Research on the Biological Effect of Heavy Charged Particles with Different Energies – The theme 1077

Presented notable project studies of accelerated heavy charged particles are a powerful tool for addressing fundamental issues of modern radiobiology and genetics for solving radiation and are innovative in the soundness of the challenge in radiation risk for the interplanetary manned human flights. Damage of this type is based on exposure that causes changes in the higher integrative functions of the brain, leads to disorders in crew´s operational performance and interplanetary flights will be under threat by cosmic radiation and be not completed with success.

Achievement of the solvers in the group is precious specialists in the field of molecular radiobiology, radiation genetics, cytogenetics, and physiology. The list continues with the specialists from the fields of molecular radiobiological aspects of radiation therapy and the mathematical modelling of radiation based on the induction of radioactive effects and data analysis, systematization and interpretation, computer simulations (using "Govorun" supercomputer at the LIT/JINR and dataspace for Information System). They don´t overlook radiation safety upgrades and the development of radiobiological stations of irradiation, science instruments for the study of the planetary nuclear problems, and the student education programs on radiobiology. The researchers in the presented group planned to improve the acceleration of the radiobiological experiment procedures, which are the main in the LRB's participation in the design, fabrication, testing, and calibration of nuclear science instruments - the necessary part of such research. In this case, the project meets all the required criteria for the scientific publishing and invited presentations of originating results, qualified processes of doctorate study, and stands for the full-time equivalent of the workload of researchers, engineers, technicians, laboratory assistants, and young people. It means that the human resources of the laboratory are in the good age group with adequate experiences and past achievements in this research field, which were demonstrated by scientific result competencies. Modern research of such a problem requires a wide range of the main methods from molecular biology and the methods of condensed matter physics, as it does the Laboratory of radiobiology and use for it the list of radiation sources at the laboratories of the JINR (X-ray irradiator – at the LRB, medical proton beam, gamma-ray irradiator (Rokus-M)- at the DLNP, heavy ion beam at U400M cyclotron, "Genome" facility – at the FLNR, heavy-ion beams from Nuclotron – at the VBLHEP, neutron source for nuclear planetary science test stand – at the FLNP). The project is considering the experiences of the research group related to planned years are on the excellent level and a large amount of the coordination of all planned experiments by the JINR organization is the right place for solvation proposed radiobiological studies among all participated institutions in the project.

The data collection strategy, potential sources of information, data accessibility and methods of molecular biology, genetics, pharmacology, neurogenesis, morphology, and radioprotection during the research of the heavy charged particles of the induction the damage in genetic structures of prokaryotic and eukaryotic cells (mammalian and human cell lines) planned in this project, are clear and project depicts a developed strategy of meaningful results collection and assess in JINR. The investigative model, tools, and methods of the project are realistic for resolving this proposed problem and the requested funding is realistic for the estimated budget. It includes clear overall responsibility of all staff resources for the activities, includes a problem-solving mechanism in the event of assignment experiments between partners including JINR, who expressed their interest in the joint studies within the proposed project.

Within the ranking scheme in the Questionnaire for the extraordinary session, I propose positively categorized this project to A as an excellent project, which is encouraged to continue during the next years and expand its scientific impact.

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