

Referee report about Proposal for Project Extension during 2021-2023

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Proposal details

Title: "New semiconductor detectors for fundamental and applied research"

Proposed by: Dzhelepov Laboratory of Nuclear Problems (DLNP)

Project leader: G. Shelkov

Status: Suggested for extension till the end of 2023

Introduction

The proposal presents very successful development and optimization of new type of position sensitive semiconductor detectors used in a wide range of fields of science and technology, from high-energy physics to computed tomography. The subject of the proposal is very general and it has an impact over a large number of scientific units like instrumental groups, large scale facilities, institutes and even international communities overcoming the borders of a local institutional project.

Nowadays the continuous development and optimization of hardware tools with outstanding parameters for experimental purposes is essential for meeting the demands of the scientific community. Sensors with larger areas, higher sensitivity and faster output contribute to the progress of different experimental methods and provide advantages in many scientific and industrial fields. In some cases the development and optimization of one single component is sufficient to influence a wide range of experimental methods. A good example for this is the subject of the current project where a semiconductor detector with improved characteristics is developed for multipurpose utilization in beams of different elementary particles like electrons, protons, heavy ions, neutrons and photons.

Scientific merits, elements of novelty, timely nature of the research

- The Project aims at carrying out paramount advanced developing work in the field of semiconductor detectors for elementary particles, directed to the creation of new type of detectors which allow for position sensitive registration of radiation fluencies with a high spatial and temporal resolution under a high

dose. The combination of all these features makes the new type of detector unique in the field of high-energy physics and related applications.

- The Project is multidisciplinary. Its subject area includes a wide spectrum of investigations underway at JINR because the institute possesses a large number of installations that allow testing of detectors in beams of different particles, from protons and neutrons to heavy ions. The close scientific relations with almost all world centers of high-energy physics allow, if necessary, to carry out such beam tests at any accelerator in the world.
- The wide spectrum of experimental methods using the new detector system are benefiting from the high readout speed, excellent spatial resolution and enormous radiation hardness of the innovative sensor.
- By using of the available infrastructure at JINR it would be possible to implement the complete technological chain for the production and test of such detectors on the territory of the Russian Federation

Expertise of the group and technical feasibility of the project

- The existence of adequate expertise of the basic staff of the Project is probed by the existing high level of qualification of the DLNP personal, the established infrastructure and the archived excellent results in the evaluated term (2018-2021) of the project.
- The planned goals in the next term of the project (2021-2023) are realistic and correspond to the expertise of the DLNP staff.

Compliance of the requested financial resources with the objectives of the project

- The requested financial resources fully comply with the objectives of the Project.


Conclusions

- In conclusion, I estimate that the proposed tasks are well formulated, are ambitious, they are directed to the development of unique equipment for the needs of the JINR and external outstanding scientific partners, they are feasible.
- The project "New semiconductor detectors for fundamental and applied research" can be evaluated as "Excellent", and I would recommend its implementation in 2021–2023 with ranking A.

Date

27.04.2021

Signature


Dr. Nikolay Kardjilov