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Novel Materials R&D for Next-Generation Accelerator Target Facilities

Thursday, June 29, 2023 9:40 AM (30 minutes)

High-Entropy Alloys and Electrospun Nanofiber materials are two novel classes of materials that can offer improved resistance to beam-induced radiation damage and thermal shock. Research to develop these new materials specifically for multi-megawatt accelerator target applications, such as beam windows and particle-production targets, has recently begun. The research program will combine in-beam experiments with complementary simulations to tailor the microstructures of these novel materials for use in next-generation accelerator target facilities. Iterative simulations to optimize the material composition, physics performance and beam-induced thermomechanical response will guide the material design and fabrication processes based on established figures of merit. Ensuing material irradiation experiments using low-energy ions and prototypic high-energy protons, followed by extensive post-irradiation material characterization, will then assess and qualify the selected novel materials. This talk will provide an overview of the novel materials development research program initiated at Fermilab through my DOE Early Career Research Program award.

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