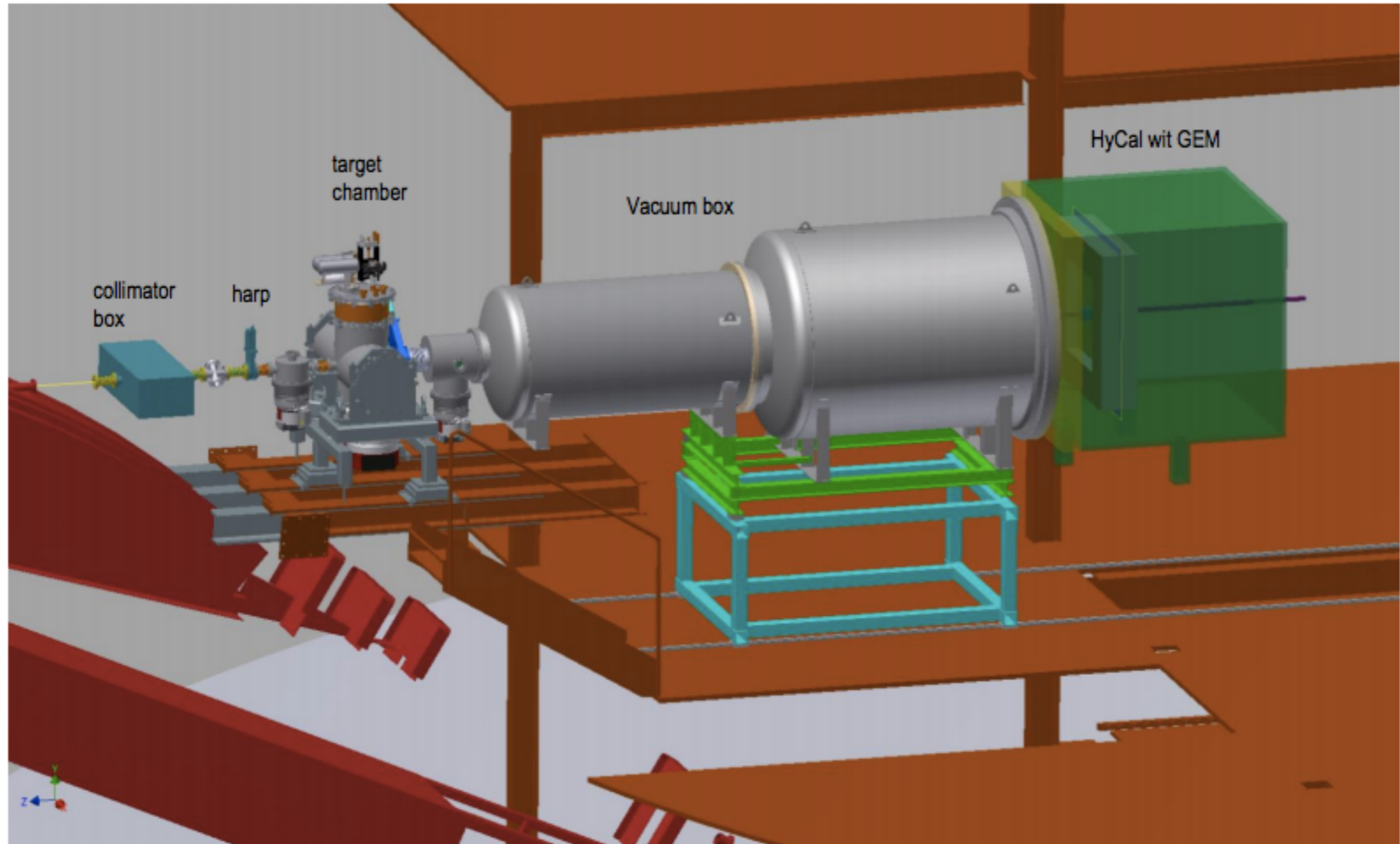
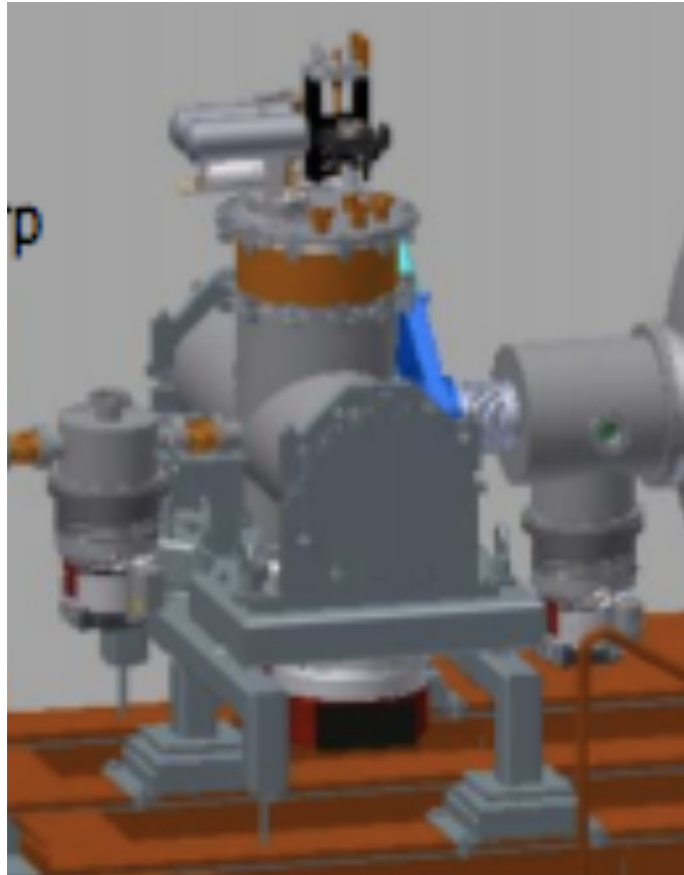


