RECENT ENHANCEMENTS TO THE LOS ALAMOS ISOTOPE PRODUCTION FACILITY *

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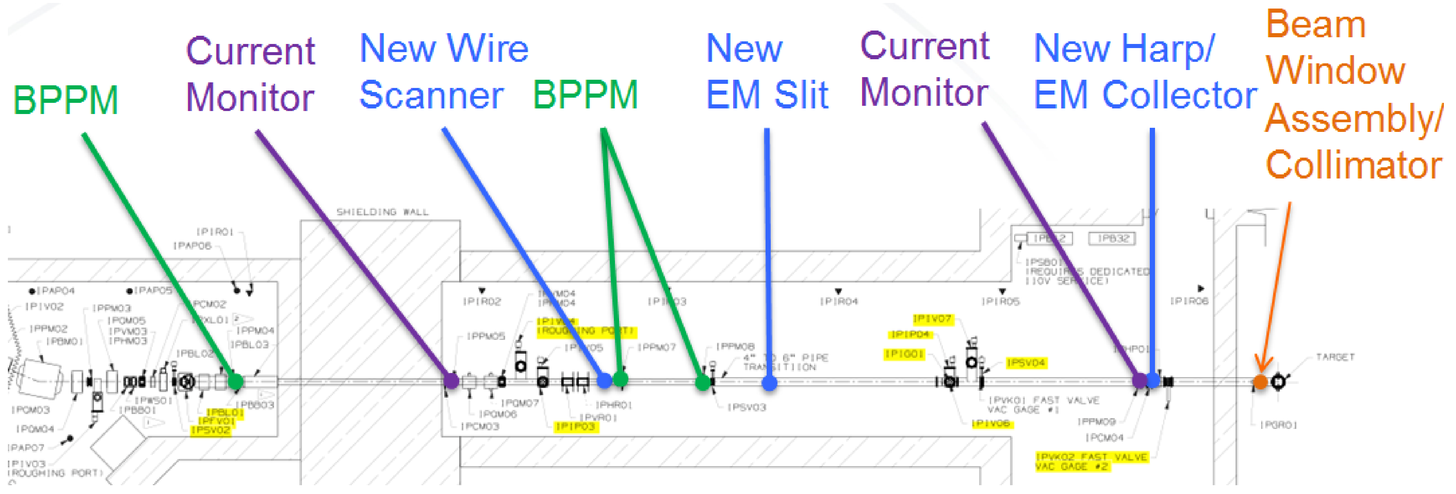
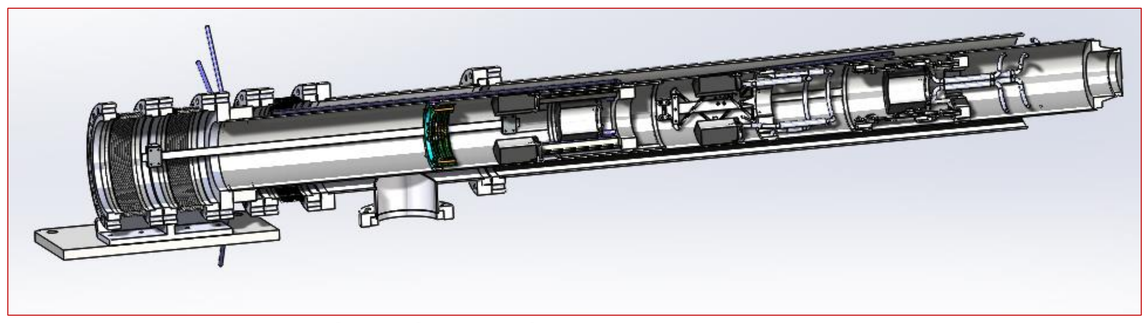
Isotopes produced at Los Alamos National Laboratory (LANL) are saving lives, advancing cutting-edge research, and helping to address national security questions. For the past two years LANL's Accelerator Operations & Technology Division has executed a $6.4M improvement project for the Isotope Production Facility. The goals were to reduce the programmatic risk and enhance facility reliability while at the same time pursuing opportunities to increase general isotope production capacity. This has led to some exciting innovations.



