

## Referee Report for FASA Project (2019-2021)

### **“PROPERTIES OF NUCLEAR MATTER AND THE FRAGMENTS FORMATION ON RELATIVISTIC BEAMS OF THE NUCLOTRON/NICA COMPLEX”**

(in the frame of topic 02-1-1087-2009/2020)

The Project FASA is known for a series of classical studies on nuclear multifragmentation, performed on the relativistic beams of the Nuclotron. Recognized and highly rated by experts in this field are the results of the work in which for the first time it was proved that nuclear reactions induced by light relativistic ions are an effective way to obtain highly heated nuclei.

In 2010 – 2018 years, the authors of the project have obtained results that significantly develop ideas about the dynamics of the multifragmentation process. Measurements of the time scale of this process, made for collisions of deuterons (4.4 GeV) and helium-4 (4 GeV) with gold target showed that the fragmentation time scale of the hot nuclei is close to the characteristic nuclear time  $\sim 10^{-22}$  second. The latest publications are devoted to experimental determination of the degree of thermalization and obtaining the average velocity of a source on relativistic  $^4\text{He}$  beams from the analysis of the longitudinal and transverse velocities of the fragments. Further in-depth study of the dynamics of the process is extremely relevant.

The FASA collaboration plans for studying the decay dynamics are very important, including the study of the radial flow of fragments of different atomic numbers, measurements of the velocity and thermodynamic state of the source of emitted fragments, new measurements of correlations in respect to relative velocity of fragments with atomic numbers reaching  $Z=20$ .

The implementation of these plans will allow this research team to maintain and strengthen the leading position in this major direction of research on the properties of hot nuclear matter.

We recommend to science and technology council of LHEP and JINR PAC for Particle Physics to support with first priority the investigations in the frame of FASA Project for the period 2019-2021.



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