

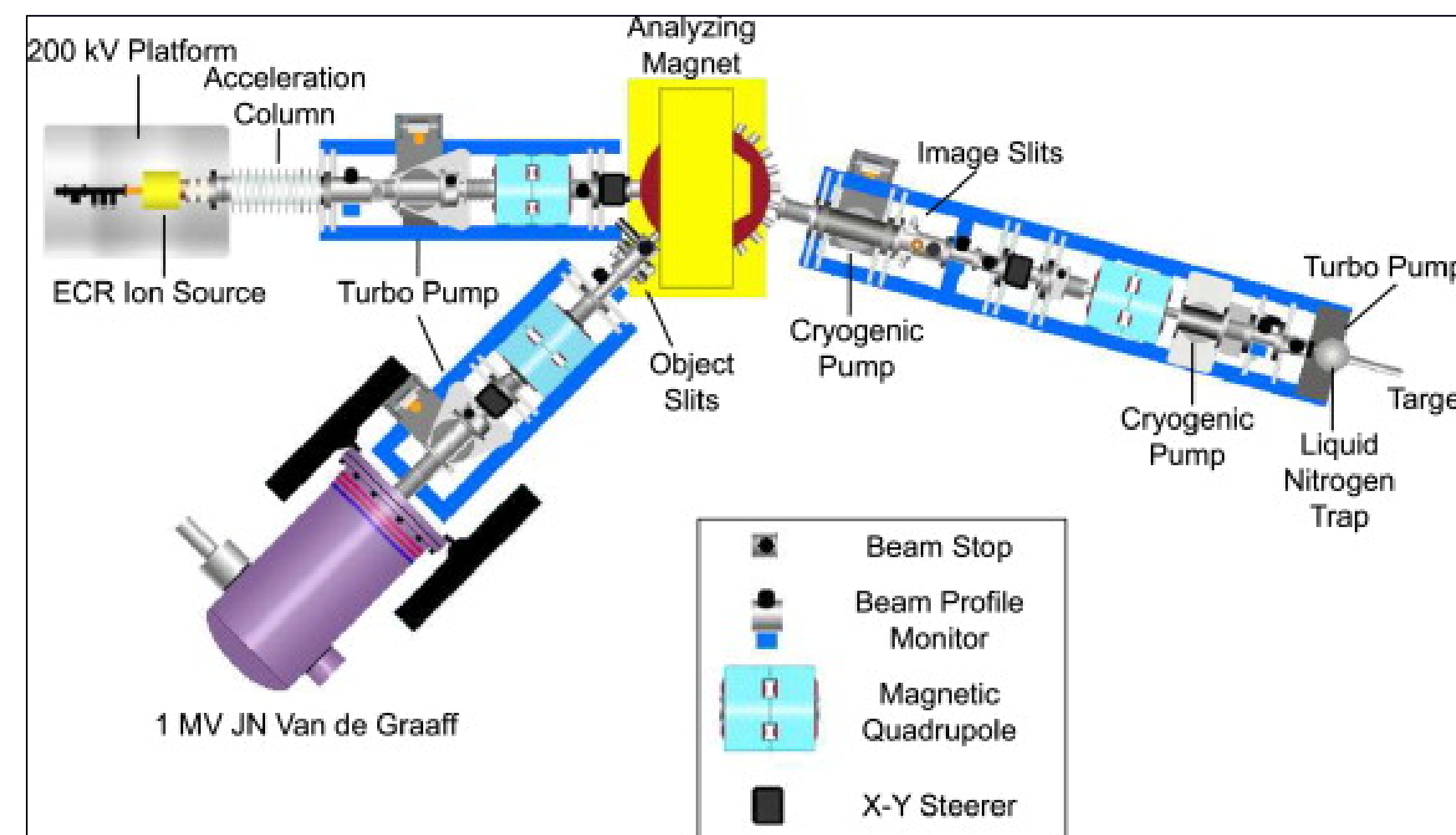
# ALIGNMENT OF A 240 KeV ECR COLUMN AT DUKE UNIVERSITY LENA

Mark Emamian, Duke Free Electron Laser Lab (FELL)

