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The fusion dynamics far below the barrier for 12C + 24Mg by gamma-particle coincidences with AGATA+Si-detectors

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Abstract

Fusion hindrance in 12C + 24Mg was observed in a recent experiment where the excitation function was measured down to ~4mub and over-estimated by standard CC calculations. An S-factor maximum vs energy shows up. This system is slightly heavier than those of astrophysical interest, like e.g. 12C + 12C,16O. The cross-section at hindrance threshold is remarkably large.
The S-factor maximum is nicely fitted using both an empirical adiabatic model, and the hindrance parametrisation. Discriminating between the two models requires further measurements at lower energies, that would be very relevant also for astrophysics. This LoI is the proposal of a further experiment on 12C + 24Mg aiming at the measurement of fusion cross sections below the mub range with the combined set-up of AGATA and silicon detectors. The fusion events will be identified by coincidences between the prompt
gamma-rays and the light charged particles (p,alpha) evaporated from
the compound nucleus. We present the preliminary results of the test carried out on 12C + 30Si, demonstrating the feasibility of the proposed experiment. The required beam time is 12 days.

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