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Plasma ion source development for molecular radioactive ion beams

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Increased ionization efficiencies for light noble gases and molecules are still required for new physics experiments, in present facilities like ISOLDE and for future installations such as EURISOL. In order to improve these beams, two new plasma ion sources are implemented on to the ISOLDE target ion source base.
The first one is a COMIC-type ion source operating at 2.45 GHz and equipped with a fully quartz coated plasma chamber. The beam current stability is typically better than 1 % and beams are easily reproducible. The highest efficiency achieved so far for xenon is about 15 %. However, the main goal is to produce molecular beam including radioactive carbon (as CO+ or CO2+), in which case the efficiency was measured to be about 0.2 %.
The second project develops radiation hard Helicon-type ion source operating at 10 ⋯100 MHz. The first plasma ignition tests have been performed and different antenna geometries have been tested. The next step is to implement the system on a full target and ion source unit compatible with the ISOLDE front-end and perform studies at the offline separator.
First online tests online are foreseen during 2011.

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