# Hazard Mitigation and Documentation for PRad



**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.

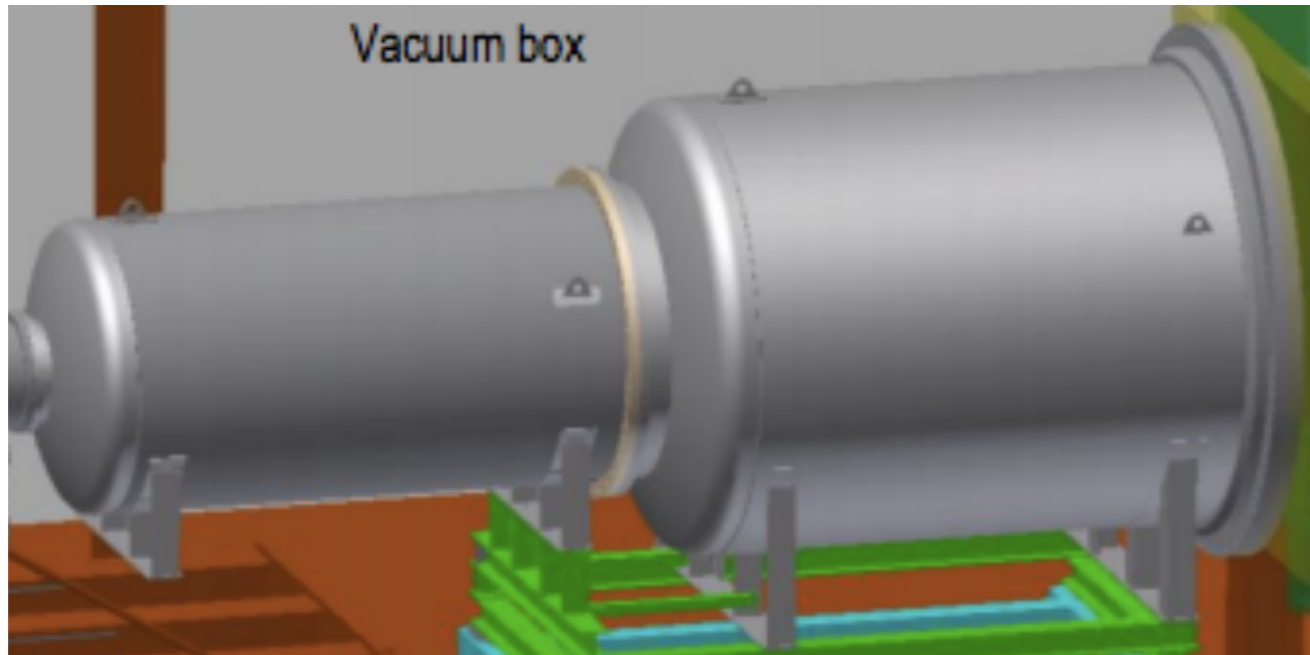
Target manual, operations manual and ESAD include detailed hazard analysis and mitigation, emergency and interlock procedure as well as inspection and maintenance schedule.

