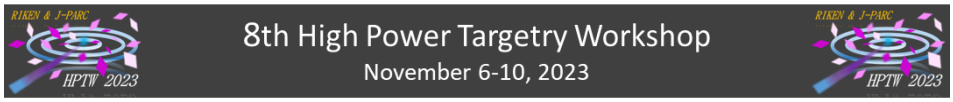

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High-power spallation target for Subcritical Transmutation Accelerated Reactor Technology START: challenges and perspectives

Tuesday, 7 November 2023 17:48 (1 minute)

Transmutex SA was founded in 2019 in Geneva, Switzerland, to build Accelerator-Driven System (ADS) plants for the safe and sustainable production of carbon-free energy and the transmutation of nuclear waste. The Subcritical Transmutation Accelerated Reactor Technology (START) under development features a high-intensity proton accelerator, a high-power spallation target, a subcritical core, and a fuel reprocessing unit.
The following formula expresses the power generated by an ADS:

P_ADS (MW)=[G_0 (E_beam) φ^* k_eff/(1-k_eff)+1] P_beam (MW)

where P_ADS is the thermal power produced by the ADS, k_eff is the effective neutron multiplication coefficient of the subcritical core, P_beam is the proton beam power, G_0 (E_beam) expresses the neutron yield of the target, and φ^* is the coupling of the spallation neutrons with the subcritical core. The planned thermal power of the START pre-industrial plant is 300 MWth, which by design implies a high beam power Pbeam of 4 MW, and, consequently, a high-performance spallation target in terms of intrinsic safety and reliability, neutronics, and thermo-mechanics.
Transmutex is developing a liquid metal cooled spallation target to be integrated into the subcritical core and capable of fulfilling the high-level requirements, while coping with the needed beam power. The main features and challenges of the conceptual design will be discussed, together with the perspectives and R&D proposals.

Themes for the contribution

8 Multipurpose use of targets and beam dumps:

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