

Measurements of $^{13}\text{C}+^{12}\text{C}$ and $^4\text{He}+^{64}\text{Zn}$ fusion cross section at deep sub-barrier energies in IFIN-HH

D. Tudor^{1,2}, A.I. Chilug^{1,2} I.C. Stefanescu^{1,2} M. Straticiuc¹, I. Burducea¹ L. Trache¹, D.G. Ghita¹, R. Margineanu¹, A. Pantelica¹ C. Gomoiu¹ and N.T. Zhang³, X. Tang³, H. Chen³

¹ *IFIN-HH, Bucharest-Magurele, Romania*

² *Faculty of Physics, University of Bucharest, Magurele, Romania*

³ *Institute of Modern Physics, Lanzhou, China*

Heavy-ion fusion reactions between light nuclei such as helium, carbon and oxygen isotopes have been studied because of their significance for a wide variety of stellar burning scenarios. Our group has studied $^{13}\text{C}+^{12}\text{C}$ and $^4\text{He}+^{64}\text{Zn}$ reaction at sub-Coulomb barrier energies at the 3 MV Tandatron facility and ultra-low background laboratory. We were able to reach cross sections of the order of tens of pb, about 100 times more sensitive than any measurement done before. The thick target yields for these two reactions were determined through measurements of γ -ray yield following the decay of ^{24}Na and ^{67}Ga in three laboratories, microBequerel (the ultra-low background laboratory), GammaSpec and NAG (Nuclear Astrophysics Group), where the gamma rays were detected with HPGe detectors. In addition, prompt in-beam gamma-rays were detected with an HPGe detector in close geometry for as long as the reaction cross section was sufficiently large for those gammas to be extracted from the target halls background. Results of the experiment will be presented.