

Referee reports on: Further Development of Methods, Technologies, Schedule Modes and Delivery of Radiotherapy - Theme 04-2-1132

Statement of research and significance in the presented proposal of project is innovative of the soundness of the challenge of scientific programme as Medico - technical, clinical and radiobiological research for the treatment of cancer patients, successive diagnostic advances and protection of living organisms irradiated with beams of heavy nuclear particles using the JINR facilities. Proposed project is the continuation of previous research, which was completed successfully and opened a few new problems in examined field of research. The objectives of the research project are well presented and clearly structured. The essential goals are consistent with results from the previous scientific works. The partners have complementary knowledges of the expertise process. The joint research programme of collaboration is of very good quality. The project is original and the overview of state of the project is adequately presented.

Scientific merits and intellectual contributions:

Showing model of investigation, tools and methods of the project will resolve the proposed problem. The scientific and technical impact of this research in the field of solution is on the very good level. The measures maximizing the impact of the project will require future independent researches based on using JINR's facility. The potential for the innovations versus risk levels are correlated on the team experiences on the pilot studies and of the continuation research from the previous works with successful results in this research field. The main purpose will be concern four activities in the frame of the project, which conclude clinical trials, continually develop and upgrade radiotherapeutic methods and radiobiological approaches in biological systems. The main goals in radiobiological research will be investigated in radioprotective effects of laser radiation as a protector against of irradiation effect of healthy cells and tissues with therapeutic gamma rays. Next, the new useful experimental and fundamental results, will be obtained in radiobiology, using the technique of proton, neutrons and gamma ray radiation facilities. These results will be focused on the study of radiation effects in the central nervous system. Previously, for the past decades such problem has been relevant mainly because of the increasing use of ionizing radiation in the treatment of brain tumors and the matters of radiation protection of astronauts in long-term space missions outside the Earth's magnetosphere. Next in this field of research, the dose released in the tumor volume during proton therapy due to saturation of its cells with heavy metal nanoparticles and the application of JINR's Phasotron beams in therapy are the main problems in neoplasm's treatment. Given the general team characterization there is a potential of practicable continuation to get such results at the worldwide level of the research using the JINR facilities.

Technical feasibility of the project within the proposed timescale:

The experimental justification and implementation of planned programme, will give evaluations of clinically safe methods of radiation during the neoplasm's treatment and study. These experiments are together an original and recommended of the development of the technical solutions, radiobiological and physical methods, clinical studies of their applications in clinical radiology and for future research in JINR. The methodology for the project is fully convincing. The data collection strategy, potential sources of information and data accessibility are clearly explained according to timescale. They include clear overall

responsibility for the activities including a problem-solving mechanism in the event of assignment experiments between partners from JINR and participating institutions from other countries, which expressed an interest of the joint study within the proposed project. Planned activities, balance between time frame and the costs, description of the work plan, benefits for JINR arising from this activity, the structure and planned procedures are list and the proposal expresses the clear experimental strategy.

Compliance of the requested financial resources with the project objectives:

The form and content of study have the required character. The requested funding is realistic for the estimated budget. The management plan is adequate and practicable in correlation with the budget.

Availability of adequate human resources at JINR and in the collaborating institutions:

Modern research of such problem requires a wide range of the main methods from technical solutions, mainly from the basic development of the proton therapy physical methods and the methods of radiobiology. They are result of collection of clinical trials and experiences for further research of medical beams at the JINR.

The all participants in project are the JINR collaborators. Experiences, related to the planned years, will be very positive appraised and important in the conclusion of research, because the JINR organization is the best focused place for conducting and coordinating these studies among all other participate institutions. The proposal with very precise manner sufficiently demonstrated, that the group has the necessary expertise and capabilities to obtain and synthesized the information needed for the project.

Planned timetable of works and resource leveling of the information, are demonstrating the proposal on an adequate level of experience of special preparation in this field and group together the international scientific specialists.

STRENGTHS of the project:

- The Project Proposal Application for Funding is specific enough to clearly show its innovative and original aspects
- JINR is the leader in Russia in the field of the proton therapy, with the patient capacity of approximately 100 people per year
- JINR belongs to the scientific leaders in fact, that in method of conformal 3D irradiation of deep-seated tumors the dose distribution precisely conforms to the target shape
- The connection between the basic research topics and with the translational project is well presented.
- The resources in scientific merit, technical ability and funding are given as a complex of the activity proposed.
- Planned timetable, balance between the time frames and costs, description of the work plan, benefits for JINR arising from this activity, structure and planned procedures are clearly determined.
- No factual errors were found, no discriminatory comments were found.
- Partners are capable to fulfil tasks in the stated periods.

WEAKNESSES of the project:

- Consequential weaknesses are not found in submitted period of the project.

Within the five usually limits (Excellent, Very good, Good, Fair, Poor and Proposal fails) the evaluation of the project is in scoring scale - Excellent level. Proposal successfully addresses all relevant aspects of the expected criterion, any shortcomings were found.

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