

"Theory of complex systems and advanced materials"

The proposed new theme "Theory of complex systems and advanced materials" focuses on the main current research trends in modern condensed matter physics. The use of new technologies for synthesis and characterization made it possible to obtain fundamentally different types of promising materials with unique physical properties. Planned studies include advanced materials such as low-dimensional quantum magnets, copper-oxide compounds, Josephson nanostructures, a variety of two-dimensional materials like graphene, phosphorene, silicene and many others.

I liked that many of the formulated tasks are directly related to ongoing or planned experiments in JINR. Among others I will note neutron scattering experiments performed in the Frank laboratory of neutron physics to study the effects of high pressure on the structural, electronic and magnetic properties of heavy rare-earth metals, and the study of physical properties of fluorinated and oxidized graphene under ion irradiation in the Flerov laboratory of nuclear reactions.

One of the stated problems concerns the study of real devices, sensors and biosensors based on 2D materials. In my opinion, this is a very promising direction of research with important practical applications.

The studies of models of equilibrium and non-equilibrium statistical physics are quite traditional for the Bogoliubov laboratory of theoretical physics and, to a certain extent, they continue the Bogoliubov investigations in the field of statistical mechanics. I would like to note that at the moment the importance of such research is increasing due to noticeable growth of their interdisciplinary nature.

The staff consists of qualified specialists from both JINR and JINR Member States with reach experience in the aforementioned fields. I would like to especially note the presence of a rather large number of young researchers. The activity during last five years is very impressive. This is reflected in more than 200 publications in recognized journals, many important results were presented at prestigious international conferences. The organizing activity includes holding of both International conferences and schools in Dubna.

Finally, I fully support the continuation of these investigations at JINR and endorsing the new theme "Theory of complex systems and advanced materials" for a period of 5 years with first priority.



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May 24, 2018