PHYSICS OF NEUTRINO DETECTORS

This is in itself an extremely wide field. Moving from low to high neutrino energies we can further divide it into sub-fields, considering the detection of solar neutrinos, supernova and low energy terrestrial neutrinos and atmospheric and middle-to-high energy neutrinos.

DETECTION OF SOLAR NEUTRINOS

ν_e produced in the sun have energies ranging from $\simeq 0.5$ to $\simeq 20$ MeV.

They are typically detected in ν_e capture processes on nuclei like ^{37}Cl or ^{37}Ar. Due to the low energies involved, the relevant contributions come from transitions between discrete bound states $\rightarrow$ the nuclear physics involved in these studies requires Shell Model [redacted] calculations.

The highest energy solar ν_e's are also detected in heavy water detectors through they interaction with the deuteron:

$$\nu_e + d \rightarrow p + p + e^-$$
$$\nu_e + d \rightarrow p + n + \nu'$$