EXPERIMENTAL STUDIES OF THE STRUCTURE OF ^{16}C WITH REACTIONS AT INTERMEDIATE ENERGY

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The investigation of nuclear structure far from stability is considered a powerful tool to explore the properties of nuclear forces. In particular, the possible existence of cluster configurations in neutron-rich weakly bound nuclei is recently attracting an increasing interest, also because of the possible formation of molecular states with exotic shapes [1,2]. In this contribution we propose a new experimental investigation of cluster structures in the ^{16}C nucleus by means of projectile in-flight resonance decays. The FRIBs facility at INFN – LNS [3,4] has been used to produce a radioactive cocktail beam, mainly composed of ^{16}C. We performed an invariant mass analysis by using the CHIMERA 4π array [5] to identify and track each break-up fragment from ^{16}C disintegrations in ^{6}He+^{10}Be and ^{6}He+^{6}He+^{4}He. Peaks on the invariant mass spectra may indicate the presence of excited states characterized by clustering phenomena. We found a non-vanishing yield in binary (^{6}He+^{10}Be) and ternary (^{6}He+^{6}He+^{4}He) cluster decompositions of ^{16}C [6]. These data will be compared with recent experimental results from the SAMURAI magnetic spectrometer at RIBF facility [7] and theoretical AMD calculations [8].

Recently, we carried out a new experiment at the FRIBs facility of LNS by coupling the CHIMERA array with a new generation array for spectroscopy, FARCOS [9], which will improve the invariant mass resolution of our experiment, allowing to obtain a better reconstruction of the spectroscopy of light nuclei far from stability. We expect to give further results on these aspects in the conference talk.

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