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High-power converters for RIB production

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TRIUMF is developing two target assemblies for radioisotope production based on the conversion of primary charged particle beams into neutral particle fluxes, which consequently induce fission in a uranium carbide (UCx) target.
One is a proton-to-neutron converter made out of a 2 cm thick tungsten core clamped by copper brackets to dissipate up to 7.5 kW deposited by a 500 MeV, 100 uA proton beam. The high-energy isotropic neutrons will then induce cold fission in an annular UCx target material upstream of the converter.
The other is an electron-to-gamma converter made out of a thin tantalum layer deposited on an aluminum backing. A 35 MeV electron beam of up to 100 kW will impinge on the tantalum surface and produce a gamma-ray flux, principally in the forward direction of a downstream UCx target.
This contribution focuses on some of the design challenges resulting from the extreme conditions in terms of power density, temperature and radiation.

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