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Measurement of Theta-13 Using a Delayed Neutron Capture on Hydrogen in Double Chooz

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Double Chooz is a reactor antineutrino experiment built to measure a mixing angle theta-13. The experiment uses two detectors at different baselines (400 m and 1 km) to precisely measure the disappearance of electron flavor anti-neutrino from the Chooz reactor cores in Ardenne, France. Our inverse beta decay (IBD) signal is a two-fold coincidence of a prompt positron followed by a delayed neutron capture on Gadolinium (Gd). The delayed neutron capture releases 8 MeV of energy from multiple gamma rays and is easily distinguished from natural radioactive backgrounds. This signal extraction channel is common to all currently running reactor based experiments. In this talk, a new approach which uses a delayed neutron capture on Hydrogen will be presented with the latest result. The latest result from the standard approach will be also presented in comparison.

While delayed neutron capture on Gd is used in all the reactor-based χ^2 theta₁₃ measurements, it is also possible to detect IBD via delayed neutron capture on Hydrogen. In Double Chooz the Hydrogen detection channel has twice the signal statistics

as the Gd detection channel and provides an independent data sample with which to cross-check the Gd analysis result.

In this talk, I present the result of χ^2 theta₁₃ measurement from the Hydrogen analysis together with the updated χ^2 theta₁₃ results from the main Gd analysis method.

Auteur principal: M. TERAU, KAZUHIRO (Ph.D Student)

Orateur: M. TERAU, KAZUHIRO (Ph.D Student)

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