

Person: Tadepalli, Arun (arunts@jlab.org)
Org: PHALLC

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Operational Safety Procedure Review and Approval Form # 142218
(See [ES&H Manual Chapter 3310 Appendix T1 Operational Safety Procedure \(OSP\) and Temporary OSP Procedure](#) for Instructions)

Type:	OSP Click for OSP/TOSP Procedure Form Click for LOSP Procedure Form Click for LOTO-COMPLEX Information Click for LOTO-GROUP Information
Serial Number:	ENP-22-142218-OSP
Issue Date:	9/30/2022
Expiration Date:	7/30/2025
Title:	Measurement of Magnetic Fields in the Helmholtz coils area for the GEN-II experiment
Location: (where work is being performed) Building Floor Plans	101E - Hall A Equipment Location Detail: (specifies about where in the selected location(s) the work is being performed) Inside the magnetic shielding box
Risk Classification: (See ES&H Manual Chapter 3210 Appendix T3 Risk Code Assignment)	Without mitigation measures (3 or 4): 3 With mitigation measures in place (N, 1, or 2): N
Reason:	This document is written to mitigate hazard issues that are : New/previously unrecognized Hazard Issue Determined to have an unmitigated Risk code of 3 or 4
Owning Organization:	PHALLA
Document Owner(s):	Tadepalli, Arun (arunts@jlab.org) Primary

Supplemental Technical Validations

Mode 1: Class 1, 2, and 3 Electrical Equipment (Bonnie Rodriguez, Phillip Stanley)
Static Magnetic Fields >5G: Fringe, High, & Quench Effect (Dainnya Busbin, Imani Burton, Jennifer Williams)
ESH&Q Liasion (Bert Manzlak)

Other Hazards:
Having a person perform the measurements in the magnetic shielding box area. (Ed Folts)

Document History

Revision <input checked="" type="checkbox"/>	Reason for revision or update <input checked="" type="checkbox"/>	Serial number of superseded document <input checked="" type="checkbox"/>
N/A	N/A	

Lessons Learned	Lessons Learned relating to the hazard issues noted above have been reviewed.
Comments for reviewers/approvers: <input type="checkbox"/>	<i>OSP for operating SBS magnet in a local mode is already approved. The HAList for operating HH coils is also approved.</i>
Attachments <input type="checkbox"/>	
Procedure: <i>procedure.pdf</i> THA: <i>3210T1Form.doc.pdf</i> Additional Files: <i>OSP_fields.pdf</i> <i>OSP_fields.pdf</i>	
Review Signatures	
Additional Authorization : Director - ES&H	Signed on 9/30/2022 8:18:17 AM by Steven Hoey (hoey@jlab.org)
Person : Subject Matter Expert : Having a person perform the measurements in the magnetic shielding box area.	Signed on 9/29/2022 4:40:14 PM by Ed Folts (folts@jlab.org)
Subject Matter Expert : Electricity->Mode 1: Class 1-> 2-> and 3 Electrical Equipment	Signed on 9/29/2022 4:42:07 PM by Bonnie Rodriguez (bonnie@jlab.org)
Subject Matter Expert : Static Magnetic Fields >5G: Fringe-> High-> & Quench Effect	Signed on 9/29/2022 4:46:01 PM by Jennifer Williams (jennifer@jlab.org)
Approval Signatures	
Division Safety Officer : PHALLA	Signed on 9/30/2022 8:35:56 AM by Ed Folts (folts@jlab.org)
Org Manager : PHALLA	Signed on 9/30/2022 10:02:00 AM by Mark Jones (jones@jlab.org)
Person : Williams, Jennifer (jennifer) Reasoning: ES&H Division Liasion: PHALLA - Filling in for Bert Manzlak and Bill Rainey	Signed on 9/30/2022 11:51:04 AM by Jennifer Williams (jennifer@jlab.org)

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The field gradient will be measured of the Helmholtz coil target field. Steps are as follows

