

Multi-MW Spallation Target Design for the European Isotope Separation On-line Radioactive Ion Beam Facility (EURISOL)

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The EURISOL is set to be the 'next-generation' European Isotope Separation On-Line (ISOL) Radioactive Ion Beam (RIB) facility, extending and amplifying beyond the year 2010 the research being performed at the present RIB facilities in Europe and elsewhere, in the fields of Nuclear Physics, Nuclear Astrophysics and Fundamental Interactions.

The proposed ISOL facility will include several 100 kW proton beams on a thick solid target to produce RIBs directly, and a 3-5 MW liquid metal 'converter' target to achieve high fluxes of high-energy spallation neutrons, which later will produce radioactive ions through fission in a secondary uranium carbide (UCx) target. The design of such an innovative spallation neutron source, several times more intense than the present ones, requires state-of-the-art simulation codes and concepts to address its technical challenges. A preliminary conceptual design of a multi-MW liquid Hg converter is presented together with the detailed thermo-nuclear characteristics obtained using the Monte Carlo code FLUKA. These include power density distributions, necessary to assess the technical feasibility of the liquid spallation target by means of computational fluid-dynamics calculations. Special attention is given to the impact of high-energy neutrons on the fission process in the UCx target, radiation damage to the internal structures and the radioprotection issues of the facility.

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