Review

**FLAP – Fundamental and applied physics with relativistic accelerated electrons**

The recent achievements in material research of micro- and nanostructures, in creation of materials with fundamentally novel functional parameters, such as various metamaterials, as well as micro- and nanoclusters of different morphology, in combination with achievements in the physics of formation of charged particle beams with controllable parameters and generation by charged particles of highly coherent and monochromatic electromagnetic radiation in a wide frequency range provide the possibility for physicists, chemists, and engineers to solve topical problems of both fundamental and applied value on an absolutely new level.

The project FLAP is aimed at creation of a multifunctional facility, whose fundamental basis is interaction of relativistic electrons in external fields, for creation of new sources of electromagnetic radiation and neutrons, formation of beams of charged particles with particular characteristics, development of new efficient methods for charged particle beam diagnostics in modern acceleration and accumulation complexes (which is important, in particular, for designing new detectors of electromagnetic radiation and charged particles for the planned experiments at NICA JINR, and will certainly be applied at constructed acceleration complexes worldwide). The applied character of the proposed studies is also important, since controllable charged particle beams, including multilbunch ones, and neutron beams, as well as electromagnetic radiation, are in high demand for solution of chemical, biological, and medical problems (for example, radiobiological studies with low doses and high resolution), as well as material research based on new, preferably nondestructive, methods (in particular, new compact neutron sources for material research).

The team of the proposed collaboration consists of highly qualified experts whose works are well known within both domestic and international project, and who represent scientific and scientific-educational centers and schools with broad specialization, which will ensure complex studies, from theoretical fundamental and experimental to applied ones. The combination of a strong team of researchers and the sufficiently developed scientific and technical basis of these institutions will ensure unique innovation research at the test facility LINAC-200.

The proposed innovation methods of research based on canalling of charged particle beams in oriented crystals, surface canalling of charged particles in micro- and nanocapillaries (monocapillaries, capillary structures of polycapillary optics and microchannel plates) at sliding reflection of particles from an amorphous surface, generation of neutron beams in electron interaction with ordered solid structures, allows one to anticipate the development in near future of novel technical solutions impossible with known old methods. Of certain interest is the development of the new beam diagnostic method – tomographic diagnostics, which will ensure monitoring of not only bulk beam parameters but also the transverse distribution of particle density in the beam with high resolution.

The work planned in the framework of the project, according to the formulated aims and tasks as well as available tools and knowledge, well agree with the project budget, which, in combination with the above advantages, yields a positive conclusion and support of this project. I think that the project has an innovation and topical character and is ready for implementation in case of proper financing.