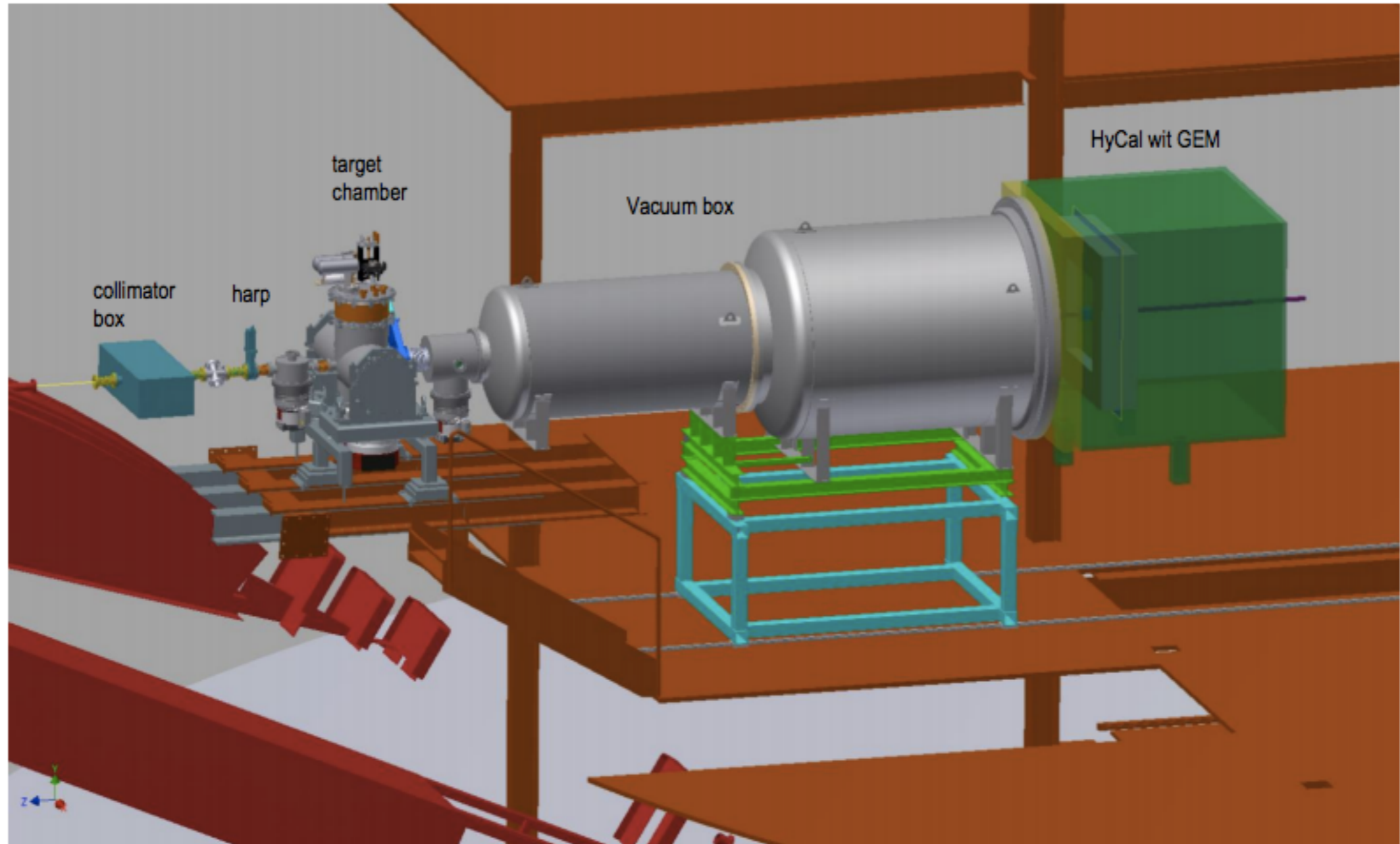
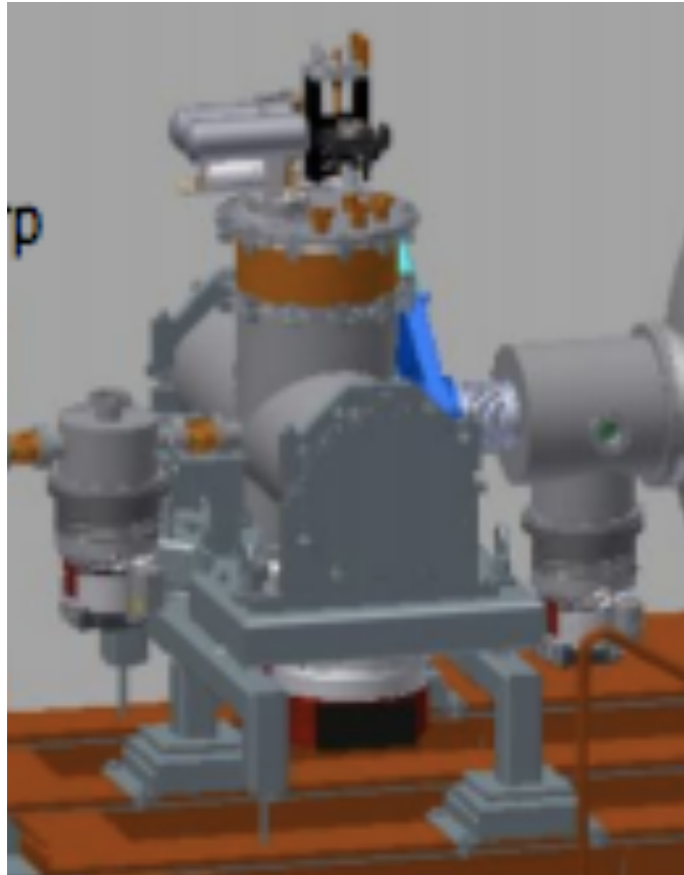


