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Jefferson Lab
Thomas Jefferson National Accelerator Facility

Operational Safety Procedure Form

(See ES&H Manual Chapter 3310 Appendix T1 Operational Safety Procedure (OSP) and Temporary OSP Procedure for instructions.)

Click

Title:	GEM detector for the LAD experiment		
Location:	Hall C – target platform	**Type:**	☒ OSP ☐ TOSP
Risk Classification (per Task Hazard Analysis attached) (See *ESH&Q Manual Chapter 3210 Appendix T3 Risk Code Assignment*.)		**Highest Risk Code Before Mitigation**	2
		Highest Risk Code after Mitigation (N, 1, or 2):	0
Owning Organization:	Hall C	**Date:**	Oct. 16, 2020
Document Owner(s):	Holly Szumila-Vance		

DEFINE THE SCOPE OF WORK

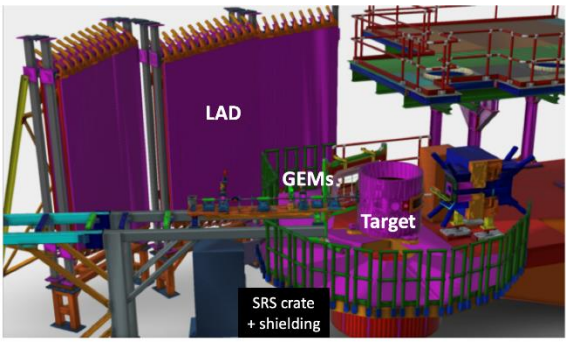
1. Purpose of the Procedure – Describe in detail the reason for the procedure (what is being done and why).

This document describes the GEM assembly detector that will be used in the LAD experiment in Hall C. These GEMs were previously installed in Hall B for the PRAD experiment.

2. Scope – include all operations, people, and/or areas that the procedure will affect.

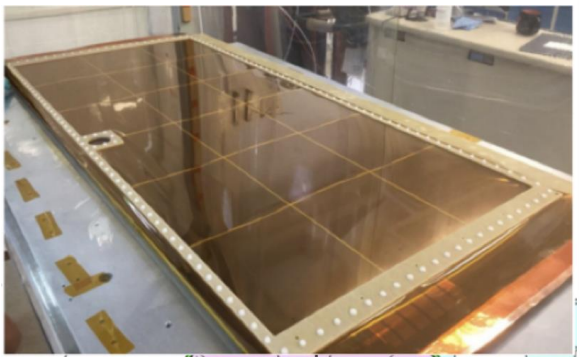
Operation of the PRAD GEMs in the Hall C LAD experiment. The scope of this OSP encompasses electrical issues associated with the GEM detector and the use of Ar/CO2 gas flowing through the detector.

