LATEST RESULTS OF THE STEREO EXPERIMENT

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The average observed neutrino rate of experiments at short distance from nuclear reactors shows a deficit of electron antineutrinos with respect to predictions. This deficit, known as the Reactor Antineutrino Anomaly (RAA) could be explained either by an underestimated systematic error on the flux prediction or by the existence of a new neutrino state, a light sterile neutrino.

The STEREO experiment aims at answering this question. Located at ten meters from the compact nuclear core of the Institut Laue-Langevin (ILL) in France, the STEREO detector is longitudinally divided in six identical cells filled with gadolinium loaded liquid scintillator. Via the inverse beta decay reaction, it allows to measure the antineutrino energy spectrum at six distances from the core. The comparison of the energy spectra offers an unambiguous test of the oscillation to the hypothetical sterile neutrino.

Since the end of 2016, when the detector started to take data, more than 130 days of data with reactor in operation have been accumulated.
Moreover, more than 150 days with reactor stopped, essential for background measurements, have been acquired. The detector performances in terms of detector response and energy reconstruction meet the initial expectations. Thanks to an efficient detector shielding and dedicated analysis methods, the background could be reduced to reach a signal to background ratio close to 1 with about 400 neutrinos detected per day.

To avoid the dependence on spectrum predictions and to get rid of systematic uncertainties related to the flux normalization, the first oscillation analysis is based on spectra ratios using one cell as a reference. At the current stage the experiment is already sensitive to significant part of the RAA region in the oscillation parameter space. The most recent STEREO results will be presented.