- 1) Inspect pivot area to ensure there are no tools or other unsecured ferromagnetic material
- 2) Put up barriers to prevent unwanted parties from entering area. One person will stand look-out at pivot while work is ongoing.
- 3) Turn ON SBS and BB magnet with Jack Segal's help
- 4) Power on Helmholtz coils to a central field of 25 Gauss (< 7 Amps; < 24 VDC)
- 5) Measure field using Gradient Measurement Device which is a machined block with two lakeshore probes. Data will be taken at ~ 6 locations.
- 6) Repeat 5 with spoiler coils on at several different settings.
- 7) Rotate field +/- 5 degrees and repeat #5
- 8) Power down coils, lock-out leads
- 9) Perform measurements with the custom compass and screens installed in place
- 10) Turn off all equipment
- 11) Remove all equipment from the HH coils area
- 12) Remove barriers and any signage

Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

Click
For Word

Author:	Arun Tadepalli	Date:	Sep 27 th , 2022	Task #: If applicable	
Complete all information. Use as many sheets as necessary					
Task Title:	Measurement of Magnetic field strength and direction in the HH coil area	Task Location:	101 - Experimental Hall A - A100		
Division:	Physics	Department:		Frequency of use:	Once per configuration change
Lead Worker:	Arun Tadepalli				
Mitigation already in place: Standard Protecting Measures Work Control Documents	Only authorized personnel are allowed in the vicinity when work is being preformed				

Sequence of Task Steps	Task Steps/Potential Hazards	Consequence Level	Probability Level	Risk Code (before mitigation)	Proposed Mitigation (Required for Risk Code >2)	Safety Procedures/ Practices/Controls/Training	Risk Code (after mitigation)
1	Electrical Shock – In the vicinity of coils when measuring the direction of the field.	L	L	1	<ul style="list-style-type: none"> ▪ Work be done by qualified personnel only ▪ Ensure proper signs are posted and boundaries set. 	<ul style="list-style-type: none"> ▪ ESC001 ▪ ESC007 ▪ ESC008 	N
2	Magnetic Field – When taking gradient measurements	L	L	1	<ul style="list-style-type: none"> ▪ Remove any loose ferromagnetic tools prior to starting measurements ▪ Ensure proper signs are posted and boundaries set. 	Place safety 5G boundaries in the hall as per 6240 Appendix T2 of the ES&H manual to indicate that the magnets are ON and prevent any other persons not performing from entering the area. These 5G lines when SBS and BB magnets are ON are the pivot area, behind BigBite and SBS magnets.	N

Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

Highest [Risk Code](#) before Mitigation:

1

Highest [Risk Code](#) after Mitigation:

N

When completed, if the analysis indicates that the [Risk Code](#) before mitigation for any steps is “medium” or higher (RC≥3), then a formal [Work Control Document](#) (WCD) is developed for the task. Attach this completed Task Hazard Analysis Worksheet. Have the package reviewed and approved prior to beginning work. (See [ES&H Manual Chapter 3310 Operational Safety Procedure Program](#).)

Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

Form Revision Summary

Revision 0.2 – 07/26/21 – Periodic Review; updated header and footer

Periodic Review – 08/29/18 – No changes per TPOC

Periodic Review – 08/13/15 – No changes per TPOC

Revision 0.1 – 06/19/12 - Triennial Review. Update to format.

Revision 0.0 – 10/05/09 – Written to document current laboratory operational procedure.

ISSUING AUTHORITY	TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ES&H Division	Harry Fanning	08/29/18	07/26/24	0.2

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

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Title: Measurement of Magnetic field & direction in the HH coil area for GEN-II experiment

Location: Hall A

Type: OSP
 TOSP

Risk Classification
(per [Task Hazard Analysis](#) attached)
(See [ES&H Manual Chapter 3210 Appendix T3 Risk Code Assignment.](#))

Highest Risk Code Before Mitigation

Highest Risk Code after Mitigation (N, 1, or 2):

