}} \rangle \simeq 15$ - 25 MeV, $\langle E_{\nu_e} \rangle \simeq 11$ MeV and $\langle E_{\overline{\nu}_e} \rangle \simeq 13$ MeV.

Terrestrial neutrinos produced by pion decay at rest have energies $E_{\nu_e} = 0$-52 MeV with $\langle E_{\nu_e} \rangle \simeq 32$ MeV.

The nucleus which is relevant for the detections in this case is Carbon 12 (contained in the mineral oil, CH_2, detectors, used,*e.g.*, in the LAMPF or KARMEN experiments) and for supernova neutrinos also Oxygen and Argon and Lead are/maybe used in the detectors.

These reactions involve transition to discrete final states and excitation of giant resonances and typical theoretical calculations use very sophisticated shell-models or continuum-RPA.