Isotope Production Facility Beamline

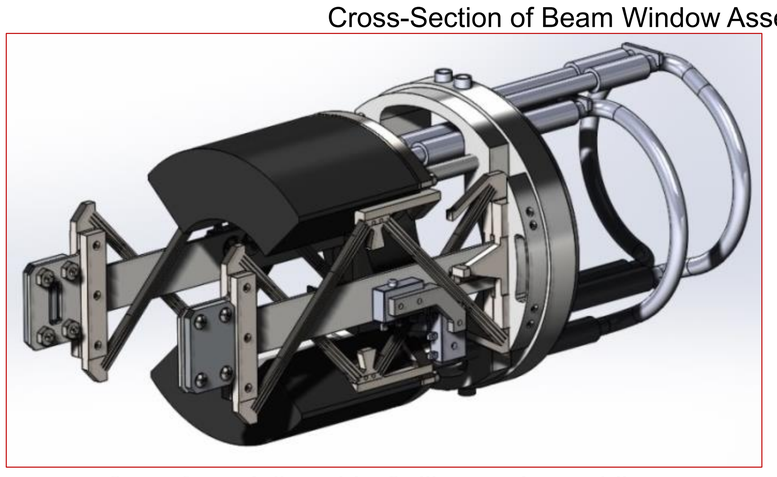


Cross-Section of Beam Window Assembly

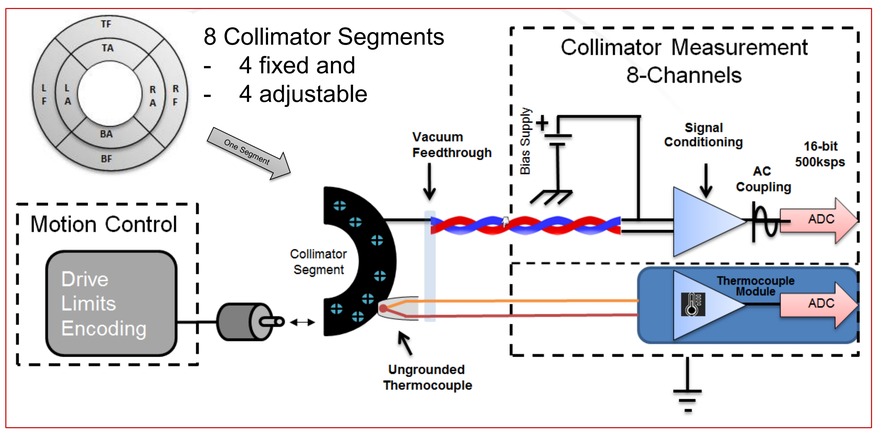
Active and Adjustable Collimator

The collimator is divided into four active-segments with a beam-spill current and temperature measurement for each segment. Furthermore, due to its adjustability (1.4-2.3”) it enables the use of larger diameter targets to *increase the production capacity* of various radioisotopes at IPF. Devices in the cross section view from left to right: Collimator Actuation System on a slide table, Guard Ring, Fixed Collimator followed by Adjustable Collimator and at the far right the beam window.

Segment Assembly



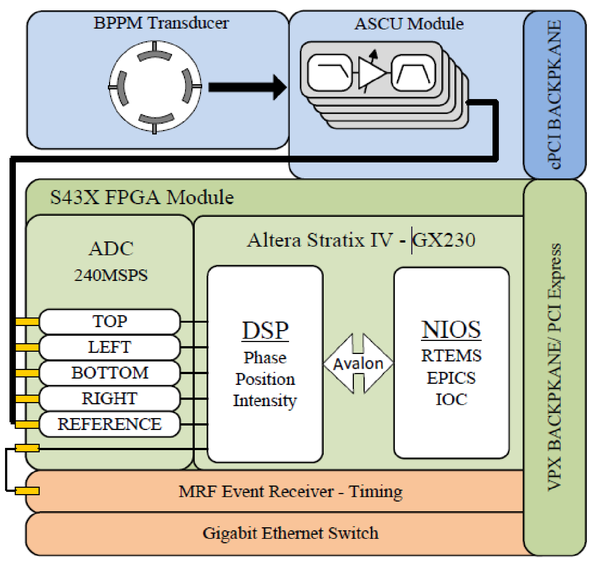
One of two Adjustable Collimator Assemblies