3. Description of the Facility – include building, floor plans and layout of the experiment or operation.

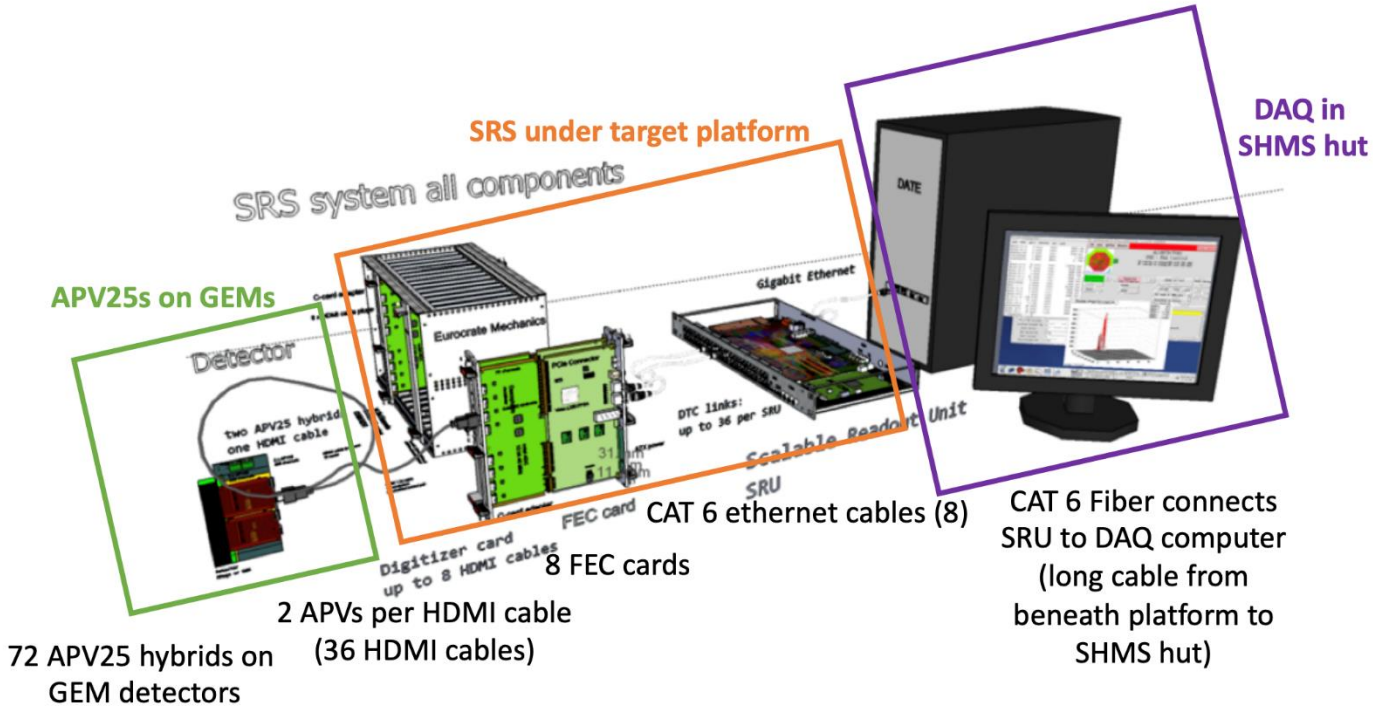


The components of the GEM detector assembly are in 4 locations.

1. The detector, GEMs with an active area of 120cm by 55cm are mounted on stands on the target platform, beam left, 127 deg off the beamline and level with the target. The first GEM layer is at 75 cm from the target center, and the second GEM layer is at 95 cm from the target center. The APV25s (72 in total) for readout are attached to the GEMs.



2. An Ar/CO2 bottle with pressure regulator is securely fastened at the bottom of the target platform. A tube connects the bottle to a flow meter near the GEM detector. The flow is <1 ft^3/hour.
3. The Scalable Readout System (SRS) is composed of 8 FEC cards+SRU and is located beneath the target platform and is shielded with lead. The FEC cards are attached to the APV25s through 36 HDMI cables (2 APVs per cable). The FEC cards are connected through 8 CAT-6 ethernet cables to the Scalable Readout Unit (SRU).



4. The DAQ is located in the SHMS electronics hut. A CAT-6 fiber connects the SRU to the DAQ computer and runs from beneath the target platform to the SHMS hut. THE GEM high voltage supply (4kV) is also located in the SHMS electronics hut.

ANALYZE THE HAZARDS and IMPLEMENT CONTROLS

4. Hazards identified on written Task Hazard Analysis

Electrical shock. Pressurized gas bottle.

5. Authority and Responsibility:

5.1 Who has authority to implement/terminate

Hall A/C Leader, Hall C Work Coordinator, Holly Szumila-Vance, Steve Wood, Xinzhan Bai, Florian Hauenstein

5.2 Who is responsible for key tasks

Holly Szumila-Vance, Xinzhan Bai

5.3 Who analyzes the special or unusual hazards including elevated work, chemicals, gases, fire or sparks (See ES&H Manual Chapter 3210 Appendix T1 Work Planning, Control, and Authorization Procedure)

Work Coordinator or designee

6. Personal and Environmental Hazard Controls Including:

6.1 Shielding

N/A

6.2 Barriers (magnetic, hearing, elevated or crane work, etc.)

N/A

6.3 Interlocks

N/A

6.4 Monitoring systems

N/A

6.5 Ventilation

N/A

6.6 Other (Electrical, ODH, Trip, Ladder) (Attach related Temporary Work Permits or Safety Reviews as appropriate.)

Use of current limited high voltage supply at 4kV. Use of HV cables and connectors. Exposed high voltage wrapped with electrical tape.

