

Application of 3D code IBSimu for designing an H⁻/D⁻ extraction system for the Texas A&M facility upgrade

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A filament-driven multicusp ion source was installed at the Texas A&M University Cyclotron Institute for production of H⁻ and D⁻ beams as a part of the facility upgrade. The light ion beams, produced by the ion source, are accelerated with the K150 cyclotron for production and reacceleration of rare isotopes.

The extraction system for the ion source was designed with a 3D ion optical simulation code, IBSIMU [1], developed at University of Jyväskylä. The extraction features a water-cooled puller electrode with a permanent magnet dipole field for dumping the co-extracted electrons and a decelerating Einzel lens for adjusting the beam focusing for further beam transport. The ion source and the puller electrode are tilted at 4 degree angle with respect to the beam line. The extraction system can handle final beam energies from 5 keV to 15 keV with H⁻ and D⁻ beams by adjusting the electrode voltages. Main features of IBSimu and the status of the H⁻/D⁻ project at Texas A&M are presented. So far, 25 μ A of H⁻ and 15 μ A of D⁻ have been extracted from the cyclotron.

Also a negative ion plasma extraction model is being developed for IBSIMU code for self-sufficient modelling of extraction systems in three dimensions. Status of the development project is discussed.

[1] T. Kalvas, et al., Rev. Sci. Instrum. **81**, 02B703 (2010)