

SERVICE DE METROLOGIE NUCLEAIRE

PARTICLES-MATTER INTERACTIONS: Particles physics

(in collaboration with IIHE - ULB particle physics department)

MASTER THESES

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Study of the characteristics of neutrinos with the JUNO detector 1

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JUNO is a liquid scintillator detector designed to detect electronic anti-neutrinos emitted from nuclear reactors situated at a distance of 53 km. The detector is located 700 m below the rock and consists of 20 kilotons of liquid scintillator contained in a 35 m diameter acrylic sphere, instrumented by more than 18000 large photomultipliers (PMTs) of 20 inches in diameter. The international JUNO collaboration was established in 2014; construction of the site started in 2015 and the R&D and production phase for the detector is underway. The start of data taking is expected at the end of 2022. The main objective of the experiment is to determine the mass hierarchy of neutrinos, but it has also other physical goals. In fact, it will be useful for the detection of other natural sources of neutrinos, including the measurement of oscillations of atmospheric neutrinos produced during interactions of cosmic rays, or of neutrinos from supernova explosions.

The student will work with simulations of these interacting neutrinos in the JUNO detector in order to characterize their detection according to their origin and their energy, taking into account the performance of JUNO and the different background noises involved.