Owning Organization: Physics

Date: 9/6/22

Document Owner(s): Arun Tadepalli

DEFINE THE SCOPE OF WORK

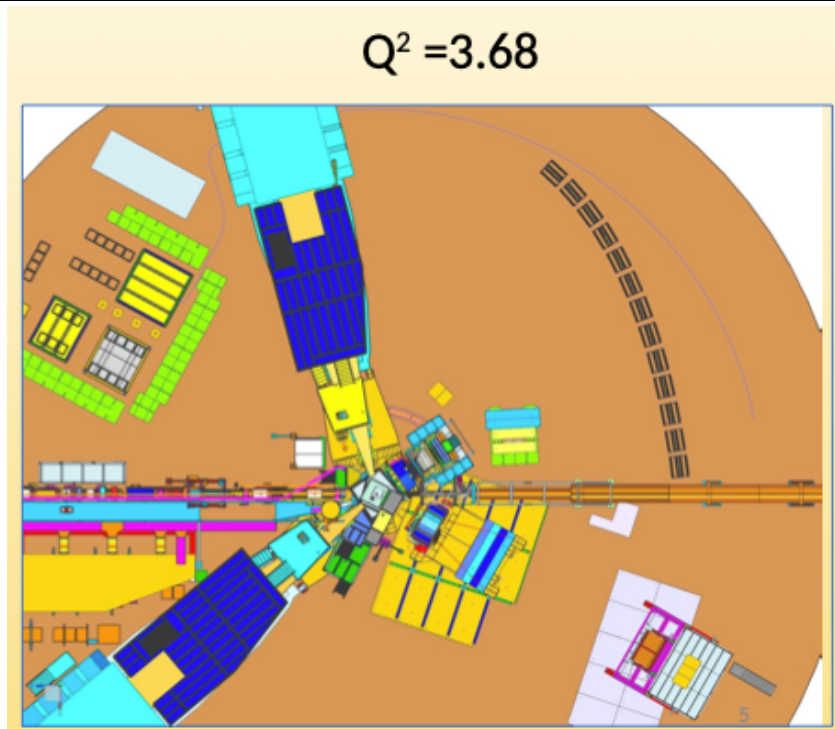
1. Purpose of the Procedure – Describe in detail the reason for the procedure (what is being done and why).

Measurement of Magnetic field and direction in the HH coil area for GEN-II experiment to determine the polarization direction of ³He nuclei

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

Two custom instruments will be used to measure the gradient and direction of the magnetic field. The affected area is the pivot area and the area within the significant fringe field of the magnet. Any work by uninvolved personnel within the fringe field boundary will need to be halted.

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



ANALYZE THE HAZARDS and IMPLEMENT CONTROLS

4. Hazards identified on written Task Hazard Analysis

Magnetic fields. Electrical.

5. Authority and Responsibility:

5.1 Who has authority to implement/terminate

Halls A and C Group Leader or Deputy

5.2 Who is responsible for key tasks

Senior Test Personnel for the system as determined by the head of the Halls A and C Spectrometer Support Group and the Hall A Work Coordinator

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](#))

Senior Test Persons leading the tests are responsible for analyzing the hazards, magnetic and otherwise

6. Personal and Environmental Hazard Controls Including:

6.1 Shielding

None

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

Barriers and covers to prevent inadvertent contact with bus bars. Barriers to delineate maximum magnetic field extent, be generous in extent.

6.3 Interlocks

Temperature Interlocks, Load Interlocks, Water Flow Interlocks, Ground Fault Interlocks have to be working during tests.

6.4 Monitoring systems

EPICS Archiver, standard test equipment

6.5 Ventilation

Standard hall ventilation

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

As required

7. List of Safety Equipment:

7.1 List of Safety Equipment:

Standard Hall A attire

7.2 Special Tools:

Compass and gradient measurement devices, mounts for positioning these custom devices

8. Associated Administrative Controls

1. Equipment specific LOTO training, equipment specific operations and manuals

2. EH&S Manual electrical safety Chapter 6200
3. Task Hazard Analysis form 331T0T1

9. Training

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

Hall A walk through.
 Radiation Worker I.
 ODH training.