Hazard Mitigation and Documentation for PRad



Dipangkar Dutta
Mississippi State University

PRad Windowless Hydrogen Target



Hazards & Mitigation

- ODH from hydrogen gas and liquid helium coolant — does not impact ODH classification.
- Vacuum chamber — stored energy 26kJ
- Gas handling lines and chilled water lines — built according to ASME B31.3 (2012)
- Use of flammable gas — Class 0 risk, potential ignition sources meet Class 1 standards.

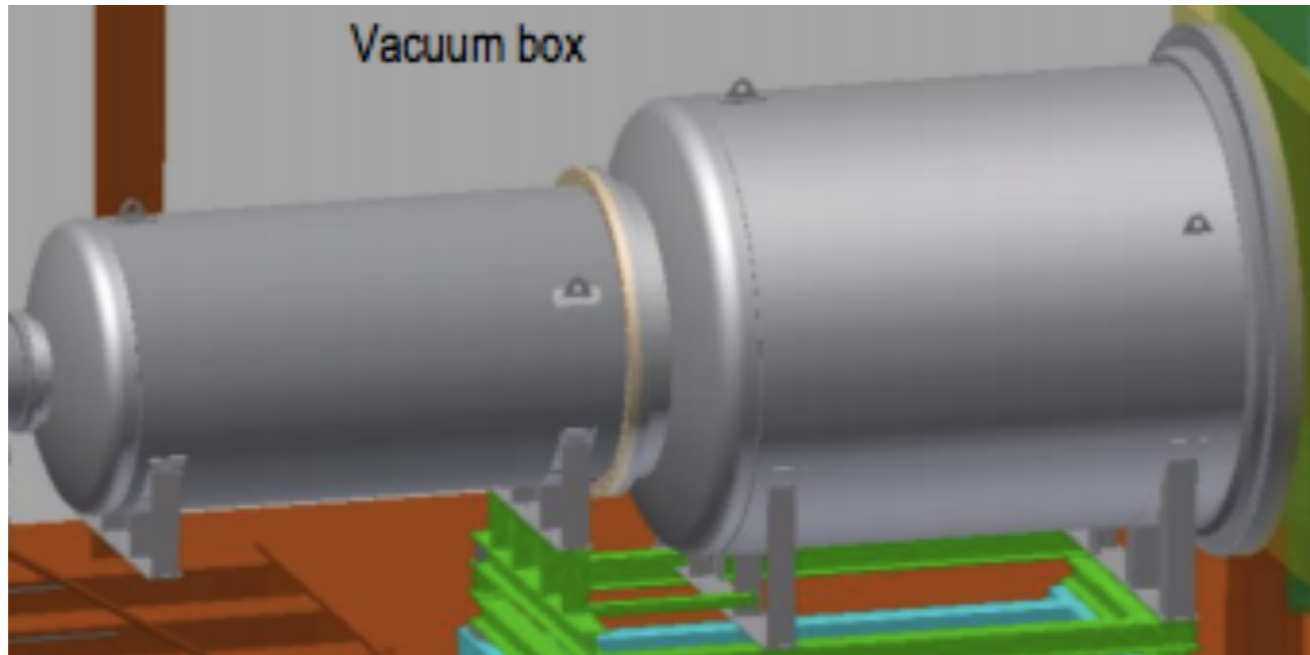
Target manual, operations manual and ESAD include detailed hazard analysis and mitigation, emergency and interlock procedure as well as inspection and maintenance schedule.

