Contribution ID: **313** Type: **Oral Presentation**

Measurement of the neutron shielding efficacy of magnetite for Proton Therapy Facilities and other applications

Tuesday 23 September 2025 18:50 (20 minutes)

The neutron shielding properties of high-density concrete and magnetite aggregates have been evaluated through both experimental measurements and Monte Carlo simulations. These materials are used in the medical accelerator facilities, making it essential to characterize their behavior against neutron radiation to ensure shielding efficiency. Our experimental results show good agreement between data and Monte Carlo calculations, confirming the reliability of the simulation approach. The first and equilibrium tenth-value layers were determined for different aggregate types based on simulations. The findings indicate that magnetite offers superior neutron shielding performance, demonstrating a shorter attenuation length for the same barrier thickness as compared to concrete. Additionally, the neutron attenuation properties of both concrete and magnetite have been characterized for typical neutron spectra found in clinical proton therapy accelerators, treatment rooms, walls, and mazes using Monte Carlo simulations. These insights can contribute to optimizing radiation shielding designs in medical and research facilities. In this talk, I will introduce a novel material for neutron shielding and an innovative method for the construction as an application of the clinic center in the future. The shielding study was carried out in both GEANT4 simulation and experimental measurement in the NASA Space Research Lab at Brookhaven National Laboratory. I will present and discuss our preliminary results.

Authors: Dr KEPPEL, Cynthia (Thomas Jefferson National Accelerator Facility); Mr WRIGHT, Kenneth (RAD Technology Medical System LLC); PARK, Kijun (Hampton University Proton Cancer Institute); Mr KOSINSKI, Mike (RAD Technology Medical System LLC); Dr AMBROZEWICZ, Pawel (Thomas Jefferson National Accelerator Facility)

Presenter: PARK, Kijun (Hampton University Proton Cancer Institute)

Session Classification: Nuclear Physics Applications

Track Classification: Nuclear Physics Applications