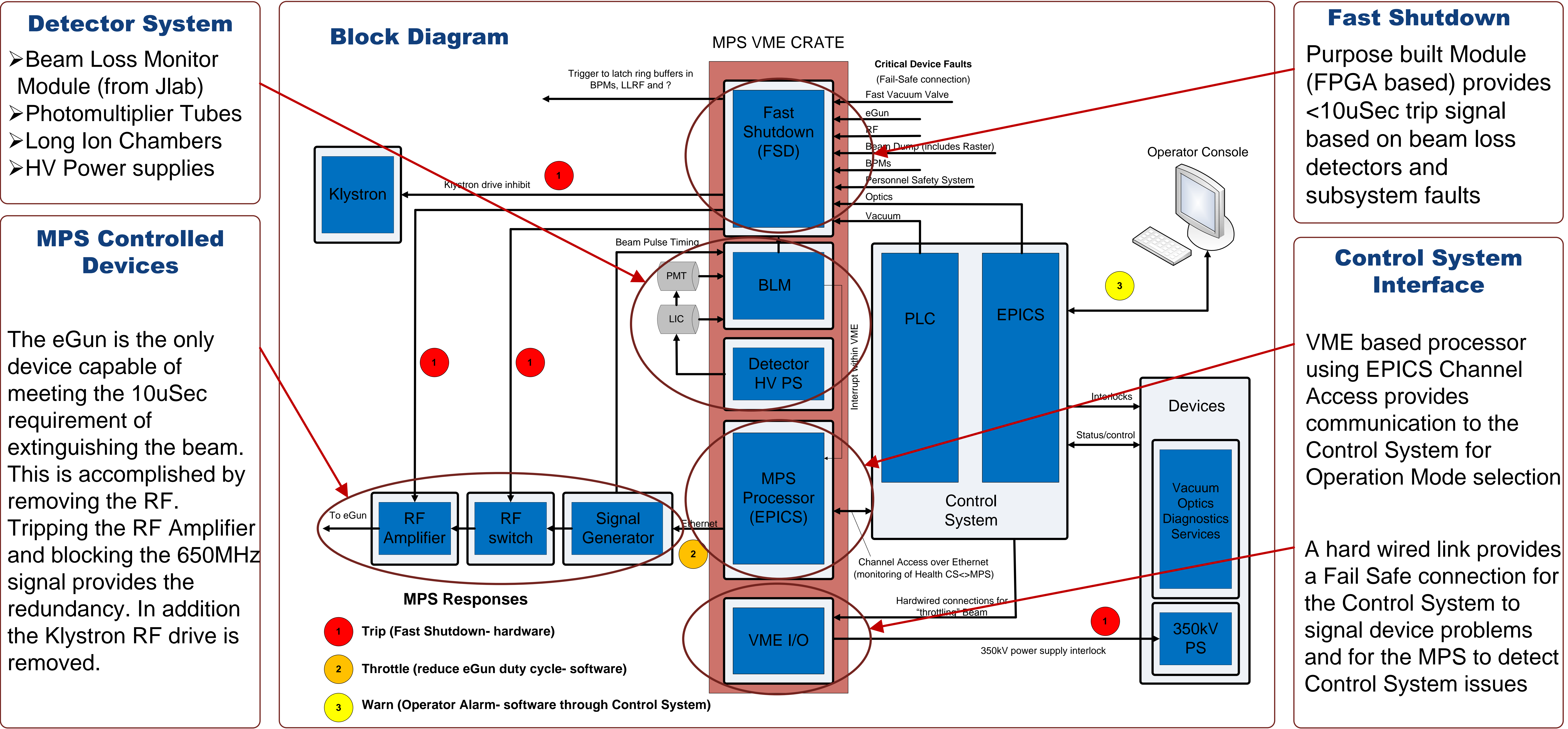


MACHINE PROTECTION SYSTEM FOR TRIUMF'S ARIEL FACILITY

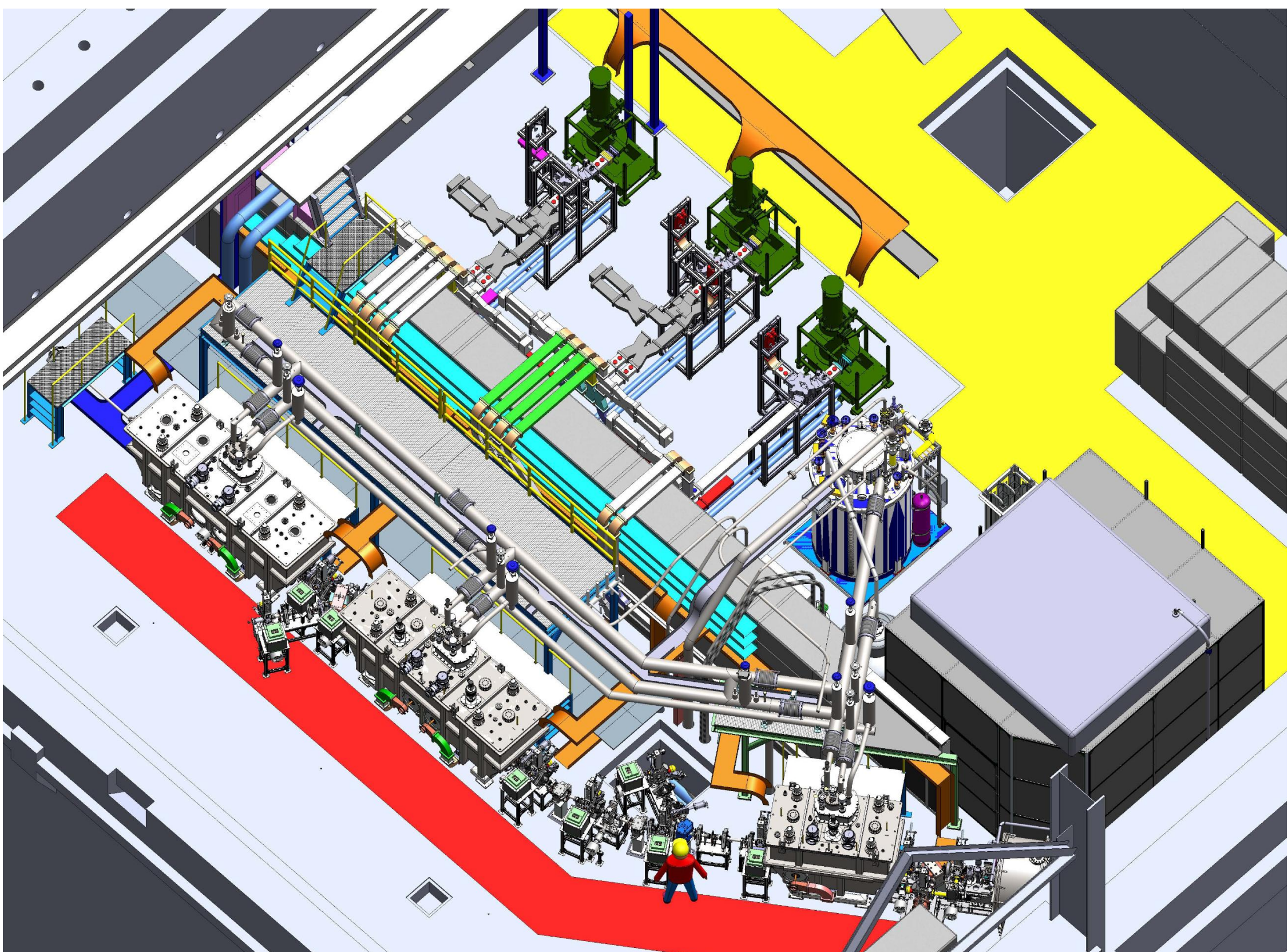
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**Abstract**

Phase 1 of the Advanced Rare Isotope & Electron Linac (ARIEL) facility at TRIUMF is scheduled for completion in 2014. It will utilize an electron linear accelerator (eLinac) capable of currents up to 10mA and energy up to 75MeV. The eLinac will provide CW as well as pulsed beams with durations as short as 10uS. A Machine Protection System (MPS) will protect the accelerator and the associated beamline equipment from the nominal 500kW beam. Hazardous situations require the beam to be extinguished at the electron gun within 10uS of detection. Beam loss accounting is an additional requirement of the MPS. The MPS consists of an FPGA based controller module, Beam Loss Monitor VME modules developed by JLAB, and EPICS -based controls to establish and enforce beam operating modes. This paper describes the design, architecture, and implementation of the MPS.



eLinac Layout



Responses and their associated Time Limits

Beam Loss Thresholds	Responses	Response Times
Catastrophic Beam Loss	1 Trip Fast Shutdown	10 uSecs
	2 Throttle Reduce eGun duty cycle	<1 sec >100mSec
Beam Loss Too High	3 Warn Operator Alarm	>1Sec
Chronic Beam Loss (Tolerable)		