Extraction of the neutrino rates in the STEREO experiment

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The STEREO experiment

Designed to probe the Reactor Antineutrino Anomaly (RAA) region, which can be explained by introducing a light sterile neutrino at the eV\(^2\) scale.

- 10 m from the compact and highly \(^{238}\)U enriched reactor core at ILL (Grenoble, France)
- Segmented target filled with Gd-doped liquid scintillator
- Test the oscillation hypothesis with a relative comparison of the \(\bar{\nu}_e\) energy distributions → reduced detection systematics and no reference to an external prediction

Neutrino detection principle

Environnemental conditions sensitivity

Correlated background in STEREO

From background parametrization to \(\nu\)-rates extraction

The background PSD distribution can be parametrized by a multi-gaussian probability density function (p.d.f.)

\[
M_{\text{tot}}^{\gamma}(t, E, \text{cell}) = A_s \times \left( \frac{1}{\Delta t} M_{\gamma} + M_p \right)
\]

- \(M_{\gamma}\) and \(M_p\) are the normalized electron-recoil and proton-recoil background p.d.f.
- \(A_s\) controls the size of the latter while \(\frac{1}{\Delta t}\) drives the balance between both.

- Atmospheric pressure correction is no longer needed: auto-coherent treatment using local rescaling to p-recoil background
- PSD parameters variations are monitored and fitted along time
- Extended Maximum Likelihood (EML) fit adapted to low statistics, procedure validated with Monte-Carlo pseudo-experiments.