Reactor anti-neutrinos detection mechanism:

Anti-neutrinos from reactors are excellent probes for monitoring reactor power and its core composition as well as for light sterile neutrino searches. The monoenergetic neutron energy response function have been simulated using the GEANT4 toolkit version 4.10.05.

**Inclusive Beta Decay**

\[
\nu_e + p \rightarrow n + e^+ + \nu_{e^+}
\]

*Prompt e⁺ signal: Energy loss + Annihilation*

\[
e^+ + e^- \rightarrow 2 \gamma
\]

n + \(^{155}\text{Gd}\) \rightarrow \(^{155}\text{Gd}^+\) \rightarrow \(^{158}\text{Gd}^+\) + \(\gamma\)’s

Data analysis for DD reaction

DATA and simulation results have a resonable agreement in studied region of energy.

Data analysis for DT reaction

These experimental results will be used for discriminatin of fast neutron background from IBD signal inside the reactor hall.

**Fast neutron response in plastic scintillator bar**

- To obtain the true energy conversion, the detector was calibrated for energy using the Compton edges of the gamma rays from Na\(^{22}\), Co\(^{60}\), Cs\(^{137}\).
- Neutron response was studied in time correlation between PS46 and PS55.
- Comparison between data and MC for energy, Z position difference and energy ratio between PS5 and PS46.

**Conclusions and Outlook**

- Fast neutron response has been studied in plastic scintillator bars using DD(2.45 MeV) and DT(14.1 MeV) reactions at PNGF.
- Data and simulation results have a resonsable agreement in studied region of energy.
- These experimental results will be used for discriminatin of fast neutron background from IBD signal inside the reactor hall.

References


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