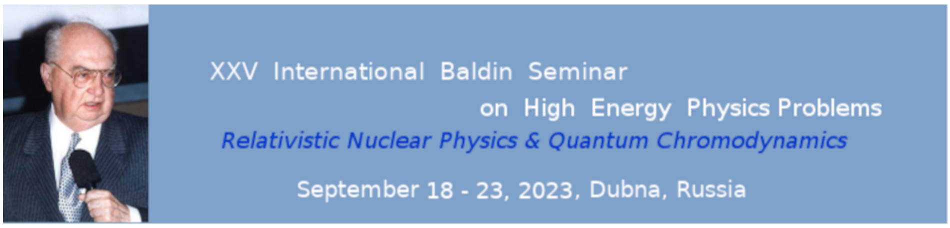
XXV International Baldin Seminar on High Energy Physics Problems
”Relativistic Nuclear Physics and Quantum Chromodynamics”



Contribution ID: **92** Type: **not specified**

On the possibility of observing weakly excited 6-quark states in d-d ⟶ 6q+d scattering processes at the NICA SPD

Thursday, 21 September 2023 12:20 (20 minutes)

There are theoretical indications that phase transitions can occur in highly compressed nuclear matter at moderate temperatures. Conventional nuclear physics as well as astrophysical constraints has not yet provided direct evidence for their existence. It is expected that future experiments at the NICA MPD facility will be able to at least partially solve this problem. However, due to the large theoretical uncertainty in the description of multinucleon systems, the interpretation of such experimental data can be very ambiguous. Therefore, the experimental detection of possible transformations in small-nucleon systems is of special importance. In case of their existence, information on the properties of these systems will have scientific value comparable to knowledge of ionization characteristics of atoms for building a microscopic theory of ordinary plasma.
In this paper we discuss the possibility of detecting weakly excited (below the pion birth threshold) deuteron states in d-d ⟶ d+*d reactions at the colliding beams of the NICA SPD facility at JINR. Since the identification of these processes by the change in momentum or scattering angle of the deuteron is not feasible against the background of the associated elastic scattering processes, the following workaround is discussed. We propose to register protons generated from the decay of 6q states in the kinematic region “almost” forbidden for d-d ⟶ p+n+d direct proton knockout processes. Calculations of the contribution to the observed events of very rare deuteron scattering processes on high momentum protons in another colliding deuteron are currently underway. In particular, the problem of fast simulation of the momentum distribution of deuteron nucleons in the whole range of variation of its wave function has already been solved.
A scheme of the dibaryon detection experiment is also proposed, which exploits the effect of flipping the spin of the polarized deuteron in d↑+d ->d↓+d* processes.

Primary author: KOSTENKO, Boris (JINR)

Presenter: KOSTENKO, Boris (JINR)

Session Classification: Parallel: Applied use of relativistic beams