Responsible Personnel

Target-on-call - Hall-B

C. Keith - JLab Target Group

PRad Vacuum Box



~ 5 m long, 1.7 m diameter
63 mil thin window, with
2-in central flange for
beam pipe.

Hazards & Mitigation

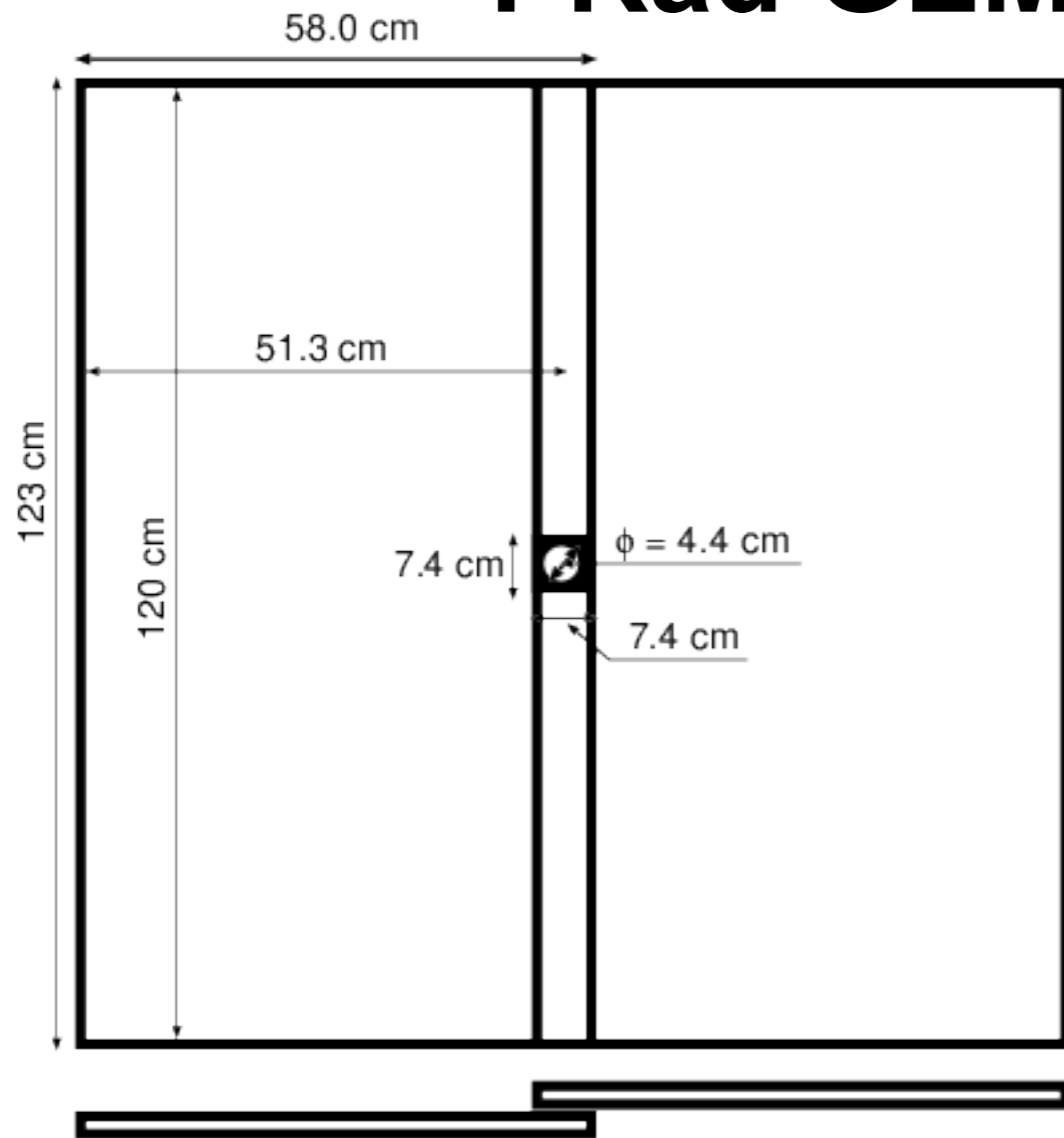
- Rapid decompression from window failure
 - all personnel in vicinity wear hearing protection and safety glasses
 - posted warning signs
 - window covered with plastic protective cover when not under vacuum
 - restrict access when under vacuum

