Measurement of ^{3}He$(\alpha,\gamma)^7$Be with ERNA Recoil Separator *

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The ^{3}He$(\alpha,\gamma)^7$Be reaction plays an important role in the interpretation of the results of the solar neutrino experiments, since the estimate of the oscillation parameters relies on the solar neutrino spectrum, calculated by solar models. The high energy component in this spectrum is mainly produced by the decay of ^{7}Be and ^{8}B.

However uncertainty in the ^{3}He$(\alpha,\gamma)^7$Be cross section is also one of the largest contributions to the uncertainty on primordial ^{7}Li abundance in Big Bang Nucleosynthesis calculations. The latter can constrain the universe initial baryon density and the number of light neutrino flavors, and then discriminate among different BBN scenarios.

Previous measurements of the ^{3}He$(\alpha,\gamma)^7$Be cross section have been performed detecting the capture gamma rays or, alternatively, measuring the activity of the synthesized ^{7}Be. While the results of the two different approaches agree on the energy dependence of the astrophysical S factor, they disagree in the extrapolated $S_{34}(0)$ value at a 3σ level, that suggests the presence of systematic errors in one or both techniques, or a non radiative component in the cross section.

A novel approach uses the European Recoil separator for Nuclear Astrophysics (ERNA), that can provide the simultaneous detection of both the capture gamma rays and the ^{7}Be ions produced in the reaction. The experiment is discussed and the first results of measurements are presented.

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