CHARACTERISATION OF THE $^{12}C(\alpha,\gamma)^{16}O$-EACTION THROUGH STUDY OF THE β-DELAYEDα-DECAY FROM ^{16}N

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The relative abundance of $^{12}C$and $^{16}O$is determined by competition between the tworeactions $(3\alpha,\gamma)^{12}C$ and $^{12}C(\alpha,\gamma)^{16}O$ at stellar He-burning temperatures. While the cross section of the first reaction is relatively well known, the low-energy (E_{cm}~300keV) cross section for the latter reaction is not. Nor is it easy to measure directly, and attempts to extrapolate the cross section from measurements at higher energies naturally lead to large uncertainties [1,2]. It is possible, though, to constrain the E1-contribution to the $^{12}C(\alpha,\gamma)^{16}O$ cross section by following an alternative route, namely by measuring the shape of the β-delayed α-spectrum from ^{16}N. One of the main contributions to the uncertainty in this approach comes from the fact that the branching ratio for decay to the 1^-resonance at 9.6MeV is at present only known to within 10% [3,4,5,6,7].

We report on a direct measurement of that branching ratio. In the experiment a ^{16}N beam was produced at the AGOR/TRIμP facility at KVI and the ions were implanted in a DSSSD. With this method we are able to detect the α-decays with almost 100% efficiency and with around 3000 observed α's it should, provided any systematic errors can be eliminated, be possible to bring the uncertainty on the branching ratio below 2%.

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