Contribution ID: 47

Experimental Study of thermonuclear reaction for the CNO cycle

Tuesday 12 June 2018 11:30 (30 minutes)

The CNO cycle is not the main responsible for the production of energy in the Sun, but it is much more relevant for the production of the Solar neutrinos. Among the all different cycles of the CNO there are several reactions that have an important role and have to be studied deeply, especially the reactions that works as bridge between different cycles (for example 15N(p,gamma)16O, 17O(p,gamma)18F, and 17O(p,alpha)14N) and of course the bottleneck of the CN cycle: the 14N(p,gamma)15O reaction. This is one of the main nuclear ingredients to calculate the neutrinos production from the Sun. It has been studied by many direct experiments during years, but still, to solve the so called solar composition problem, new data are requested. In particular, the uncertainties on its S-factor have to be lowered from the 8%, quoted by the recent database (Adelberger et al. 2011) to what requested by Solar models (5%).

The previous experiments performed on this reaction together with measurements planned in the future will be presented in this contribution. For the reactions involved in the other CNO-cycles the studies performed at LUNA will be presented with comparison with other facilities.

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Session Classification: CNO Cycle: Theoretical Aspects and Experimental Perspectives