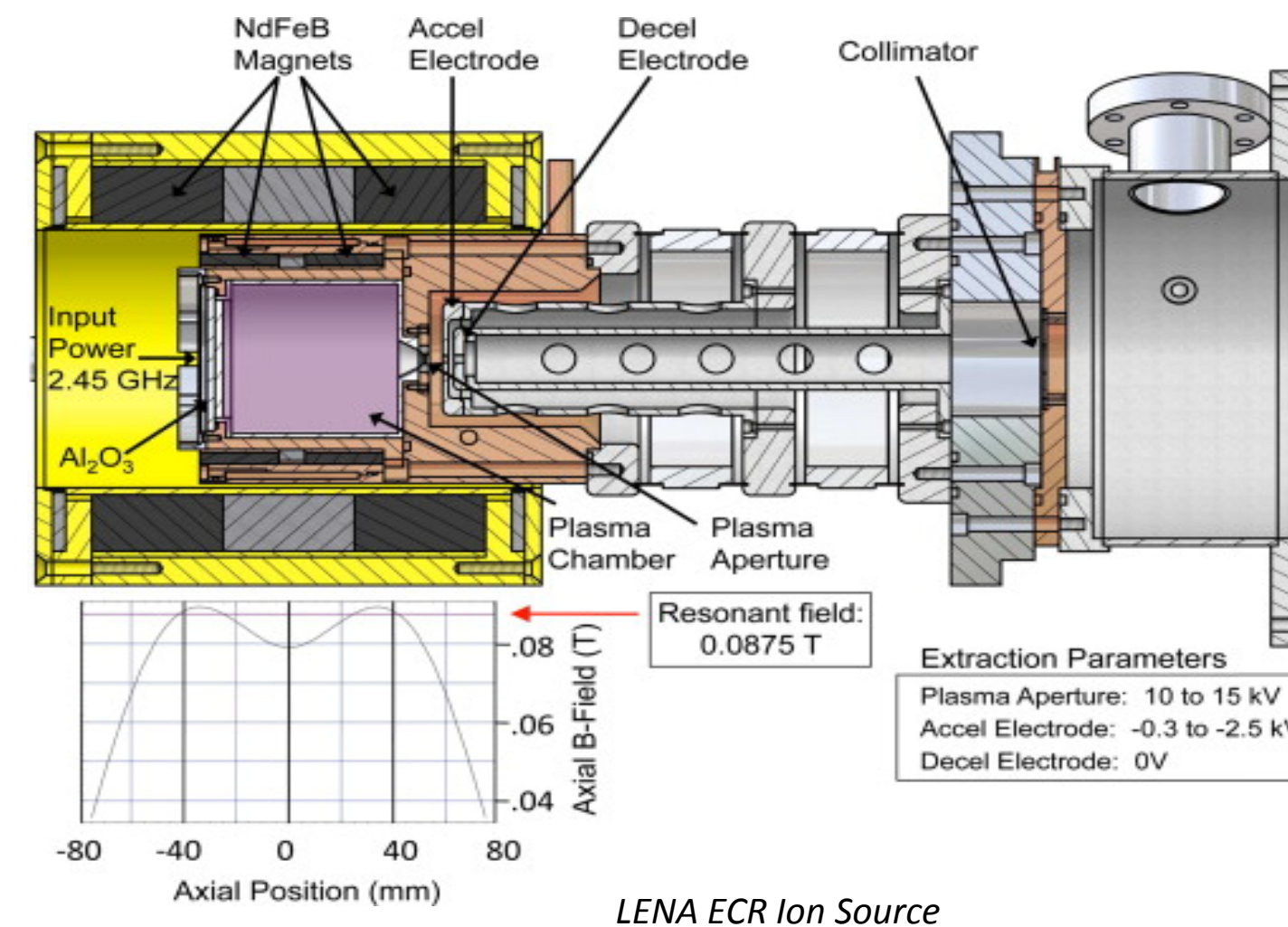
Andrew Cooper, Laboratory for Experimental Nuclear Astrophysics (LENA)

In spring of 2015 construction of a new 240 KeV particle accelerator column and its extraction system were completed at the Laboratory for Experimental Nuclear Astrophysics (LENA) at Duke University. This was done as part of an upgrade to the existing Electron Cyclotron Resonator (ECR) Ion Source at LENA, located in the basement of Duke University Physics Department.

In this report, survey and alignment of this ECR accelerator column and its extraction system will be discussed in details.



