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Radioactive molecular ion beams at CERN-ISOLDE

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The ISOLDE facility at CERN provides radioactive ion beams of nuclides produced in reactions between 1.4-GeV protons and thick targets using the Isotope Separation On-Line (ISOL) technique. The formation of volatile molecules has been used as a method to deliver beams of otherwise non-volatile release-limited elements [1-5]. Molecular sideband extraction is also used to improve beam purity. The availability of molecular beams additionally provides opportunities for fundamental physics studies [6-11].

We present our work on molecular ion beam production at CERN-ISOLDE using actinide targets and Forced Electron Beam Induced Arc Discharge (FEBIAD)-type ion sources [12]. Beam composition studies are presented using: the ISOLTRAP Multi-Reflection Time-of-Flight Mass Spectrometer (MR-ToF MS) [13], online γ-ray spectroscopy at the ISOLDE tape station [14,15], and off-line α- and γ-ray spectrometry of ion-implanted samples.

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