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Developments for actinide molecular ion beams at CERN-ISOLDE

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The ISOLDE facility at CERN provides ion beams of isotopes across the nuclear chart produced in thick targets from reactions with accelerated protons from CERN's Proton Synchrotron Booster. Molecular ion beam techniques have the potential to improve intensity and purity through volatilization and sideband extraction [1-5]. Molecules additionally provide opportunities for fundamental physics at radioactive beam facilities [6-8].

We present first results of actinide molecular ion beam development at ISOLDE. Uranium carbide targets were used to produce molecular beams via injection of reactive tetrafluoro methane (CF_4) gas. The ion beam composition was studied using: the ISOLTRAP Multi-Reflection Time-of-Flight Mass Spectrometer (MR-ToF MS) [9] for identification by ToF mass measurements, online γ -ray spectroscopy at the ISOLDE tape station [10,11], and off-line α - and γ -ray spectrometry of ion-implanted samples. The results contribute to beam developments for actinide elements and radioactive molecule production for fundamental physics research.

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