Laboratory for Experimental Nuclear Astrophysics



LENA ECR Ion Source

ECR consists of a plasma chamber into which 2.45 GHz microwave power is injected through a tapered waveguide, a surrounding solenoidal magnet array, and ion extraction and focusing electrodes, which shape the beam and transport it to the accelerator column.

Alignment Mechanism for the ECR Extraction System

Stepper Motor to Move the Extraction System in the Beam Direction

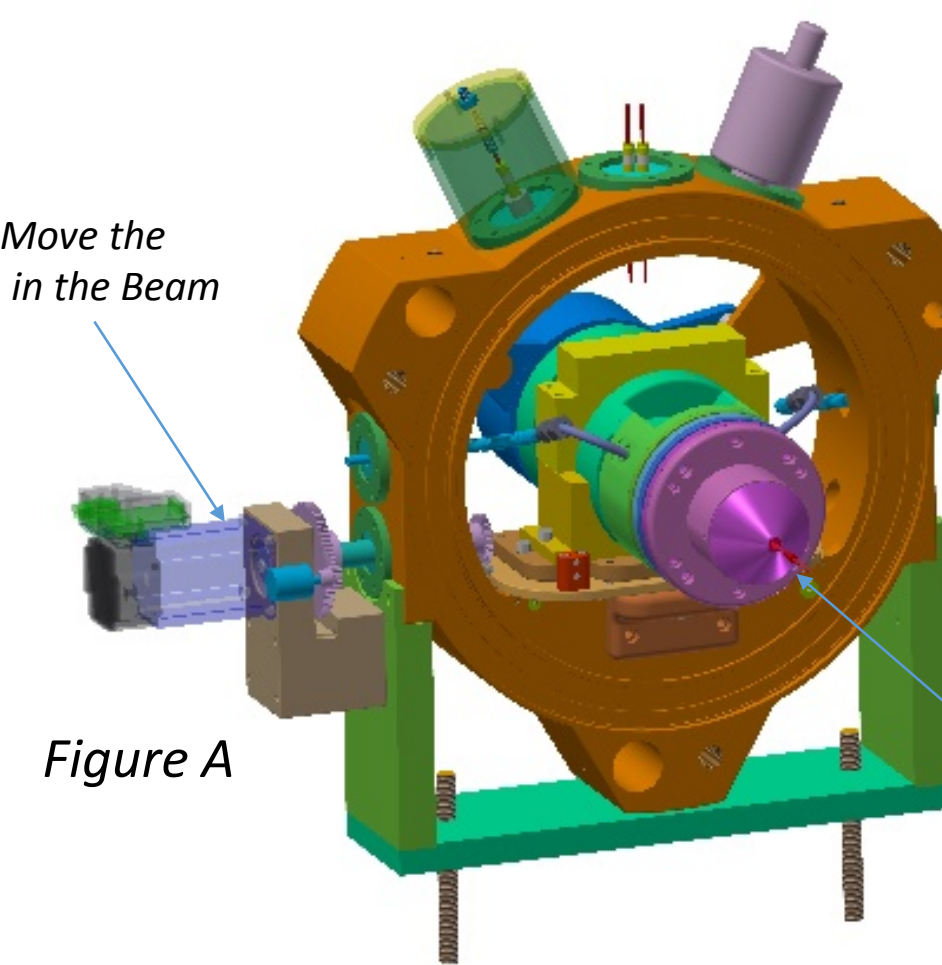


Figure A

Isometric View of the Extraction System and its Kinematic Mount Mechanism

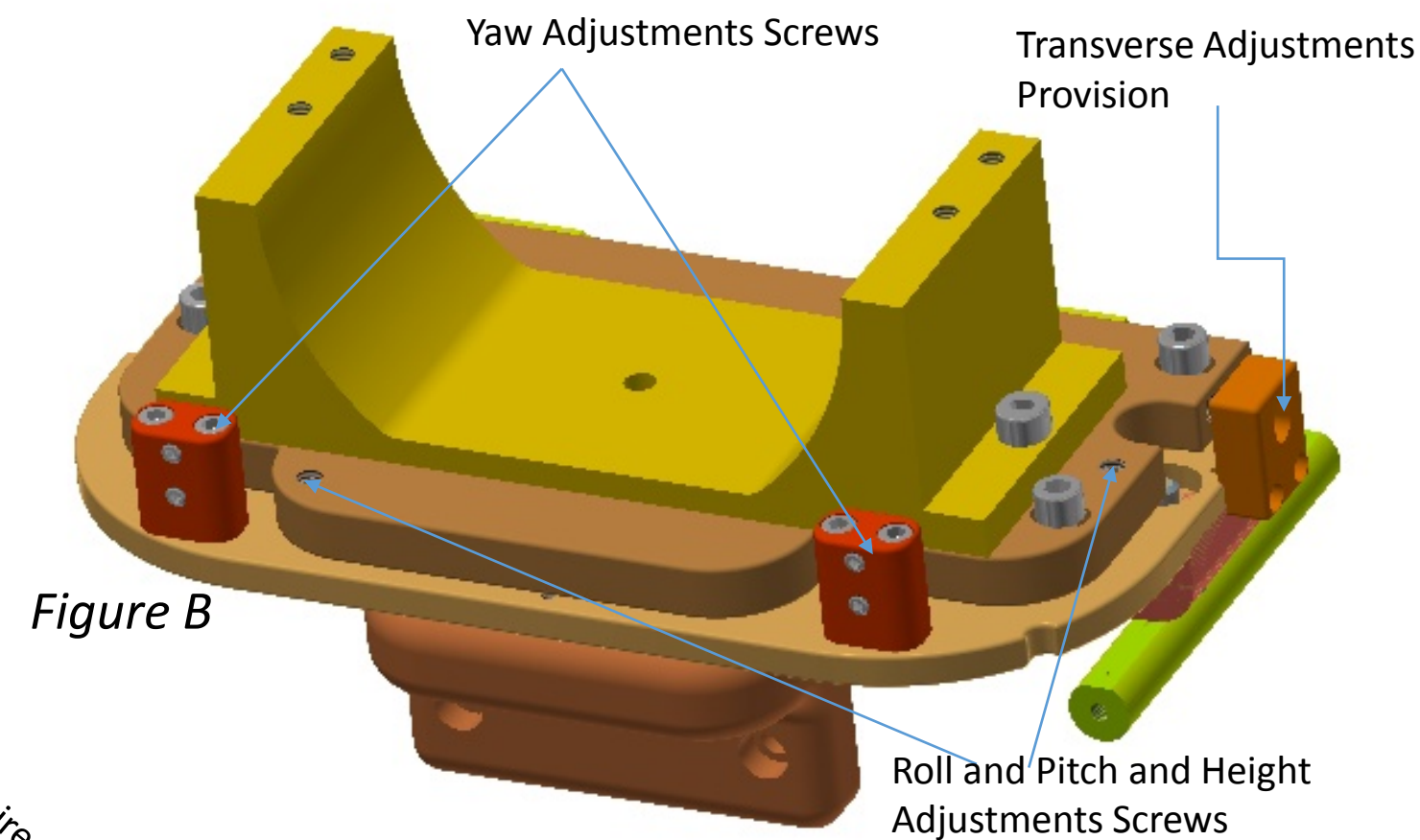
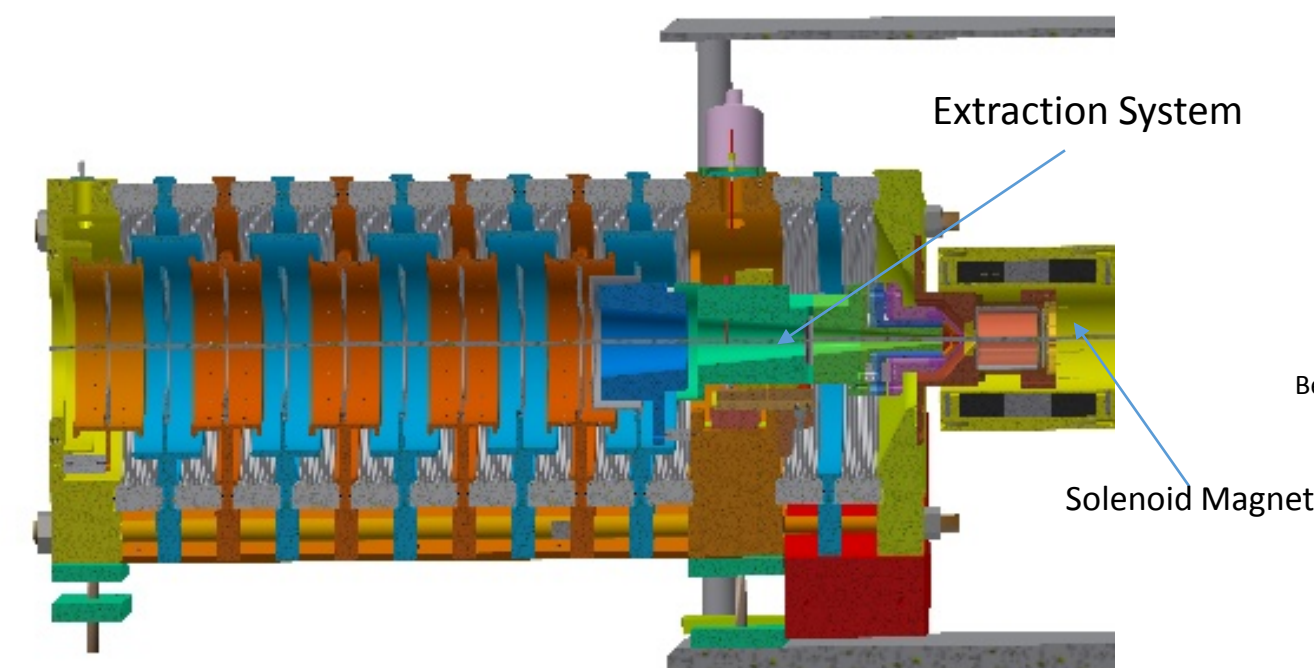
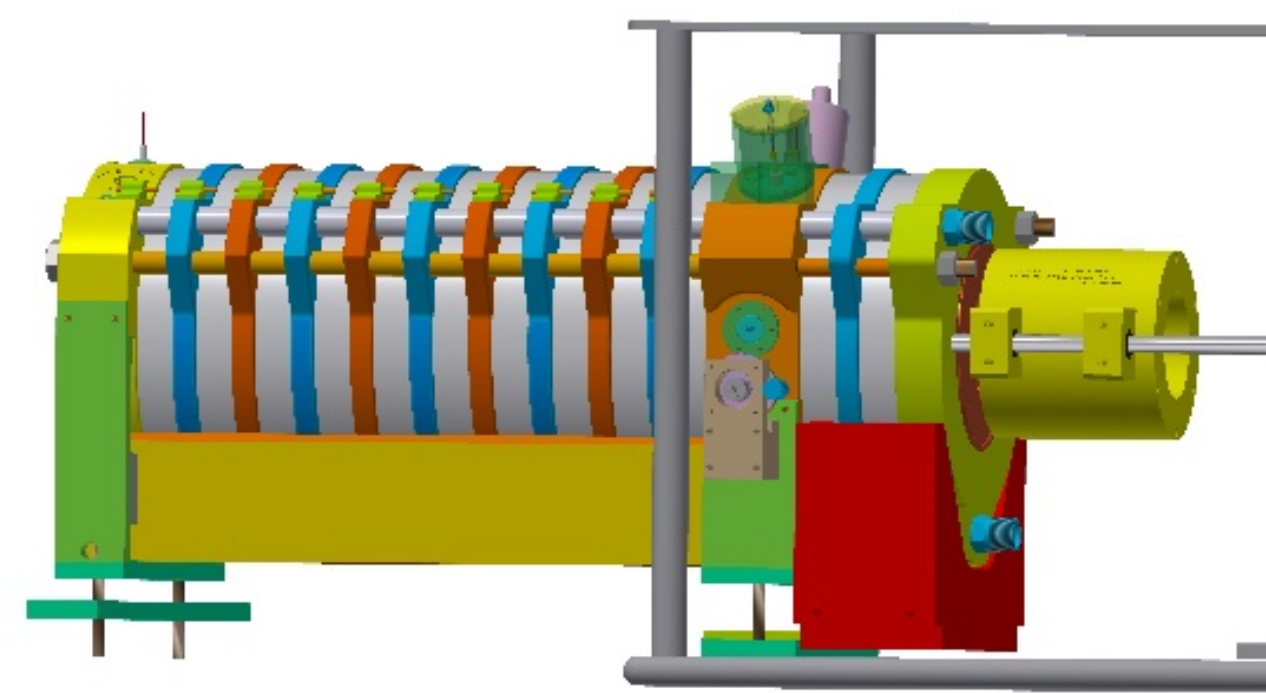


