

Report

on the project HADES (JINR participation), theme 1106.

The HADES detector is designed to work at the accelerator SIS-18 at GSI (Darmstadt). The main purpose of this project is to study the properties of nuclear matter formed in heavy ion collisions (up to Au) at the energy of 1-2 GeV/nucleon. Researches also cover the processes of interaction between protons and pions with protons and nuclei, which are used as the reference for the selection of the actual nuclear effects of the environment. The design and features of the detector (high acceptance $\sim 50\%$, high mass resolution $\sim 1\%$) are focused on the registration of electron - positron pairs as the main probe in the study of the properties of vector mesons (ρ, ω) formed in the nuclear matter and their characteristics (mass, width) modification in this environment. Obtaining statistically provided and accurate information about the properties and characteristics of particles and the processes of their formation is necessary to search for and study features of phase transitions of nuclear matter, understanding the mechanism of restoration of chiral symmetry, and finding the equation of state.

The physical results obtained by the collaboration are regularly presented at international conferences and published in refereed journals. The most interesting data are the yields of dileptons and strange particles for different systems.

The main contribution of the JINR group to the HADES project is one of the 4 planes of drift chambers consisting of 6 modules, as well as the readout electronics for the chambers. All components are designed, developed, integrated into the system of the spectrometer and they work normally. The original mathematical software for the search and reconstruction of tracks in the system of drift chambers of the HADES spectrometer is developed. LHEP JINR peoples take part in data analysis on the study of the charged pions production in n+p and p+p reactions and short- range correlations in the deuteron.

During last period JINR group has completely restored the performance of the second plane of the drift chambers and prepared a spare sector for data taking in the Ag+Ag interactions in 2018 y. The works on the software development for tracking, RICH, and the forward detector are continued in order to improve particle identification and angular resolution. A number of works on the data analysis and interpretation of results obtained by HADES are performed. The measurement of Δ^+ - isobar form-factor in time-like region using a pion beam is proposed.

In 2019-2021 yy. HADES collaboration plans to perform the measurements on the beams of pions and protons. Then it is planned to continue the ongoing researches on the SIS-100 accelerator complex in the nuclei energy range of 3-10 AGeV. For this purpose the spectrometer upgrade and elaboration of the physical program is carried out.

Resources requested by authors for the execution of the activity on the project HADES (JINR participation) in 2019-2021 yy are justified. I recommend to prolong this work with the first priority and present the Project at the JINR PAC.

Doctor of Physics and Mathematics
tokarev@jinr.ru

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M.V.Tokarev