## 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

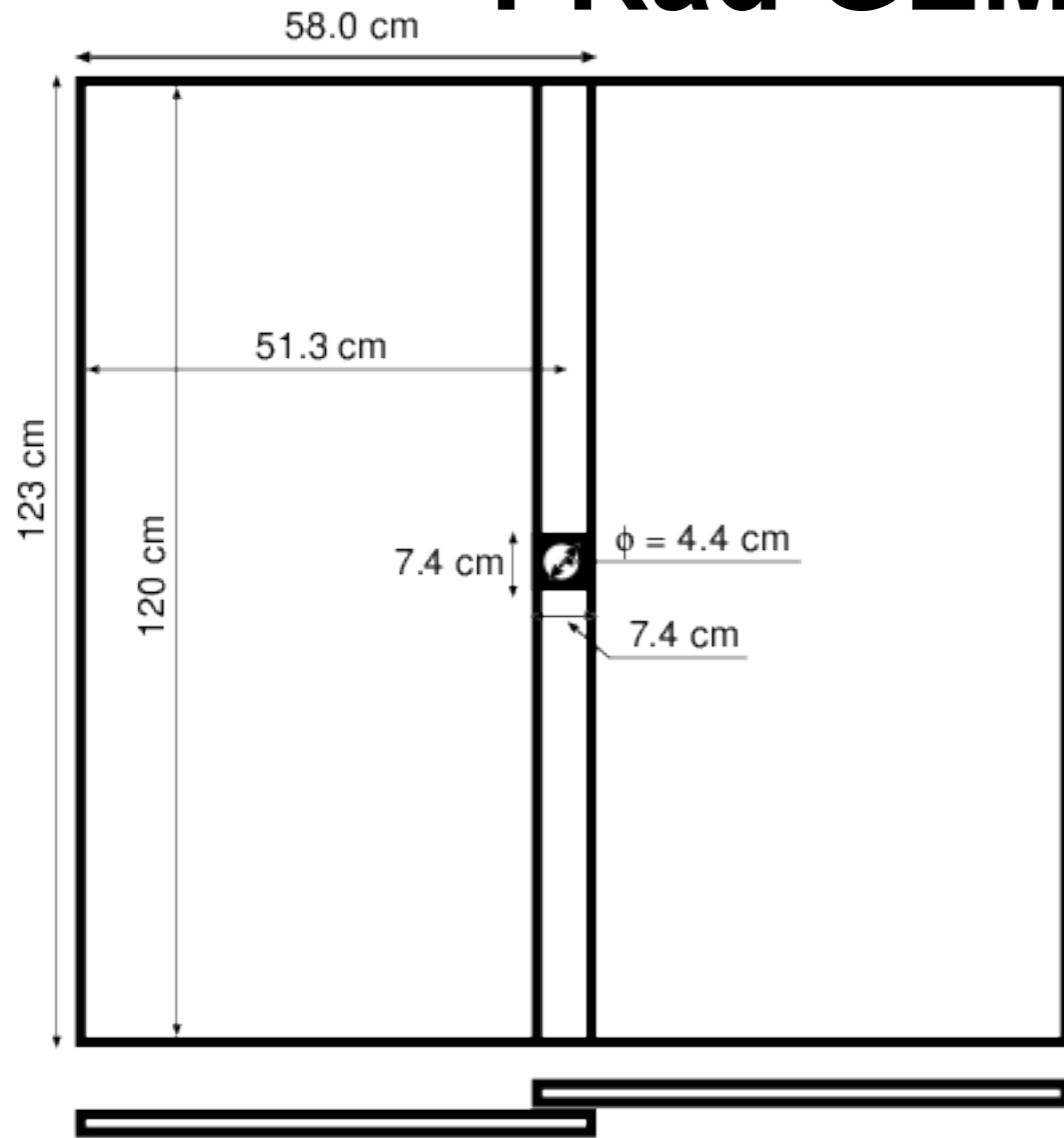
- Rapid decompression from window failure
  - all personnel in vicinity wear hearing protection and safety glasses
  - posted warning signs
  - window covered with plastic protective cover when not under vacuum
  - restrict access when under vacuum