DEVELOP THE PROCEDURE

10. Operating Guidelines

Follow this OSP

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

Jessie Butler, Andrew Lumanog, users who make the measurements

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

1. All personnel working on the field measurements should apply danger lock to the laser fibers box in the laser room.
2. Contact Jack Segal who is the POC for operating the SBS and BB magnets in local mode (as per OSP **ENP-21-123286-OSP**).
3. Once the magnets go into a local mode, gather all the necessary equipment (custom probes, custom mounts for the probes, laptop and chargers) and take them into the Helmholtz coil enclosure. The KEPCO power supplies should already be connected and be operable remotely. The procedure for turning on the coils and making measurements with the HH coils on has already been approved and is available as HALIST 107485.
4. Ramp up the SBS magnet and BB magnet currents.
5. **Gradient measurements:** Turn on the B-Field measurement devices. Take 2 measurements at -30, -15, 0, 15, 30 cm location along the beamline. Measure the field gradient at the pumping cell (one location) and on target cell in 5 locations.
6. Remove the first mount and attach the second mount designed to make gradient measurements at the pumping chamber. Take 2 measurements at this location.
7. **Field direction measurements:** Attach the two direction measurements device screens to the surveyed locations; one on the wall opposite to the BigBite magnet on the inside of the shielding box and the second on the diametrically opposite side across two of the walls on the shielding box. Measure the field direction of the magnetic field in the same locations as mentioned above.
8. Contact Jack Segal and ask to turn off the SBS and BB magnets after the measurements are completed.
9. Remove all equipment from the pivot area.

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

Call Jack Segal and request to turn off the magnets. Take all the equipment out of the Helmholtz coils area.

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

None

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

None

14.3 Abatement steps (secondary containment or special packaging requirements)

None

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)

Lakeshore probes can use the self-calibrating feature on the devices.

17. Inspection Schedules

Inspection prior to start of work

18. References/Associated/Relevant Documentation

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

Relevant data is automatically captured and stored through EPICS

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://jlabdoc.jlab.org/docushare/dsweb/Get/Document-24048/3310T1Form.doc>
- 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 1.7 – 02/25/2021** – Corrected link to Word doc; updated ‘ESH&Q’ to “ES&H”; other minor edits. No approval required.
- 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	02/25/24	1.6

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[Procedure](#) for instructions.)

Click
For Word Doc

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Location:	Hall A	Type:	<input checked="" type="checkbox"/> OSP <input type="checkbox"/> TOSP
Risk Classification (per Task Hazard Analysis attached) (See ES&H Manual Chapter 3210 Appendix T3 Risk Code Assignment.)		Highest Risk Code Before Mitigation	
		Highest Risk Code after Mitigation (N, 1, or 2):	
Owning Organization:	Physics	Date:	9/6/22
Document Owner(s):	Arun Tadepalli		

DEFINE THE SCOPE OF WORK

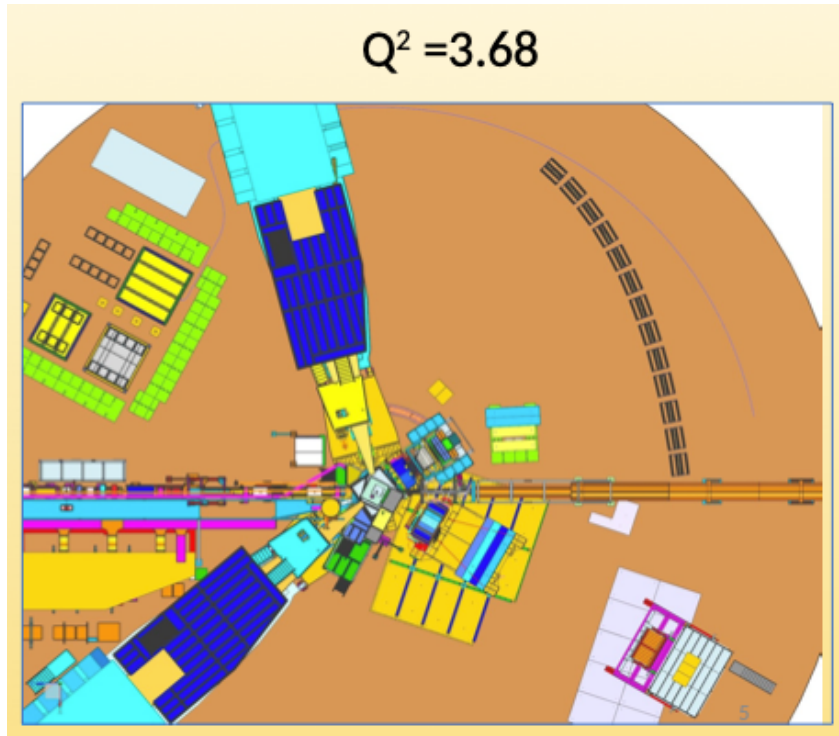
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Barriers and covers to prevent inadvertent contact with bus bars. Barriers to delineate maximum magnetic field extent, be generous in extent.

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