# ON ENHANCEMENT OF THE $^{2}H(D, P)^{3}H$ REACTION YIELD IN METALLIC ENVIRONMENTS

**M. Kaczmarski Institute of Physics University of Szczecin, Szczecin, Poland**

M. Kaczmarski[1], K. Czerski[1,2] , D. Weissbach,[1,2], A. I. Kilic[1] , G. Ruprecht[2] , A. Huke[2] , N. Targosz-Ślęczka[1]

1 Institute of Physics, University of Szczecin, Szczecin, Poland
2 Institute for Solid-State Nuclear Physics, Berlin, Germany

Cross section of nuclear reactions at low energies can be strongly enhanced due to electron screening of the Coulomb barrier by the surrounding electrons. In the past decade, this effect was intensively studied for the deuteron fusion reactions taking place in metallic environments as a model for dense astrophysical plasmas, where the reaction rates can be increased even by many orders of magnitude. The experimentally determined screening energies corresponding to the reduction of the Coulomb barrier height are, however, much larger than the theoretical predictions based on the self-consistent dielectric function model. New experimental studies of the $^{2}H(d,p)^{3}H$ reaction, applying Zr targets under ultra-high vacuum conditions, indicate that the electron screening effect cannot entirely explain a rapid increase of the enhancement factor of the reaction yield while reducing the projectile energy. Introducing a threshold $0^{+}$ resonance into the T-matrix reaction model allows to reproduce both the experimental total cross section and the angular distribution very well. Additionally, the observed interference effects between different reaction amplitudes make it possible to estimate the parameters of the threshold resonance. However, further experiments carried out at much lower energies are highly desired to distinguish precisely between competing reaction contributions. It will be probably possible for the first time using a new accelerator facility at the University of Szczecin which will be presented in detail.