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LIEBE: Design of a molten metal target based on a Pb-Bi loop at CERN-ISOLDE

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Future perspective for physics measurements at CERN-ISOLDE call for the use of molten metal targets to improve the yield of radioactive isotopes delivered to the experiments and better handle the high power density from the beam. CERN launched in 2012 an R&D project called LIEBE to investigate the feasibility of testing on line a Pb/Bi loop target compatible with the present installations at ISOLDE. While ISOLDE will be able to deliver a maximum of 10 kW of beam power, the power density on target is comparable to those available in existing or future facilities as EURISOL.

The design of the loop has been performed in collaboration with SCK-CEN, CEA, PSI, IPOOL and the prototyping phase has now started. The design of this target includes key components that never been integrated in an Isolde target before such as a heat exchanger to evacuate the high power deposited by the beam and an electromagnetic pump to ensure the circulation of the liquid metal. In the same time, the designs proposed for the irradiation and diffusion chambers have been optimized to allow a faster release of the produced isotopes. All these elements need to be extensively tested before the on-line installation of the target and the prototyping phase has now started.

This talk focuses on the development of the element of the liquid metal loop target, presenting the challenges due to the different constraints involved and developing the proposed target design. Finally, an overview of the results of preliminary tests will be presented while future prototypes and tests will be introduced.

Primary author: DELONCA, Melanie (Universite de Technologie de Belfort-Montbeliard (FR))

Co-authors: MAGLIONI, Cesare (CERN);   HOUNGBO, Donald (SCK-CEN);   POPESCU, Lucia (Belgian Nuclear Research Center (BE));   Mr SCHUURMANS, Paul (SCK-CEN);   DE MELO MENDONCA, Tania Manuela (CERN);   STORA, Thierry (CERN)

Presenter: DELONCA, Melanie (Universite de Technologie de Belfort-Montbeliard (FR))

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