## 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

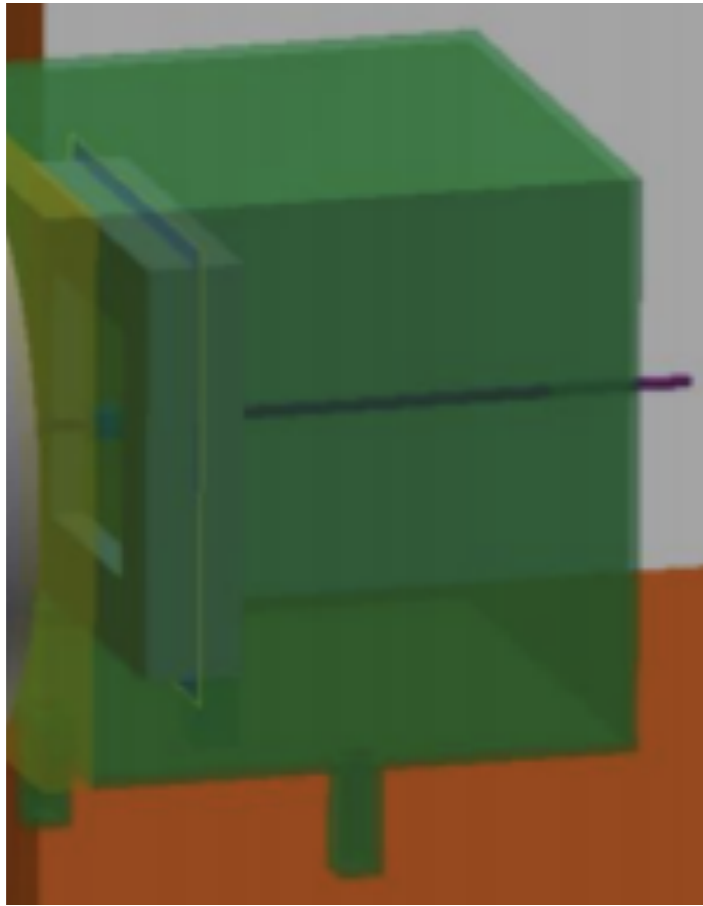
- High voltage (4kV) bias supplied to chamber
- All power supplies turned OFF before accessing cables and electronics on the chambers

