Announcement of Opportunity

Investigations into Biological Effects of Radiation Using the GSI Accelerator Facility

AO-08-IBER

Letters of Intent due: 31. March 2008

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Proposals due: 19. May 2008

Summary of the AO for Investigations into Biological Effects of Radiation:

- ESA announces an opportunity to propose investigations into biological effects of space radiation

- Experiments will be performed using the GSI accelerator facility in Darmstadt, Germany (http://www.gsi.de)

- Experiments should contribute to improved risk assessments or study countermeasures to allow a safe and stable human exploration of, e.g., the Moon or Mars with acceptable risk from exposure to space radiation

- Important dates:
  - Letter of Intent due March 31, 2008
  - Proposal workshop (at GSI, Darmstadt, Germany) April 7, 2008
  - Proposals due May 19, 2008

- For questions related to this Announcement of Opportunity please contact:

ESA/ESTEC/HME-GAL
Oliver Angerer
Tel. +31 71 565 3728
Announcement-specific Email: radbio@esa.int

Table of Content

1 Background

Ever since the Apollo missions, crewed spaceflight has been limited to the Low Earth Orbit (LEO). Such missions remain inside the protective magnetic field of the Earth. Therefore humans in LEO are to the largest degree protected from the damaging effects of space radiation. However this will change soon, when crewed long duration space exploration missions to the Moon and later to Mars become a reality. Crews on these missions will be exposed to significant ionising radiation doses from Galactic Cosmic Radiation (GCR, highly energetic particles incl. heavy ions) as well as from Solar Particle Events (SPE, mainly solar protons). Also secondary particles from the interaction of this radiation with spacecraft materials, planetary surfaces or a planetary atmosphere (in the case of Mars) have to be considered. When assessing the risks related to radiation in exploration scenarios high uncertainty remains, which is mainly due to uncertainties about the biological effects of this space radiation. This creates a need for investigations into biological effects of space radiation, in order to allow more accurate risk assessments, which in turn leads to more accurate planning of countermeasures.
To address these issues, biological experiments at particle accelerator facilities can be of great use. In realisation of this fact, the European Space Agency sponsored a preparatory study, evaluating different European facilities and providing recommendations of priorities for future research (final report available at http://iber.na.infn.it).
The accelerator facility of the Gesellschaft für Schwerionenforschung (GSI, http://www.gsi.de) in Darmstadt, Germany, was recommended as the best suited one.

2 Announcement Objectives

ESA announces an opportunity to propose investigations into biological effects of space radiation using the accelerator facility of the GSI. Experiments should contribute to improved risk assessments or study countermeasures on cells or animals to allow a safe and stable human exploration of, e.g., the Moon or Mars with acceptable risk from exposure to space radiation.

3 Specific Research Topics of Interest

Four major themes for relevant research have been identified and scientists answering to this AO must indicate which of the four themes is addressed by their proposal:

1) Prediction of risk for late effects: carcinogenesis, tissue degenerative effects, hereditary effects
2) Prediction of risk for acute effects: prodromal syndrome, bone marrow, intestinal epithelium, skin

3) Combined effects of cosmic radiation and other stressors in the deep space and planetary environments
4) Countermeasures

The following table provides more detail on each of these topics:

Prediction of risk for late effects: carcinogenesis, tissue degenerative effects, hereditary effects	Molecular mechanisms of carcinogenesis by charged particles	DNA repair
		Genomic instability
		Epigenetic changes
		Non-targeted effects and their role in carcinogenesis
	Innovative experimental models for cancer risk assessment at low doses and low dose rates	Animal and tissue models
		3D cultures
		Specific experimental models for leukaemia or breast, thyroid, colon, and lung cancers
	Individual susceptibility and early biomarkers of risk	Genes or proteins responsible for radiosensitivity
		New methods in biodosimetry
	Accelerated aging induced by energetic charged particles	Mechanisms of charged particle-induced accelerated senescence studied in vitro
		Development of animal models
		Extrapolation to risk of cardiovascular diseases
	Central nervous system damage by heavy ions	Behavioural endpoints in animals
		Molecular mechanisms studied in vitro
	Risk of transgenerational genetic alterations induced by cosmic rays	Relative biological effectiveness of heavy ions for the induction of hereditary effects
		Combined effects of radiation and other stressors on reproduction in space
Prediction of risk for acute effects: prodromal syndrome, bone marrow, intestinal epithelium, skin	Risk of acute radiation sickness induced by exposure to very intense solar particle events	Simulations of solar protons and shielding
		Risk of prodromal syndrome for protons at low dose rate
Combined effects of cosmic radiation and other stressors in the deep space and planetary environments	Interaction between space environment and radiation	Ground-based simulations of microgravity using bioreactors and interaction with exposure to heavy ions
		Effect of stress on radiation response: elucidation of possible adaptive response (protection) or sensitization (potentiation)
		Interaction with physical and chemical stressors in spacecraft or planetary surfaces
	Mixed radiation fields	Simultaneous high-/low-LET radiation exposures
		Effect of pre-exposure to low-dose rate protons on response to single heavy ions
		Biophysical modelling of mixed radiation fields
Countermeasures	Shielding	Nuclear fragmentation for heavy ions at energies >1 GeV/n
		Testing new shielding materials
		Influence of biological endpoints on shielding design
	Radioprotectors	Drugs to prevent acute radiation sickness and their effectiveness for protons at low dose rate
		New molecules and rugs to reduce late morbidity
	Dietary supplements	Antioxidants as radioprotectors
		Tests with heavy ions, low dose rates, and different endpoints

