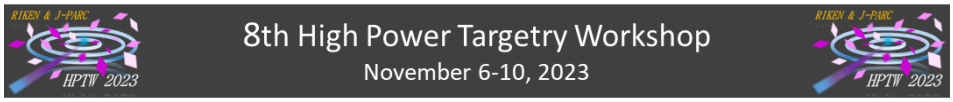

Contribution ID: **56** Type: **Contributed Oral**

Tesla-Converter: A high power water cooled Bremsstrahlung converter

Wednesday, 8 November 2023 09:45 (15 minutes)

Targeted alpha-particle therapy is a promising approach for cancer treatment, with ^{255}Ac emerging as a potent radionuclide candidate. However, the scarcity of ^{255}Ac supply hinders extensive clinical research. In this presentation, we focus on the photo-nuclear route as a potential means to extend the ^{255}Ac production. The current bottleneck in this approach is the requirement for a high-power Bremsstrahlung converter.

We introduce a novel concept for a high-power Bremsstrahlung converter capable of handling up to 125 kW of beam power, corresponding to an electron pulse energy density of approximately 120 $\mathrm{J/cm^3}$. The design is based on the Tesla pump concept, employing layered rotating tungsten discs to act as both a shear-force pump and a Bremsstrahlung converter within the same unit. The rotation of the target facilitates effective thermal distribution and coolant flow, allowing for a compact design.

During this talk, we will present the design optimization concerning photon yield, thermal and mechanical considerations, and material and component selection. Additionally, we will discuss the first prototype's development and testing, including cold tests to validate pumping performance and preliminary cooling experiments conducted with the METAS electron accelerator.

This concept's successful implementation can significantly contribute to the advancement of targeted alpha-particle therapy research by overcoming the limitations posed by limited radionuclide supply.

Themes for the contribution

1 R&D to support concepts

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