## 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:

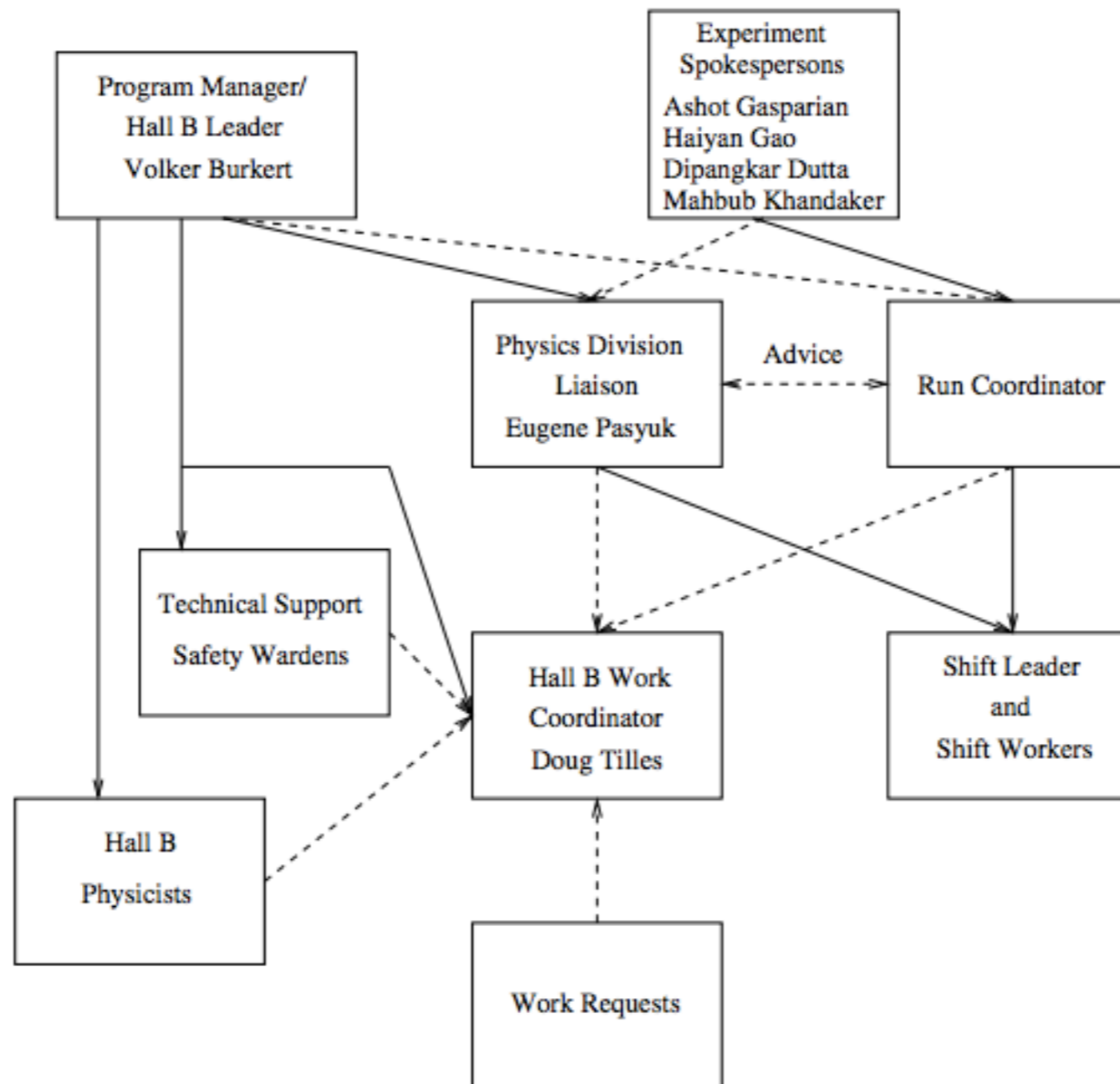
1. tagged photon beam from 2.2 GeV electrons (0.1 nA) on a  $10^{-5}$  r.l. radiator.
2. Less than 10 nA, 1.1 and 2.2 GeV electron beam on thin gas target for < 10 PAC days

**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 Conduct of Operations (COO) is also complete.





**All required safety documents and operations procedure Documents have been completed**