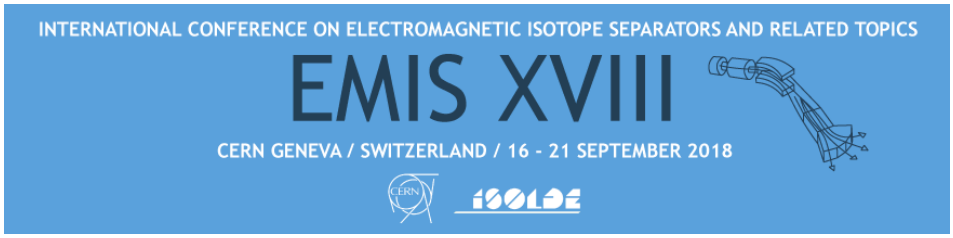


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# Isolde V

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The Isolde facility was established in 1967 and since then has been rebuilt three times, in 1976, 1983 and in 1992. The fourth and current incarnation is 26 years old, and there is now a strong case for another major upgrade to address increasing demands on the targets, the isotope separators, and the experimental hall.

The existing target areas are well designed and have already been upgraded with new frontends in 2010 and 2011. The beam-dumps and surrounding concrete are at the end of their lives and will be replaced in 2024, and the frontends will be upgraded once again at the same time. However the geometry of the building, the beam-lines and the surrounding services limits how much can be changed. Furthermore the radiation levels and the schedule requirements make large modifications difficult and risky, even during the long shutdown periods. Even with upgrades the target stations are reaching the limits of their capabilities in terms of proton beam capacity, maintainability, and compatibility with prototype targets.

The performance of the isotope separators is largely determined by their geometry. Upgrade of their performance – to improve isobar separation, to improve acceptance of beams from new ion-sources, or to improve background suppression for ultra-sensitive experiments – is not possible without moving the permanent shielding and the downstream beam-lines, which is not practical.

The current ion beam delivery system has a severe bottle-neck, in that beam from only one target at a time may be delivered into the experimental hall. There are ideas to switch rapidly between the two target stations, but this is of limited usefulness.

Thus there is a strong case to build new target stations and a new beam preparation system to circumvent these limitations and to expand and modernise Isolde's capabilities. Constructing a new isotope production area would minimise perturbation of the running facility, whilst simultaneously permitting radically improved designs.

This paper explores the possibilities and makes a proposal for two new target stations, new isotope separators, and a beam transport system designed along modern principles. Connection of the new beam-lines to the existing facility is discussed, as well as a layout for a completely new experimental area. The layout of the proton beam-lines, radiation shielding, and the impact on the surrounding infrastructure is considered.

A possible layout will be presented with two new target areas, pre-separators, and a beam-switching system which can deliver multiple beams into the existing experimental hall. Design concepts for the new target areas and beam-lines will be shown, compatible with up-to-date handling techniques. The integration of beam preparation systems will be considered, including beam cooling and bunching and isobar separation. Finally a possible the expansion of the facility with a new experimental hall will be shown, with space for new experiments and a sophisticated and flexible beam delivery system.

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