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The necessity of Medical Physics Research on Rare isotope Accelerator complex for ON-line experiments (RAON) Low-Energy Beamline for Biomedical Experiments

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Radiation plays a crucial role in modern civilization, with applications in medical diagnostics, treatment, and industry. Additionally, in the context of the space age, there is growing interest in understanding the biological effects of radiation on human health and organisms. The biological impact of radiation varies with particle size and charge, with greater biological effects observed from X-rays to protons and heavy ions. Many nations try to use heavy ions generated by large accelerators for biomedical research. In Korea, the low-energy beamline facility of the Rare isotope Accelerator complex for ON-line experiments (RAON) generates a wide spectrum of heavy ion beams, from protons to uranium.

However, RAON's low-energy beamline, which is called as KoBRA, is primarily designed for physical experiments. Thus, for biomedical research, additional experimental set-ups, as well as dose measurement and monitoring systems, are essential. This study seeks to characterize the heavy ions generated by KoBRA and propose advanced methodologies for dose measurement and monitoring systems necessary for conducting biomedical experiments.

The study involves analyzing the physical characteristics of low energy beam from KoBRA, including spot size, uniformity, and irradiation area, to determine optimal conditions for biomedical experiments. A comparison of RAON's heavy ion beams with domestic proton and heavy ion beam facilities will be conducted to propose an optimized research environment for biomedical studies.

Site inspections and technical data collection will be conducted at KoBRA to assess the current state of particle beam,including beam spot size, and uniformity. This study will also evaluate differences in beam energy, dose rates, and profiles compared to domestic proton facilities.

Based on the 2024 research demand survey for biomedical experiments utilizing KoBRA, methods for precise dose measurement and monitoring will be proposed. Optimal conditions for target installation and the necessary medical physics support for biomedical experiments will also be outlined.

Paper submission Plan

Yes

Best Presentation

Yes

Contribution track

ICABU WG4. Applications of Particle Beams

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