Figure B

Extraction System's Alignment Cradle and its Adjustment Provisions



3D Model of ECR Column (left) and the Cross Section View (Right)

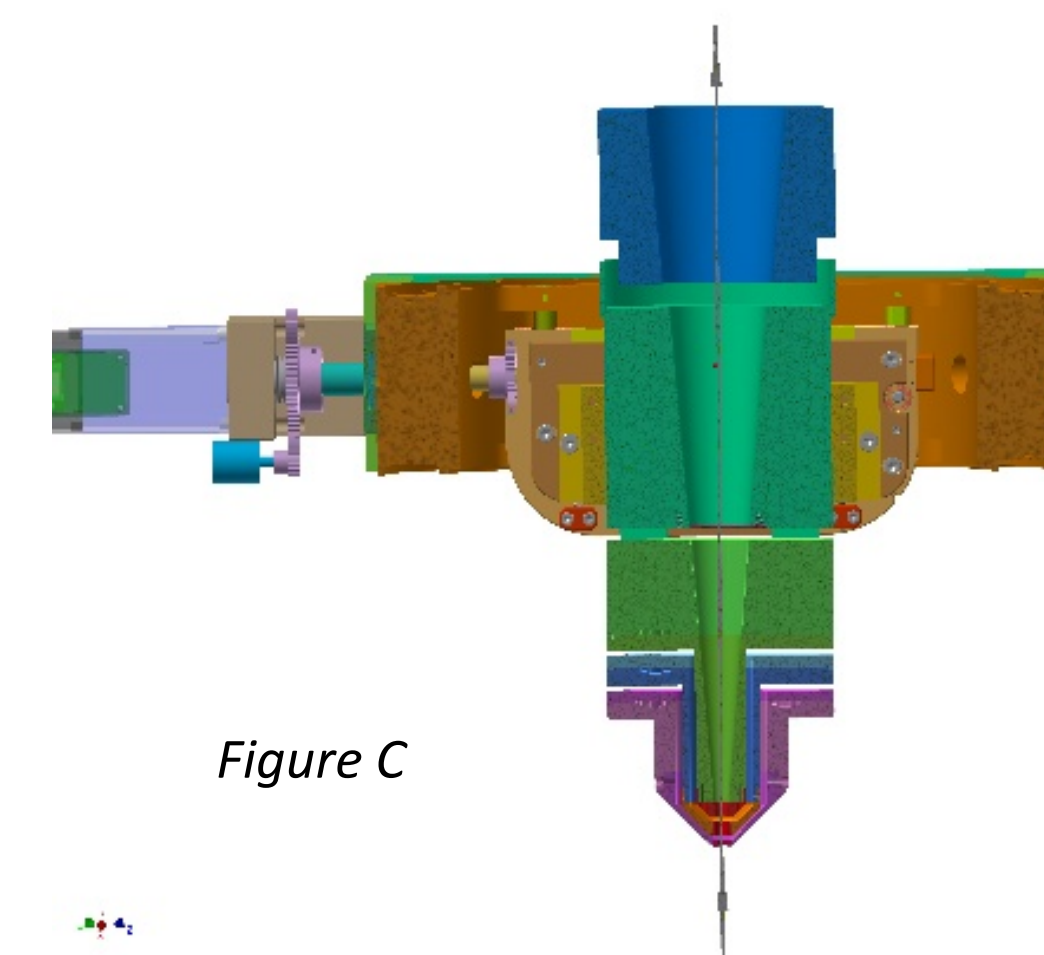
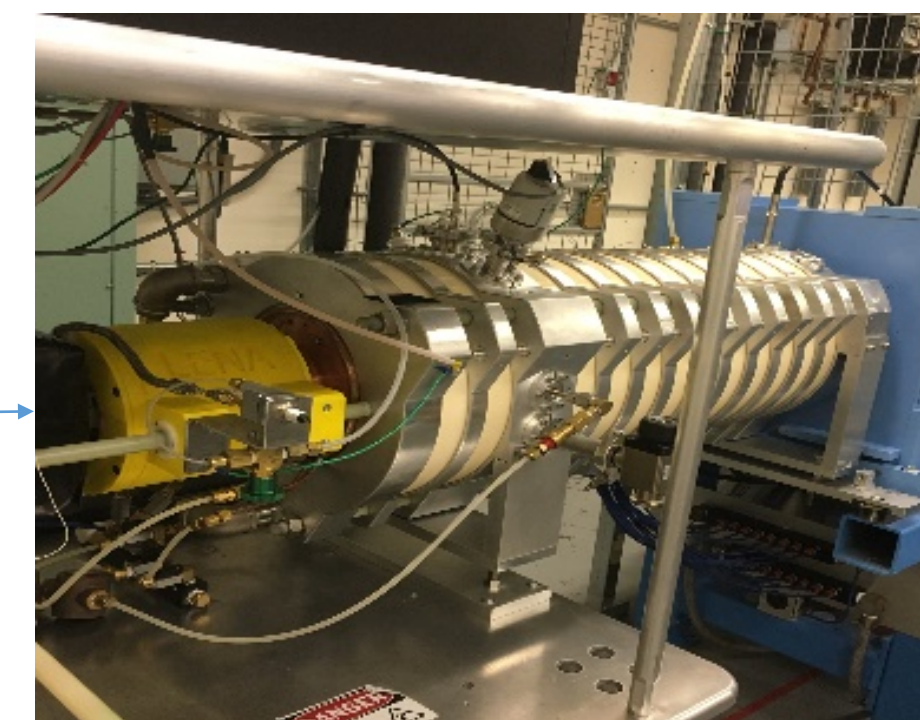


