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Direct Measurements of α-capture Cross Sections Relevant for Nuclear Astrophysics

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Since helium is the second most abundant element in the universe, there are numerous reaction rates involving α-particles that play a key role in nuclear astrophysics. For instance, some (α,p) reactions have been found to be fundamental for the understanding of X-ray bursts and the production of 44Ti in core-collapse supernovae. Furthermore, some (α,n) reactions are considered to be important neutron sources in different astrophysical scenarios. Direct measurements of these reactions at relevant astrophysical energies are experimentally challenging because of their small cross sections and the intensity limitation of radioactive beams. In this talk I will describe a novel technique to study (α,p) and (α,n) reactions using a Multi-Sampling Ionization Chamber (MUSIC), a simple and highly efficient active target system with a segmented anode that allows the investigation of a large energy range of the excitation function. Recent results on the direct measurement of (α,n) and (α,p) reactions in the MUSIC detector will be presented.
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