Especially welcome are proposals that are clearly characterised by

- relevance for protection in interplanetary missions;
- a practical impact on radiation risk reduction within a reasonable time frame;
- possible spin-offs in hadrontherapy.

Scientists working in rapidly developing areas of life sciences not necessarily associated with the study of radiation should consider the contributions that their field of study can make and to propose relevant investigations. However, investigators new to heavy-ion effects or radiation research in general are encouraged to consult or collaborate with radiation experts in order to develop realistic experimental plans.

4 The GSI accelerator facility

4.1 Facility description

GSI operates a large, in many aspects worldwide unique accelerator facility for heavy-ion beams. Ions from H to U can be accelerated to energies between 3 MeV/n to 2 GeV/n with intensities above those required for radiobiological research. GSI currently offers two accelerators: the low-energy UNILAC and the high-energy SIS. UNILAC is a 120 m heavy ion linear accelerator where ions (H to U) from 2 sources and an additional high charge injector (HLI) are accelerated up to 11.4 MeV/n. SIS, the heavy-ion synchrotron of 216 m circumference accelerates particles from H to U up to 2 GeV/n. Two target stations are installed for radiobiological research, one at the UNILAC (low energy) and one at the SIS (high energy beams). In addition, a micro beam for the irradiation of biological samples is installed as well as an online microscope, both at the low energy beam lines at the UNILAC. Radiobiology laboratories are available, which are standard cell laboratories for research on cultured cells, DNA laboratory and a microscopy laboratory. Information about this facility is available at the webpage http://www.gsi.de. For further information on GSI facilities please contact Dieter Schardt (D.Schardt@gsi.de).

4.2 Specific Requirements for Biological Experiments at GSI

Please note that regulations at GSI allow only biosafety level S1 experiments. All persons entering the GSI labs must comply with yearly updated biosafety instructions (certified by signature) in addition to the general GSI safety procedures. Activities with cytostatica require special safety instructions.
To avoid any cross-contaminations, anyone who is bringing a cell culture to GSI must have it certified "mycoplasma free" (by PCR or ELISA) no more than two months prior to the run. The testing should not be done in house but by a certified lab, for example: DSMZ (www.dsmz.de). Mycoplasma-free conditions should be stated in English.

Radiobiological experiments involving the use of radioactive materials are not allowed at GSI.
Persons intending to perform safety-relevant work at GSI are required to possess advanced English skills for communication (e.g. corresponding to 220 TOEFL-scoring (computer-based) or level 6 of IELTS. No exam result needs to be presented.)
For further information on biological facilities at GSI and safety issues please contact Dr. Sylvia Ritter (S.Ritter@gsi.de).

5 Proposal Evaluation and Selection Procedures

5.1 General

In line with the standard evaluation process of ESA, the evaluation of the proposals will cover three aspects: scientific merit, relevance and feasibility. Due to the special arrangement between ESA and GSI related to these activities, and in line with recommendations by ESA's Life Science Advisory Group, the evaluation process will be performed by GSI's Biophysics Programme Advisory Committee (BioPAC) on behalf of ESA, using ESA's usual criteria. The feasibility review will also take into account the overall resources available for ESA solicited experiments (up to max 40 8-hour shifts over two years).