Responsible Personnel

Tech-on-call - Hall-B

D. Tilles - Hall-B

PRad GEM Tracking Chambers



Two 1.2m x 0.6 m
3-layer GEM chambers

Hazards & Mitigation

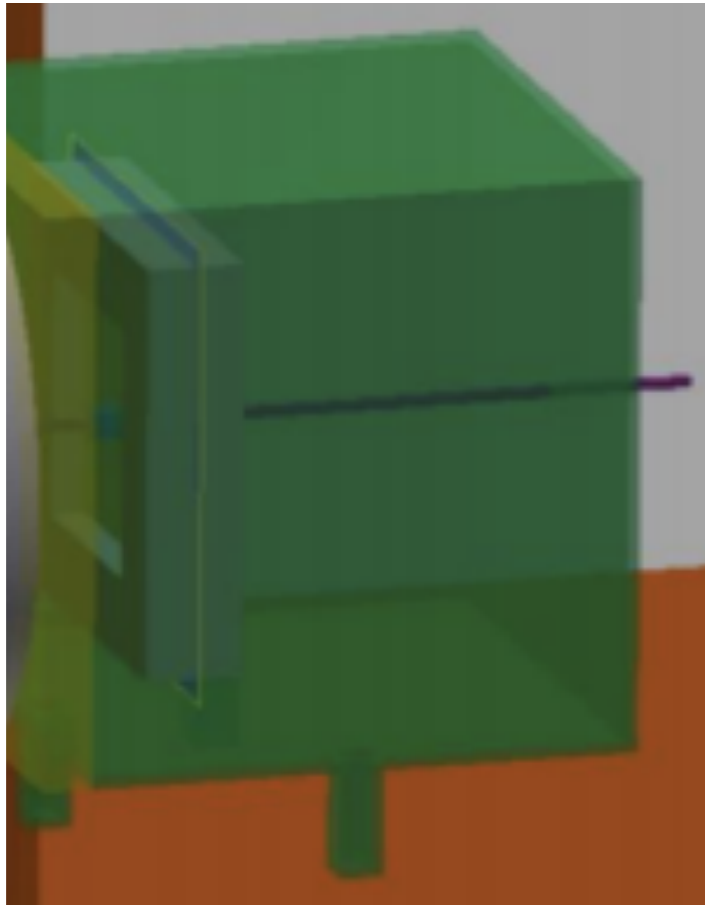
- High voltage (4kV) bias supplied to chamber
- All power supplies turned OFF before accessing cables and electronics on the chambers

Responsible Personnel

K. Gnanvo - UVa

K. Adhikari - MSU

High Resolution Electromagnetic Calorimeter



~1700 lead glass and lead tungstate detector modules, each with photomultiplier tubes with readout inside a temperature controlled enclosure

Hazards & Mitigation

- High voltage supplied to PMTs
- Coolant leak
 - All power supplies turned OFF before opening enclosure
 - Any change in temperature $> 1^{\circ}\text{C}$ must be investigated.
 - Chiller turned OFF when accessing calorimeter.

Responsible Personnel

A. Gasparian - NC A&T

E. Pasyuk - Hall-B

Hall-B Standard Equipment & General Hazards

Hazards, their mitigation and responsible personnel for all Hall-B standard equipment used by PRad experiment such as tagger system and Hall-B beamline have been listed in the ESAD.

All general hazards and their mitigation have been documented in the ESAD.

