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Measurement of the $3He(\alpha, \gamma)$ 7Be gamma-ray angular distribution

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The 3 He(α, γ)⁷Be reaction affects the nucleosynthesis of 7 Li as well as the predicted solar 7 Be and 8 B neutrino fluxes. It is being studied over a wide energy range at the Rossendorf 3 MV Tandetron accelerator, with a focus on the measurement of the γ -ray angular distribution at E \approx 1 MeV.

There are multiple and overlapping precise experimental data sets at E = 0.7 - 1.3 MeV.

Any extrapolation of this precise data down to a unique data set from an experiment of the LUNA collaboration at E = 0.09 MeV - 0.13 MeV has to deal with the fact that at E = 1 MeV, the capture is possible both from s-wave incident particles and from d-wave incident particles, whereas at 0.1 MeV and lower the d-wave component plays no role due to the angular momentum barrier.

A measurement of the angular distribution of the emitted γ -rays at E = 1 MeV may constrain the relative contributions

of s-wave and d-wave components at high energies and thus enable a better comparison between the highenergy and the low-energy data points.

Data from a first run for the angular distribution of the emitted prompt γ -rays in the ³He(α, γ)⁷Be reaction was done using a setup of four HPGe detectors at various angles and shall be presented here.

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