5.2 Scientific Merit Review

Only complete and programme-compliant proposals submitted in response to this AO will undergo a scientific merit (peer) review. Only those proposals most highly rated in the merit review process will undergo the additional review for relevance and feasibility.
The following criteria will be used in determining the merit score:

Significance: Does the study address an important problem? If the aims of the application are achieved, how will scientific knowledge or technology be advanced? What will be the effect of these studies on the concepts, methods, or products that drive this field?

Approach: Are the theoretical framework, experimental design, data analysis and interpretation methods adequately developed, well integrated, and appropriate to the aims of the project? Is the proposal hypothesis-driven? Is the proposed approach likely to yield the desired results? Does the applicant acknowledge potential problem areas?

Innovation: Does the project employ novel concepts, approaches, or methods? Are the aims original and innovative? Does the project challenge existing paradigms or develop new methodologies or technologies?

Personnel: Are the scientific personnel appropriately trained and well suited to carry out this work? Is the evidence of the personnel's productivity satisfactory? Are the functions and responsibilities of the team members adequately described and appropriate? Does the project employ useful collaborative arrangements?

Environment: Does the institutional environment, in which the work will be performed, contribute to the probability of success?

In the review, each proposal will receive a scientific merit score between 0 and 100 points. As a result of the scoring the proposals will receive one of the following marks:

- Outstanding 100 - 91 points
- Excellent 90 - 81 points
- Very Good 80 - 71 points
- Good to Fair 70 - 46 points
- Unacceptable 45 - 0 points

The scoring will be weighted according to the 5 sub-criteria:

- Significance 30%
- Approach 25%
- Innovation 20%
- Personnel 15%
- Environment 10%

5.3 Relevance Score

The peer board will also evaluate the proposal's relevance to space radiation research in line with the topics and characteristics described above. Again, scores between 0 – 100 will be given, resulting in a second mark.

5.4 Feasibility Review

For the most highly rated proposals following the scientific merit and relevance review, a final review level will determine the feasibility of the proposed protocols.
The feasibility evaluation shall address three aspects:

- Functional Requirements;
- Resource Requirements;
- Safety;

5.5 Development of a Selection Recommendation

A selection recommendation will be developed based on the scientific merit review, relevance and feasibility as described above. Deficiencies in any one of these factors will prevent selection of a proposal. The development of selection recommendations is the responsibility of ESA supported by its advisory bodies.
ESA reserves the right to select only a part of a Science Team Coordinator's (STC) project if this portion is still of high scientific merit. The applicant will be given the choice to accept or decline such a partial opportunity. If two or more proposals address similar problems and/or adopt similar approaches, ESA may request that the STCs consolidate specific parts of their projects into a single project and work as one team.
The selected experiments will enter a pool of experiments and will be accommodated as soon as possible.

5.6 Data Rights

The general data policies of ESA's Directorate for Human Spaceflight, Microgravity and Exploration will apply to all data resulting from the experiments in the context of this AO.
Final results of the experiments shall be made available by the scientific teams to the scientific community through publication in appropriate journals or other established channels as soon as practicable and consistent with good scientific practice. In the event such reports or publications are copyrighted, ESA shall have a royalty-free right under the copyright to reproduce, distribute, and use such copyrighted work for their purposes.
Typically, data will be obtained and processed under the responsibility of a Science Team Coordinator for the experiment protocol. Data not requested by any other STC may be used exclusively by the STC for scientific purposes. For data requested by more than one STC, each STC must agree before the experiments start as to the conditions for the data usage for scientific purposes. This category of data shall be referred to as "STC proprietary data." The STC proprietary data may be used by the sponsoring agencies for internal purposes. The sponsoring agencies agree that this data will not be made public for 1 year after the completion of the experiment.
In case follow-up points are required for publication long after the main experiment, a STC can apply for extension of the one-year exclusive publication period by submitting a scientific report in the format of a manuscript 1 year after the completion of the main experiment.

Data Access:
A STC may access proprietary data from other STCs participating in the investigations through a written data sharing agreement (signed by involved STCs). In that case, ESA will ensure that a data-sharing plan among the participating STCs is established prior to the beginning of the respective experiments.

Acknowledgement:
Any publication on the results generated during the studies solicited in this AO must acknowledge the sponsorship of the study by ESA.

5.7 Support of Education and Outreach

The activities covered in this AO provide an opportunity for ESA to enhance and broaden the public's understanding and appreciation of research facilitated by ESA. Therefore the investigators of selected experiments are expected to promote and communicate their experiments to a wide audience (general public, colleagues, involvement of students) and to support ESA in the event of organised press conferences, educational events, publications etc.

