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Alpha structure of 16O at high excitation energies by 3He+13C nuclear reactions

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3He induced reactions allow to investigate the spectroscopy of high excitation energy regions of light compound nuclei that can be formed in low energy reactions. We performed a new experiment of this type, HELICA, with the solid-state hodoscope OSCAR at the AN-2000 accelerator of the INFN-LNL. In the experiment, a 3He beam, with energies ranging from about 1400 keV to 2200 keV was delivered to a thin 13C target. In particular, 13C(3He,alpha)12C reactions, leading to the C nucleus into several excited states (including the Hoyle state), were correctly identified. In the talk, we show preliminary angular distributions and excitation functions of the cross section for the 13C(3He,a0), 13C(3He,a1), 13C(3He,a2) reactions in a broad angular domain, and discuss the impact on the spectroscopy of 16O. The preliminary values of the branching ratios between the transitions populating the ground state and the Hoyle state show an energy dependence that suggest the occurrence of a strongly clustered state in 16O at about 24 MeV excitation energy.

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