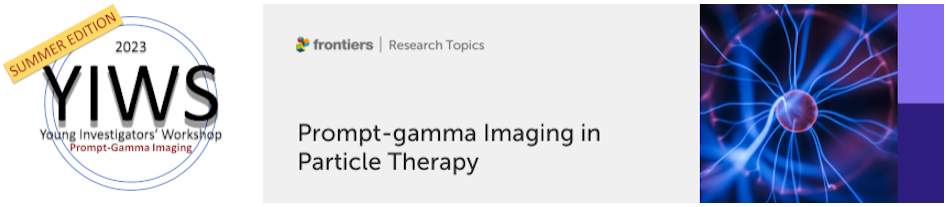

Contribution ID: **3** Type: **Oral**

Characterization of organic glass scintillators for a hybrid multi-particle imaging system for range verification in proton therapy

Friday, 7 July 2023 17:10 (30 minutes)

The high sensitivity of proton therapy to anatomical deviations implies improved treatment outcomes are achievable with real-time range monitoring. To this end, the NOVO project was initiated with the goal of developing a multi-particle imaging system for proton therapy. In this work, we characterize a novel organic glass scintillator (OGS) and investigate its potential for such a system, where range monitoring will be based on the simultaneous imaging of both secondary prompt gamma-rays and fast neutrons produced in patient tissues during treatment. The neutron vs. gamma-ray pulse-shape discrimination (PSD), light output, and energy resolution of a 10 × 10 × 200 mm3 bar of OGS were evaluated using time-of-flight methods. Additional measurements with a 10×10×100 mm3
OGS bar and radioactive emitters were made to investigate the coincident time, depth-of-interaction reconstruction, and energy resolution of the detector. The tested samples exhibited PSD figure-of-merits > 1 above 250 keVee (corresponding to recoil protons > 550 keV). Additionally, above 400 keVee an energy resolution < 10 %, coincident time resolution < 500 ps, and a position resolution < 10 mm was achieved. This work demonstrates that OGS is a promising candidate for particle therapy range verification using both neutrons and gamma-rays.

Primary author: Mr TURKO, Joseph (Helmholtz-Zentrum Dresden-Rossendorf)

Presenter: Mr TURKO, Joseph (Helmholtz-Zentrum Dresden-Rossendorf)

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