6 Proposal Preparation Guide

6.1 Contact and Submission Address

For questions related to this Announcement of Opportunity please contact:

ESA/ESTEC/HME-GAL
Oliver Angerer
Tel. +31 71 565 3728
Announcement-specific Email: radbio@esa.int

Proposals should be submitted in electronic format AS ONE SINGLE FILE (Microsoft Word (.doc) or Adobe Acrobat (.pdf)) to the above email address.
The Letter of Intent, questions, and other files concerning the AO should also be emailed to this address.
To facilitate transmission of the file the total file size should be no more than 5 MB (incl. pictures). Whenever signatures are required on a form, the completed, signed form should be scanned and inserted into the proposal file.
Your submission will be acknowledged within 10 working days of receipt.
It is planned to organise a proposal workshop in connection to this research announcement on 7th of April 2008. The workshop will take place at the GSI, Planckstr. 1, 64291 Darmstadt. This will be an opportunity to clarify potential questions or gather contacts for cooperative research projects. Please indicate your interest in participating in this workshop to the abovementioned contact email by March 31, 2008, for planning, registration and logistical information distribution purposes.

6.2 Time Schedule

- Letter of Intent due March 31, 2008
- Proposal workshop (at GSI, Darmstadt, Germany) April 7, 2008
- Proposals due May 19, 2008

6.3 Letter of Intent

To facilitate timely proposal processing (e.g. organisation of peer review), potential investigators are requested to confirm their plans to submit a proposal in response to this announcement. The Letter of Intent is not binding. It should contain:

- the names, addresses, affiliations and telephone numbers of a single STC and all Science Team Members (STMs).
- a title descriptive of the proposed research.
- a brief summary (10 lines maximum) describing the proposed research.
- up to 6 keywords that best describe the research area of the pending proposal.

Letters of Intent are to be sent to the following address:

radbio@esa.int

A template can be found in Annex 1.

6.4 Proposals and Funding

The proposal should be written in the format described below, using the template in Annex 2 (also downloadable on the AO website). This format is not intended to increase the “paper work” but should be considered as a useful guideline, which will permit a fair and standardized evaluation of the proposals. Also, due to specific facility safety and other regulations, adequate responses to the respective questions in the proposal template are mandatory for consideration of the proposals.
Beamtime and access to local laboratories and support will be provided by GSI (with ESA support) in line with the usual GSI operation. However, neither ESA nor GSI financially supports the work of selected experimenters. Any additional expenses related to the proposed work of an experimenter, including costs for travel and subsistence, are considered investigator-related costs, which are not sponsored by ESA. Co-funding from national agencies / organisations, universities, or other institutions is required to cover investigator-related costs. ESA strongly advises STC/STMs to submit their proposal to their national bodies in parallel with their application in response to this AO, in order to commence applying for national funding as early as possible. If the proposed experiment is selected a proof of appropriate funding is mandatory in order to commence implementation.
Please state the status of co-funding availability and/or application in “Supporting Budgetary Information”.

6.5 Structure and Layout

The proposal, using the template in Annex 2, should include the following material in this order:

- Cover Page with signatures
- Proposal Abstract
- Project Description
- Management Approach and Personnel
- Supporting Budgetary Information
- Facilities and Equipment
- Safety

6.5.1 Cover Page

The proposal template in Annex 2 includes the standard cover page form. All information asked for must be filled in.

6.5.2 Proposal Abstract

Prepare a brief description of the application stating the broad, long-term objectives and specific aims of the proposed work. Describe concisely the research design and methods for achieving these objectives and aims. This abstract is meant to serve as a succinct and accurate description of the proposed work when separated from this application. Limit abstract to 300 words or less.

6.5.3 Project Description

The project description section of the proposal should be 15 pages maximum (excluding references and CVs). The proposal should contain sufficient detail to enable a reviewer to make informed judgements about the overall merit of the proposed research and about the probability that the investigators will be able to accomplish their stated objectives with the resources requested and with their own resources. In addition, the proposal should indicate clearly the relationship between the proposed work and the research emphasis defined in this announcement.
The STCs are encouraged to describe any preparatory research from their laboratory relevant to the proposal.

