

Referee report

Project: “Further development of methods, technologies, schedule modes and delivery of radiotherapy”

Theme 02-4-1132-2017/2022

Project Leader: G.V. Mytsin

The issue of developing new methods of radiotherapy is socially very important. Classic methods of radiotherapy based on electron accelerators have limitations related to the effective deposition of the therapeutic dose. A promising alternative is proton therapy, which is currently being developed in many research and therapeutic centres around the world. The project on the development of the technique of 3-D conformal proton radiotherapy of deep located tumours is therefore very important from the scientific and application point of view. It is worth to mention that this project, realized at the Medico-Technical Complex of DLNP JINR, was conducted for the first time in Russia and Eastern Europe. JINR is a leader in the development of new radiotherapeutic techniques based on proton beams, effectively implemented in the treatment of numerous patients. Important achievements of the JINR group were the development of specialized treatment planning software using 3-D conformal proton radiotherapy and construction of the prototype of a multileaf collimator for the dynamic proton beam irradiation.

The measurable effect of the project so far has been twenty scientific publications that have been noticed in the scientific community, as evidenced by the citations of these works. It is also worth to note, that the project also resulted in preparation of four theses – one PhD dissertation, two Candidate of Science and one Master’s thesis.

Further research work planned in the project will be carried out in four research areas (clinical research, development and upgrade of proton therapy methods, radiobiology and dosimetry and microdosimetry of therapeutic hadron beams). The proposed specific research objectives were well focused and motivated. In my opinion, the planned activities related to dosimetry and minimizing the negative effects of irradiation are particularly important. Equally important are studies on increasing the effectiveness of radiotherapy in the presence of metallic nanoparticles on model animal cell lines. I have no objections to the detailed research topics presented. The project meets the standard criteria for research projects, the planned research is feasible, well-motivated and should end with scientific publications, and promote also the development of young research staff as well.

I have no objections to the budget for the period 2021-2022 presented. Planned expenses are realistic and estimated DLNP Phasotron operation - 1000 hours, seem well balanced.

A team of qualified researchers, involved in the implementation of this project, guarantees the effective implementation of the planned activities. The mentioned international research cooperation is well-motivated and perfectly complements the planned scope of research.

To sum up, in accordance with the ranking scheme, I propose to rate this project as an "excellent project" and qualify this project to category "A". In my opinion, this project should be fully funded with adequate resources and also supported to continue and expand its scientific impact.

Prof. dr hab. Maciej Kozak

Member of the PAC for Condensed Matter Physics