Radiological Hazards

Two different running conditions:

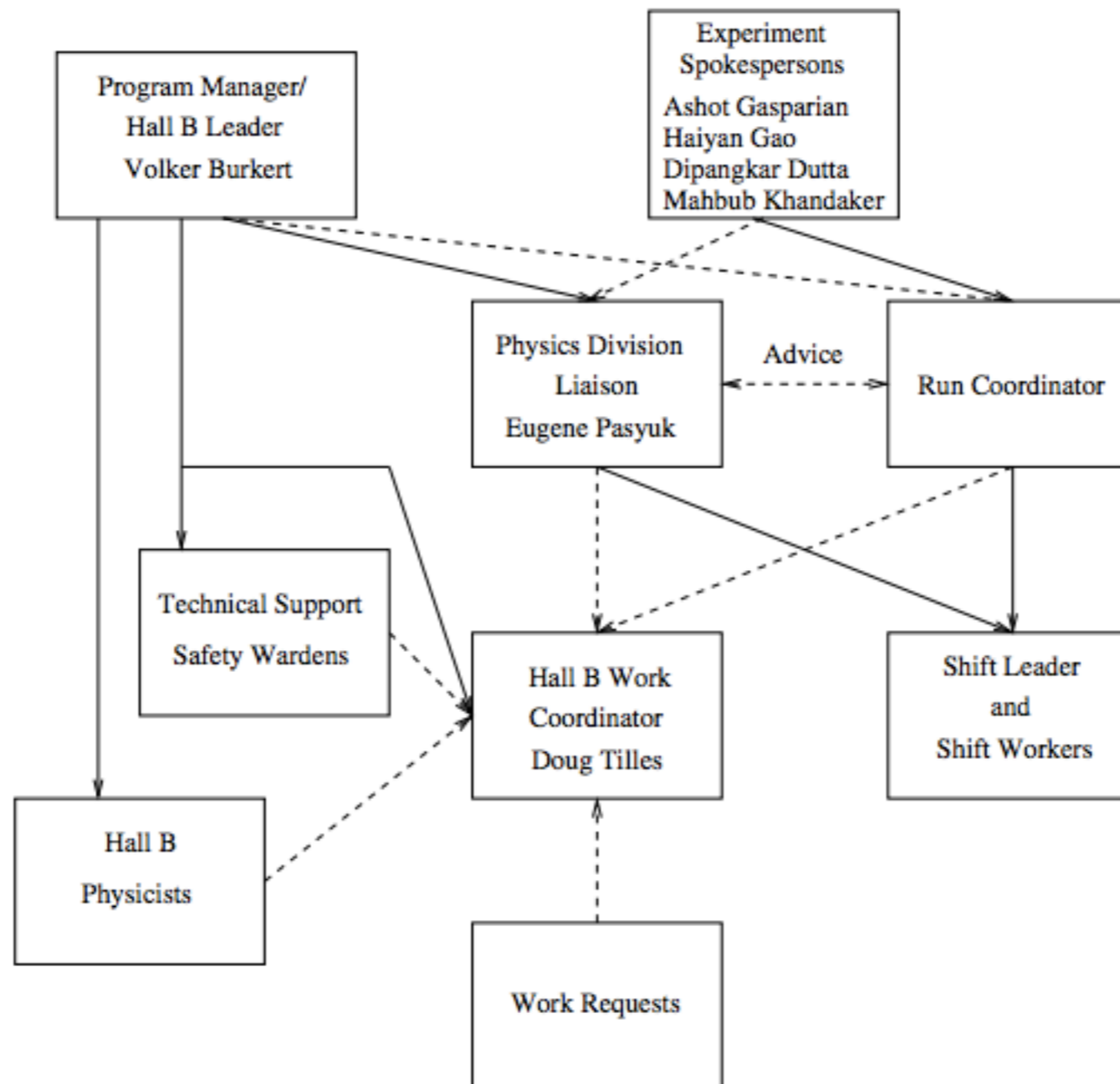
1. tagged photon beam from 2.2 GeV electrons (0.1 nA) on a 10^{-5} r.l. radiator.
2. Less than 10 nA, 1.1 and 2.2 GeV electron beam on thin gas target for < 10 PAC days

RSAD prepared by Radiation Control Group

“The PRad experimental runs as planned are not expected to produce significant levels of radiation at the site boundary. However, it will be continuously monitored by the Radiation Control.”

Other Safety and Operational Procedures Documents

Hall -B Emergency Response Guidelines (ERG) is ready
PRad Conduce of Operations (COO) is also complete.



All required safety documents and operations procedure Documents have been completed