6.5.4 Management Approach and Personnel

Each proposal must specify a single Scientific Team Coordinator, who is responsible for carrying out the proposed project and coordinating the work of other personnel involved in the project. The scientific institution for which the coordinator of a proposal is working must be located in one of the ESA member or associated member states that financially contribute to the ELIPS-2 programme: Austria, Belgium, Canada, Denmark, France, Germany, Greece, Ireland, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland.
In proposals that designate several senior professionals as key participants in the research project, the management approach section should define the roles and responsibilities of each participant, and note the proportion of each individual's time to be devoted to the proposed research activity. The proposal should state clearly and unambiguously whether the key personnel have reviewed the proposal and endorsed their participation.
Despite the fact that cooperative research proposals are favoured, big clusters of research proposals are not welcome because of the difficulty for the peer reviewers to make their judgement and later on the difficulty of implementation with the other selected protocols.
The STC is the main ESA point of contact for a team and must participate in the conduct of the research. He/she is responsible for direct supervision of the work and efficient communication among STMs. A short curriculum vitae (not exceeding 3 pages) of the STC, which includes her or his current position, title and educational background, list of principal publications (up to 20), and any exceptional qualifications should be included. Give similar biographical information on other senior professional personnel who will be directly associated with the project (STM). Universities should list students or other assistance involved, together with information as to their level of academic achievements. Any special industry-university cooperative arrangements should be described.

6.5.5 Supporting Budgetary Information

Please describe briefly the status of co-funding availability and/or applications.

6.5.6 Facilities and Equipment

Please describe the required beams and supporting equipment, addressing the questions in the proposal template.

6.5.7 Safety

Proposals must be compliant with applicable European, national and local laws and guidelines. Please complete the safety questions in the proposal template. Proposals missing information on this topic will not be accepted.

Annex 1: Letter of Intent

Letter of Intent
Concerning the Announcement of Opportunity for
Investigations into Biological Effects of Radiation Using the GSI Accelerator Facility (AO-08-IBER)

I intend to submit a proposal in response to ESA AO-08-IBER.

I will participate in the proposal workshop at GSI, Planckstr. 1, 64291 Darmstadt, Germany, on April 7, 2008:

☐ YES ☐ NO

The information in this Letter of Intent can be distributed to the participants at the Information Workshop

☐ YES ☐ NO

1. Submitted by:

Please insert data of the Science Team Coordinator (STC)

Title, name and function: University/Research Centre: Address: Tel.: Fax: E-mail:

Please insert data for each Science Team Member (STM). Copy/paste box for inclusion of more than 2 STM:

Name and function: Institution: Address: Tel.: Fax: E-mail:

Name and function: Institution: Address: Tel.: Fax: E-mail:

2. Descriptive title of intended proposal

3. Six keywords of your proposal/research focus

4. Area of Research

Please indicate the area of research of your experiment/project

5. Brief summary

Please provide a brief summary of the experiment/project you intend to perform giving a clear understanding of the objectives of the project and how these objectives will be achieved.

Annex 2: Proposal Template

ANNOUNCEMENT OF OPPORTUNITY
FOR INVESTIGATIONS INTO BIOLOGICAL EFFECTS OF RADIATION USING THE GSI ACCELERATOR FACILITY (AO-08-IBER)

1. Cover Page

TYPE OF PROPOSAL ☐ Scientific proposal ☐ Scientific proposal with industrial participation
I WAS INFORMED OF THIS OPPORTUNITY VIA ☐ EMAIL FROM ESA ☐ LETTER ANNOUNCEMENT FROM ESA ☐ COLLEAGUE POINTED TO ESA WEB ANNOUNCEMENT ☐ VIA MY NATIONAL SPACE AGENCY ☐ TRADE FARES ☐ MAGAZINE/PRESS/PUBLICATIONS (SPECIFY) ☐ OTHER, SPECIFY
COMPLETE TITLE OF PROPOSAL
SCIENCE TEAM COORDINATOR Name and function: University/Research Centre: Address: Tel.: Fax: E-mail:

PLEASE INSERT DATA OF EACH SCIENCE TEAM MEMBER (NO LIMIT TO NUMBER):

Name and function:
Institution:
Address:
Tel.:
Fax:
E-mail:
Signature:

Name and function:
Institution:
Address:
Tel.:
Fax:
E-mail:
Signature:

6. THIS OR SIMILAR PROPOSAL HAS BEEN SUBMITTED TO OTHER AGENCIES

☐ YES ☐ NO
IF "YES", PLEASE SPECIFY AGENCY, PROPOSAL TITLE AND YEAR OF SUBMISSION

7. PREVIOUS SUBMISSIONS TO ANY ESA-AO

☐ YES ☐ NO

DETAILS:

8. COMMENTS	SIGNATURE OF THE STC SIGNATURE ……..…….. Place, date

2. Proposal Abstract

Prepare a brief description of the proposal, stating hypothesis/hypotheses and specific aim(s) of the proposed work including the broad and long-term objectives. Describe briefly the research design and methods for achieving these objectives and aims. This abstract is meant to serve as a succinct but accurate description of the proposed work when separated from the main text of the proposal. The abstract should be no more than about 300 words.