Figure C

Cross Section Top View of the Extraction System and its Kinematic Mount Mechanism

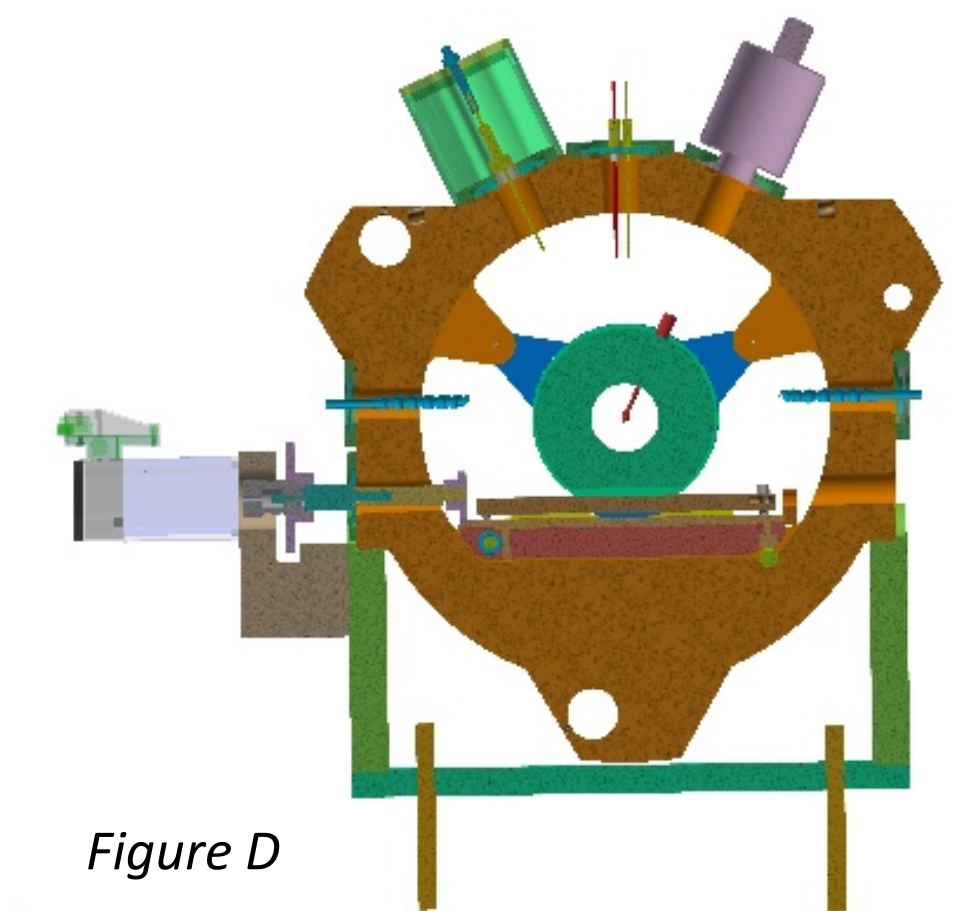


Figure D

Cross Section Front View of the Extraction System and its Kinematic Mount Mechanism