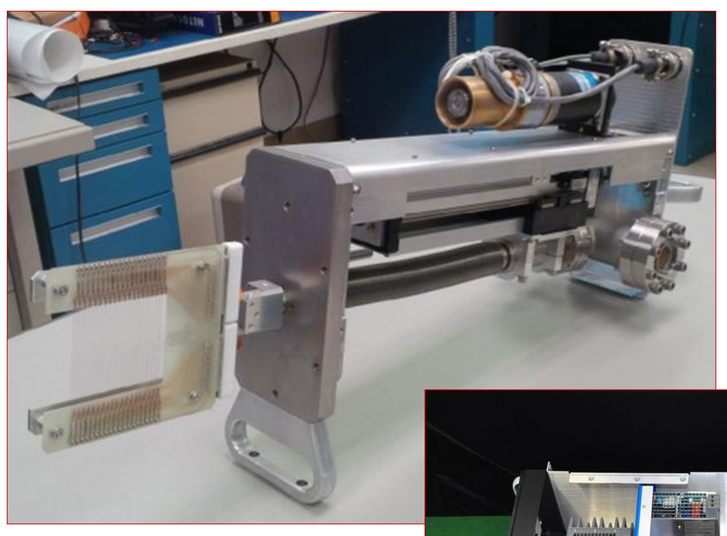


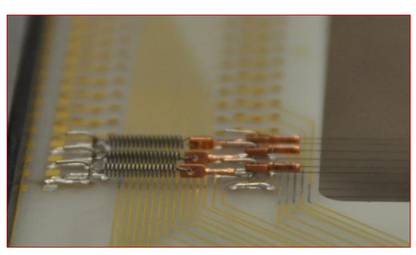
Electronics Chassis Overview Signal Flow

New and Improved Beam Diagnostics

Predicts better beam size and position at the target window and target therefore *enhancing the reliability* of IPF. This is based on our new capabilities: transverse emittance characterization of the beam, the measurement of rastered and unrastered beam profiles (via Harp and Wire Scanner), accurate beam current measurement from 100 nA to 450 uA time-of-flight energy measurements at the energies of 41, 72 and 100 MeV.





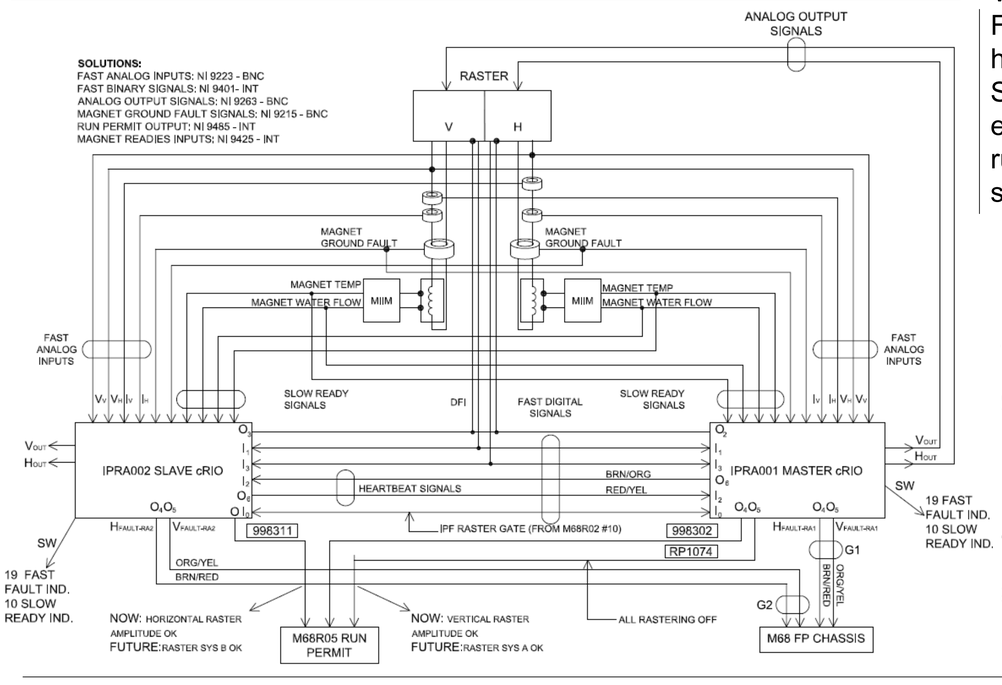


Left: Harp Actuator & Head

Lower Left: Harp Head Wires, 1mm pitch

Below: NI cRIO w/ cPCI backplane

VPX hardware consists of a FPGA Mezzanine Card hosting an ADC and an Altera Stratix. The later is hosting an embedded EPICS IOC running RTEMS operating system on a NIOS-II softcore.



Beam Rastering

Ensure that the beam-power is distributed optimally across the surface of each target which will allow for an *increase in isotope production capacity*. The new system can provides Control, Run Permit and Fast Protect functionality. Fast Protect turns beam off within 200 µs. The system is able to produce up to ~3 rastered circles of the same size in one macropulse. It is able to adjust on the fly to account for variation in the day-to-day beam spot size by independent adjustment of X and Y amplitude, +/- 10% in one percent step sizes.

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