Gas supplied through a pressure regulator attached to the gas bottle with flow limited by a flow meter.

7. List of Safety Equipment:

7.1 List of Safety Equipment:

N/A

7.2 Special Tools:

N/A

8. Associated Administrative Controls

Setup, removal or changes to the GEM setup may only be done by Holly Szumila-Vance, Xinzhan Bai, Florian Hauenstein, Chuck Mahon, members of the Work Coordinators staff, members of Hall

A/C staff, and others designated by Holly Szumila-Vance or Steve Wood. Users may operate the high voltage under the direction of Holly Szumila-Vance, Steve Wood, or Florian Hauenstein.

9. Training

9.1 What are the Training Requirements (See List of Training Skills)

Hall C walk through, Radiation Worker I

DEVELOP THE PROCEDURE

10. Operating Guidelines

11. Notification of Affected Personnel (who, how, and when include building manager, safety warden, and area coordinator)

Contact hall work coordinator prior to start of work, daily.

12. List the Steps Required to Execute the Procedure: from start to finish.

1. GEM installation prior to start of experiment on GEM stands on target platform.
2. GEM electronics installed beneath target platform.
3. Connect gas system to GEM.
4. Install GEM HV unit and PC in the SHMS electronics hut.
5. Connect electronics, data acquisition, high voltage and gas.

13. Back Out Procedure(s) i.e. steps necessary to restore the equipment/area to a safe level.

1. Turn off high voltage.
2. Stop gas flow.

14. Special environmental control requirements:

14.1 List materials, chemicals, gasses that could impact the environment (ensure these are considered when choosing Subject Mater Experts) and explore EMP-04 Project/Activity/Experiment Environmental Review below

N/A

14.2 Environmental impacts (See EMP-04 Project/Activity/Experiment Environmental Review)

N/A

14.3 Abatement steps (secondary containment or special packaging requirements)

N/A

15. Unusual/Emergency Procedures (e.g., loss of power, spills, injury, fire, etc.)

In the event of injury, or an immediate emergency exists, call **911** and also notify:

- Guards (**x5822**)
- Occupational Medicine (**x7539**)
- Crew Chief (**x7045**) (if inside the fence)

In case of an injury follow standard JLAB procedures. Initial response cards are located with each phone for appropriate emergency phone numbers. Additional information can be found at https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-24400/*.pdf.

16. Instrument Calibration Requirements (e.g., safety system/device recertification, RF probe calibration)

None

17. Inspection Schedules

None

18. References/Associated/Relevant Documentation

19. List of Records Generated (Include Location / Review and Approved procedure)

Submit Procedure for Review and Approval (See ES&H Manual Chapter 3310 Appendix T1 OSP & TOSP Instructions – Section 4.2 Submit Draft Procedure for Initial Review):

- Convert this document to .pdf
- Open electronic cover sheet: https://mis.jlab.org/mis/apps/mis_forms/operational_safety_procedure_form.cfm
- Complete the form
- Upload the pdf document and associated Task Hazard Analysis (also in .pdf format)

Distribution: Copies to Affected Area, Authors, Division Safety Officer
Expiration: Forward to ES&H Document Control

Form Revision Summary

Revision 1.6 – 06/23/2020 – Update section 15 to reflect guard number, what to do in an emergency, crew chief numbers, etc. approved by H. Fanning
Revision 1.5 – 04/11/18 – Training section moved from section 5 Authority and Responsibility to section 9 Training
Revision 1.4 – 06/20/16 – Repositioned "Scope of Work" to clarify processes
Qualifying Periodic Review – 02/19/14 – No substantive changes required
Revision 1.3 – 11/27/13 – Added "Owning Organization" to more accurately reflect laboratory operations.
Revision 1.2 – 09/15/12 – Update form to conform to electronic review.
Revision 1.1 – 04/03/12 – Risk Code 0 switched to N to be consistent with 3210 T3 Risk Code Assignment.
Revision 1.0 – 12/01/11 – Added reasoning for OSP to aid in appropriate review determination.
Revision 0.0 – 10/05/09 – Updated to reflect current laboratory operations

ISSUING AUTHORITY	FORM TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ES&H Division	Harry Fanning	04/11/18	04/11/21	1.6

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