



Contribution ID: 138

Type: Poster

Study of sub-barrier fusion of $^{36}\text{S}+^{50}\text{Ti}$, ^{51}V systems

Most of the existing studies on near- and sub-barrier heavy-ion fusion reactions concern even-even projectile and target nuclei. This is mainly due to the theoretical analysis, which results simpler when both interacting nuclei have 0^+ ground state. However, interesting effects are expected when odd spins are involved in fusion reactions [1].

Because of the non-zero spin of the ground state, each magnetic substate has to be treated separately. The ion-ion potential and consequently the height of the Coulomb barrier is different for each magnetic substate. This may affect both the fusion cross sections and the shape of the barrier distribution, which keeps memory of the various barriers associated to the substates.

At the National Laboratories of Legnaro (LNL), the electrostatic deflector PISOLO [2] has been employed for the study of sub-barrier fusion of the two systems $^{36}\text{S}+^{50}\text{Ti}$ and $^{36}\text{S}+^{51}\text{V}$.

The aim of the experiment was the investigation of the possible effect of the $7/2^-$ spin of ^{51}V ground state on sub-barrier fusion cross sections and on the shape of the barrier distribution.

The excitation functions of the two systems have been measured down to $\sim 20\mu\text{b}$, and we observe that they are very similar in the whole energy range, as well as the two extracted barrier distributions.

Therefore, a coupled-channels analysis has been performed in order to highlight possible differences between the two systems, by employing a modified coupled-channels code in order to treat the odd nucleus ^{51}V . The obtained theoretical predictions have been compared to the experimental excitation functions and the extracted barrier distributions. This comparison suggests a small difference between the two systems above the barrier, that might be experimentally observed by measuring the backward-angle quasi-elastic scattering in that energy region.

[1] H. Esbensen, Phys. Rev. C (2010) 81.

[2] G. Montagnoli et al., Phys. Rev. C (2018) 97.

Primary authors: STEFANINI, Alberto (LNL); MONTAGNOLI, Giovanna (PD); COLUCCI, Giulia (PD); HAGINO, Kouichi (Tohoku University); CACIOLLI, Antonio (PD); COLOVIC, Petra (Ruder Boskovic Institute); CORRADI, Lorenzo (LNL); FIORETTO, Enrico (LNL); GALTAROSSA, Franco (LNL); GOASDUFF, Alain (Universita di Padova); GREBOSZ, Jerzy (IFJ PAN Cracow, Poland); MAZZOCCO, Marco (PD); MONTANARI, Daniele (USIAS - Universite de Strasbourg, IPHC-CNRS); PARASCANDOLO, Concetta (NA); SCARLASSARA, Fernando (Univ. Padova e INFN sez. Padova); SICILIANO, Marco (Irfu/CEA, Université de Paris-Saclay, France); STRANO, Emanuele (PD); Mr VUKMAN, Nikola (Ruder Boskovic Institute, HR-10002 Zagreb, Croatia); SZILNER, Suzana (Ruder Boskovic Institute)

Presenter: COLUCCI, Giulia (PD)

Session Classification: POSTER SESSION