On the ^{12}C hoyle state gamma decay

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The γ-decays of ^{12}C excited levels (the Hoyle state at 7.6 MeV and in some cases the 9.64 MeV) are very important for its production in universe. We present here a new attempt to precisely measure such gamma decay probabilities. The one of the Hoyle state is known to be of the order of 4×10^{-4} [1], while for the one of the 9.64 MeV 3^- only a lower limit decay probability is known, of the order of 10^{-7} [2]. The measurement was performed at INFN-LNS in Catania using the 4π CHIMERA multidetector [3]. In order to measure such low probability decay-channels we performed a 4-fold coincidence measurement. The target ^{12}C nucleus was excited by using a beam of 64 MeV α-particles produced by the superconducting cyclotron (CS) of INFN-LNS. The scattered α-particles, and the recoiling ^{12}C were detected and identified by E-E and ToF methods [3] performed by two stages Si-CsI(Tl) CHIMERA telescopes and the Timing of the Pulsed CS . The emitted γ-rays were detected and identified by using the second stage of the telescopes, CsI(Tl) scintillators, using fast-slow techniques [4]. Kinematical rules and energy momentum conservation laws were used to constraint the data analysis. In the experiment also the 3-α decay of highly excited nuclei was measured. The contemporary measurement of all decay channels is useful to reduce the systematic errors. Preliminary results of the data analysis will be shown.

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