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Type: **Poster presentation**

AN INNOVATIVE METHOD TO MEASURE TARGET FRAGMENTATION IN DIRECT KINEMATICS WITH NANOMETRIC NUCLEAR EMULSIONS

Tuesday 3 September 2024 18:30 (20 minutes)

Proton therapy, a cutting-edge cancer treatment, is currently employed successfully for treating deep-seated tumors near vital organs. However, uncertainties surrounding the Relative Biological Effectiveness (RBE) of proton beams pose limits to its efficacy. A significant factor contributing to these uncertainties is the production of highly-ionizing, short-ranged secondary fragments through nuclear interactions due to target fragmentation.

Addressing this issue, the DAMON (Direct meAsureMent of target fragmentatiON) project aims to pioneer a direct measurement of target fragments produced by proton beams. This groundbreaking initiative utilizes “Nano-Imaging Trackers” (NITs), a novel form of fine-grained nuclear emulsions initially designed by the NEWSdm collaboration for directional dark matter searches via induced nuclear recoils.

The NITs employ AgBr crystals with an average diameter of 70 nm dispersed in a gelatine matrix containing Carbon, Oxygen, Hydrogen, and other elements found in the human body. Boasting an unparalleled spatial resolution of 1 sensitive element per 140 nm, NITs offer a unique advantage for detecting tracks at the micro-meter scale. Ongoing research and development are focused on optimizing NITs for the study of target fragmentation.

To read-out information from NITs, a specialized process has been devised, leveraging both a fast scanning microscope and a super-resolution optical scanning microscope.

In a groundbreaking pilot test conducted in February 2023, a bulk of NITs was exposed to protons at 211 MeV. This presentation will unveil the results of this exposure, showcasing the potential of NITs as detectors for the in-depth study of target fragmentation in proton therapy.

Internet talk

No

Is this an abstract from experimental collaboration?

Yes

Name of experiment and experimental site

DAMON (Direct meAsureMent of target fragmentatiON)

Is the speaker for that presentation defined?

No

Details

N/A

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