ID de Contribution: **51** Type: **Poster**

Search for a sterile neutrino with the Stereo detector

mardi 10 mai 2016 10:15 (20 minutes)

Neutrino physics stays beyond the Standard Model. If neutrino oscillation involving masses mixing between three neutrino flavours seems today a valid theory, there are some hints for other neutrino families. The "reactor neutrino anomaly" is one of them and puts forward a deficit of electronic antineutrinos at short distance. This deficit can be interpreted as the existence of a *sterile* neutrino, apparent only through the oscillation mecanism.

The Stereo experiment aims to confirm of infirm this hypothesis of a new neutrino oscillation thanks to a segmented detector placed close to a nuclear reactor core, source of electronic antineutrinos. Detection is based on liquid scintillator technique with a Gadolinium doping. An antineutrino interacting in the liquid via the so-called *inverse beta decay* will be identified through a time-related coincidence between a prompt and a delayed signal, after the neutron diffusion and capture. The major challenge of the experiment is to discriminate the neutrino signal with enough precision from the high environmental background (cosmic muons, gammas from reactor...).

Within this frame, it is crucial to estimate correctly and reduce the systematics. It involves a deep understanding of the detector and of its response, especially via a reliable simulation. Analysis tools are used to extract the neutrino spectra from the background, and errors due to accidental and correlated background have to be mastered.

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Classification de Session: Poster session

Classification de thématique: Particle Physics