



Contribution ID: 74

Type: Talk

Fusion reactions and neutron transfer in collisions induced by Li isotopes on Sn targets

Thursday, 29 March 2012 15:25 (20 minutes)

Recently experimental evidences have been observed concerning the enhancement of the sub-barrier fusion cross section due to neutron transfer, both in reaction with stable nuclei [1,2] and with weakly bound nuclei [3]. The enhancement seems to be related to the sign of the Q-value for neutron transfer. A new mechanism has been proposed [4] for the sub-barrier fusion of weakly bound nuclei, in which an intermediate rearrangement of valence neutrons with positive Q-value may lead to a gain in kinetic energy of the colliding nuclei and, thus, to enhancement of the barrier penetrability and therefore of the fusion cross-section. To investigate the role played by the coupling to transfer channels having positive Q-value, we proposed to study the fusion of lithium isotopes with a combination of different Sn isotopes: $6\text{Li}+^{120}\text{Sn}$, $7\text{Li}+^{119}\text{Sn}$, $8\text{Li}+^{118}\text{Sn}$ and $9\text{Li}+^{117}\text{Sn}$. All these reactions lead to the same compound nucleus but are characterized by different Q-value for neutron transfer. The fusion cross section are measured by using an activation technique where the radioactive evaporation residues are identified by the X-ray emission following their electron capture decay. In this contribution, results of the $6\text{Li}+^{120}\text{Sn}$, $7\text{Li}+^{119}\text{Sn}$ which have been recently measured at LNS(Catania) will be discussed.

[1] Trotta et al, Phys.Rev.C65,011601(2002)

[2] Stefanini et al, Phys.Rev.C74,034606 (2006)

[3] Penionzhkevich et al, Phys.Rev.Lett.96,162701(2006)

[4] Zagrebaev et al., Phys.Rev.C 67 061601(R) (2003)

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Session Classification: Session 13