

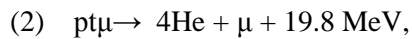
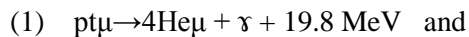
Referee Report to the 46th N.P. PAC at JINR

concerning 9.2 experiment TRITON

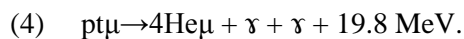
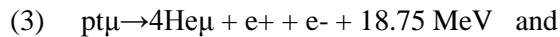
“experimental study of nuclear fusion reactions in a $pt\mu$ system”

The TRITON experiment is the latest of JINR’s long standing and famous experiments on muon catalyzed fusion in (H, D, T) isotopic mixtures. In 2016, the collaboration has performed two very successful experimental runs to study the proton-tritium fusion reactions of the $pt\mu$ mesic molecule, using two different experimental geometries of gamma detectors. The measurements were carried out on the muon channel of the Dubna phasotron using the tritium handling facility from Sarov.

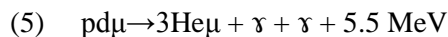
In addition to the already known “classical” reaction channels



the group discovered two new fusion output channels, namely:



In the written report convincing spectra of γ 's, conversion- μ 's and e^+ are presented, evaluated in a preliminary analysis. In fact – as a side result – even the two- γ channel of the sister reaction in the $pd\mu$ mesic molecule:



produced due to the natural abundance of deuterium in the HT mixture was also observed for the first time!

To exploit these interesting results it is essential to perform more detailed processing of the data including Monte Carlo calculations, to make a careful calibration of the gamma detectors with a 20 MeV electron beam, and to undertake the necessary theoretical investigations for the understanding of the reaction mechanisms (MEC currents in few body physics). Of special interest will be the extraction of the S factor for the $3H(p,\gamma)4He$ reaction, very important for astrophysics, the $3He(p,e\nu)$ reaction.

To reach this goal, the TRITON collaboration has proposed a three-years extension of the experiment in 2018-2020. Since the described work is of highest experimental and theoretical interest, I strongly recommend to approve the extension request and to continue support of the (local) TRITON experiment by the laboratory.

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