

Experiment Safety Review Form

Review Number: AD-019-2015-FEB-25

PRINCIPAL INVESTIGATOR: Wousik Kim

GROUP: JPL

EXT: 7830

E-MAIL: wousik.kim@jpl.nasa.gov

LIFE NUMBER: P7673

Project Title: Space Radiation Effect Experiments for Jovian mission. (AE67)
Location(s): 0820
Area(s): ATF BEAMLIN 2

SIGNATURES:

Principal Investigator: Wousik Kim	Date:
Experiment Review Coordinator:	Date:
Co-PI or Alternate Contact (s): Kusche, Karl	Date:
Reviewer: Asher Etkin	Date:
Reviewer: Karl Kusche	Date:
Reviewer: Mikhail Fedurin	Date:
Reviewer: Frank Craner	Date:
Review/Approval (ERC) Comments:	
Walkthrough Signature:	Date:
Next Annual Review Date:	
FUA Change Required? No	
Fire Rescue Run Card Changes Required? No	
Has a NEPA Review been Performed for this Project? Don't Know	
Required Approvals (i.e., IACUC, IBC, etc.):	
Project Termination Acceptance Signature:	
Comments:	Date:

I. Define the Scope of the Work

A. Description

In support of the planned Europa Clipper mission, it is critical to conduct experiments at a facility with high energy electron beams

(>50 MeV) to simulate the space radiation effects found in the Jovian radiation environment.

We propose to conduct such tests at the ATF to verify the methodology and models for the interaction of high energy electrons with slab shields. Our experimental objectives include measuring secondary particles (electron and photon) behind shielding and obtaining spectral and angular distributions.

The slab shields (Al and WCu (90/10 wt%), and possibly Cu) will be oriented orthogonal to the electron beam trajectory. The secondaries will be collimated by a slit (Al) and steered by a permanent magnet dipole into dosimetry film (GAFCHROMIC type HD-V2). This configuration will be installed into a beamline vacuum chamber (see attachment).

Equipment manuals or procedures that are controlled documents:

None.

B. Human Performance Factors

TBD.

C. Waste Minimization/Pollution Prevention

No wastes will be generated by this experiment.

D. Materials Used /Waste Generated

Materials Used	Disposal Method	Amount per Use	Amount per Year	Comments
		0.00	0.00	

II. Identify and Analyze Hazards Associated with the Work

The following hazards were identified:

Physical Hazards:

- None
(Area: ATF BEAMLIN 2)

Chemical Hazards:

- None
(Area: ATF BEAMLIN 2)

Ionizing and Non-ionizing Radiation Hazards:

- Class 1M, 2/2M,3R lasers
(Area: ATF BEAMLIN 2)
- Static magnetic fields =>600 G (attach exposure form)
(Area: ATF BEAMLIN 2)
- ATF electron beam (50-70 MeV) (Other)
(Area: ATF BEAMLIN 2)

Biological Hazards:

- None
(Area: ATF BEAMLIN 2)

Offsite Work:

- None
(Area: ATF BEAMLINe 2)

Other Issues (Security, Notifications, Community, etc.):

- None
(Area: ATF BEAMLINe 2)

Significant Environmental Aspects

- None
(Area: ATF BEAMLINe 2)

III. Develop and Implement Hazard Controls and Assess Risk

A. Physical Hazards, Tasks and Controls

None

B. Chemical Hazards, Tasks and Controls

None

C. Environmental Hazards, Tasks and Controls (include on/off site transportation and products/services)

None

D. Radiation Hazards, Tasks and Controls

Hazard, Default Controls, Task Specific Info	Risk Level
<p>Hazard: Class 1M, 2/2M,3R lasers</p> <hr/> <p>Default Controls: Administrative Controls • Complete registration form and laser use permit for laser(s), submit to Laser Safety Officer (LSO) • Contact LSO for posting requirements Comply with Subject Area "Laser Safety"</p> <hr/> <p>Task Specific Info: Low power beamline alignment laser. No eyewear required.</p>	<p>Negligible (0-20)</p>
<p>Hazard: Static magnetic fields =>600 G (attach exposure form)</p> <hr/> <p>Default Controls: Administrative Controls • As above for fields >5 and <600 G • Training: workers also to complete TQ-SMF Log Exposures and observe exposure limits. Engineering Controls Work with fields de-energized if practical Block access with barriers Where practical, use non magnetic tools Shield sources with high permeability materials (eg Mumetal)</p> <hr/> <p>Task Specific Info: Permanent magnet dipole has 5KG field within gap (not accessible), up to 3KG on contact. The field drops to 5G at a distance of 1 foot. 5G line will be contained within vacuum chamber once installed. During installation, magnet will be handled by trained staff only. Experimental area is already posted as 5G hazard.</p>	<p>Negligible (0-20)</p>

<p>Hazard: ATF electron beam (50-70 MeV) (Other)</p> <hr/> <p>Default Controls:</p> <hr/> <p>Task Specific Info:</p> <p>The ATF linac is operated under existing radiation interlock system, shielding, postings, documentation and approvals. All personnel have GERT training & TLD for Controlled Areas.</p> <p>Requested electron beam parameters: 62 MeV, 500pC, spot size ~1sq-mm. The need for local radiation shielding will be determined by the RSC.</p> <p>According to the PI: "The (electron) flux will depend on where to measure it because of the area. Assuming 10 cm², the flux will be ~ 50E-9(C)/1.6e-19(C/e-)/0.67(s)/10(cm²) = 5e10 e-/cm² s. The photon flux will be similar to the electron flux."</p>	<p>Negligible (0-20)</p>
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E. Biological Hazards, Tasks and Controls

None

F. Offsite Work Hazards, Tasks and Controls

None

G. Other Issues (Security, Notifications to Other Organizations, Community Involvement, etc.)

None

H. Recommended Exposure Monitoring

- None
(Area: ATF BEAMLINER 2)

Description or comments:

I. EPHA Determination

Chemical Name	Quantity (lbs, gal)	Location (Bldg/Room#)
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IV. Perform Work Within Controls

A. Recommended Training and Medical Surveillance Summary

- JTA for ATF User (GE-53A)

B. Personnel Training, Qualification, and Authorization List

Employee/Guest Name	Life/Guest#	Dept	Required Training Course(s)	Signed
Wousik Kim	P7673	DB	(TQ-SMF) [EXPIRES: 5/25/2017] (OM-MEDSURV-SMF) [UNASSIGNED: INCOMPLETE] JTA for ATF User (GE-53A) [COURSE NOT FOUND]	
Mikhail Fedurin	23594	AD	(TQ-SMF) [EXPIRES: 5/23/2015] (OM-MEDSURV-SMF) [EXPIRES: 10/20/2015] JTA for ATF User (GE-53A) [COURSE NOT FOUND]	
Karl Kusche	19960	AD	(TQ-SMF) [EXPIRES: 4/5/2016] (OM-MEDSURV-SMF) [EXPIRES: 12/23/2015] JTA for ATF User (GE-53A) [COURSE NOT FOUND]	

C. Emergency Procedures

ATF linac operator will follow existing procedures for linac operations and local emergency plan. ATF linac operator acts as LEC.

D. Transportation

None

E. Logistical Interactions

None

F. Termination/Decommissioning

Items directly exposed to electron beam require activation check prior to release from experimental hall. User-owned equipment will be returned to home institution.

V. Provide Feedback

None

VI. Attachments

See attachments.

Attached Files:

[JPL_proposal_AE67.pdf](#)

[JPL_Shielding_Test.pptx](#)