3. Project Description

The project description section of the proposal should be 15 pages maximum (excluding references and CVs). The proposal should contain sufficient detail to enable a reviewer to make informed judgements about the overall merit of the proposed research and about the probability that the investigators will be able to accomplish their stated objectives with the resources requested and with their own resources. In addition, the proposal should indicate clearly the relationship between the proposed work and the research emphasis defined in this announcement. The STCs are encouraged to describe any preparatory research from their laboratory relevant to the proposal.

The proposal addresses:

☐	Prediction of risk for late effects: carcinogenesis, tissue degenerative effects, hereditary effects
☐	Prediction of risk for acute effects: prodromal syndrome, bone marrow, intestinal epithelium, skin
☐	Combined effects of cosmic radiation and other stressors in the deep space and planetary environments
☐	Countermeasures

4. Management Approach and Personnel

Each proposal must specify a single Scientific Team Coordinator, who is responsible for carrying out the proposed project and coordinating the work of other personnel involved in the project. An overview of the global management approach in the proposed project should be provided in this section. Also, a short curriculum vitae (not exceeding 3 pages) of the STC, which includes her or his current position, title and educational background, list of principal publications (up to 20), and any exceptional qualifications should be included. Give similar biographical information on other senior professional personnel who will be directly associated with the project (STM). Universities should list students or other assistance involved, together with information as to their level of academic achievements. Any special industry-university cooperative arrangements should be described.

5. Supporting Budgetary Information

Please describe briefly the status of co-funding availability and/or applications.

6. Facilities and Equipment

Please describe the required beams and supporting equipment, addressing the questions in the proposal template. For all material transported to and from GSI European transportation regulations have to be respected.

Requested Ion Beam Properties and Experimental Equipment

Ion Species (isotope, charge state)	
Intensity (e.g. particle nA, ions/s)	
Energy (e.g. MeV/u)	
Pulse Duration	
Special Requests on Beam Properties	

Requested Beam Time (in Shifts of 8 Hours each)

Primary	
Parasitic	
Number of Runs	

We need laminar flow box(es) hours before and hours after exposure, space for culture flasks in an incubator of % CO2 for days before and days after exposure.
Please note that the capacity of incubators may be limiting!

Other GSI Equipment Needed (please indicate approximate time)

Centrifuge – Heraeus, Megafuge	
Centrifuge - Eppendorf	
Coulter counter, indicate number of samples	
Fluorescence microscope (for the measurement of apoptosis, etc.)	
Power supply	
Fume hood	
Space in refrigerator (indicate number of flasks)	
Flow-cytometer	
others, please indicate:	

Consumables: provided by the user. Special requests must be addressed to the spokesperson of the experiment.

Any other Equipment required:

7. Safety

General Safety
Do you use combustible or hazardous gases within your experiment (e.g. gas target, gas detectors)?
☐ Yes ☐ No
What sort of gases?
Which quantities or flow rates?

Do you use other dangerous (e.g. toxic, inflammable, biologically hazardous etc.) materials within your experiment?
(Only biological material of biological safety level 1 may be irradiated at GSI)
☐ Yes ☐ No
What sort of materials?
Which quantities?

Is your vacuum set-up equipped with fragile parts like thin glass or foil windows etc. (danger of implosion)?
☐ Yes ☐ No
Brief description of the construction

Is it intended to move heavy parts for setting-up your experiment or during the experiment?
☐ Yes ☐ No
Brief description of the equipment and working procedure

Radiation Safety
Do you use radioactive sources or materials on-site?
☐ Yes ☐ No
Which isotopes/type?
Which activities [Bq]?

Do you use a target?
☐ Yes ☐ No
Position
Material
Thickness/Interaction probability with primary beam

Do you use a secondary target/degrader?
☐ Yes ☐ No
Position
Material
Thickness/Interaction probability with primary/secondary beams

Do you use a beam stop for primary/secondary beam?
☐ Yes ☐ No
Position

Electrical/Laser Safety
Do you use electrical instruments on-site?
☐ Yes ☐ No
Max. voltage/max. current
Brief description of the electrical instruments

Do you use high-intensity radio frequency (RF) sources on-site?
☐ Yes ☐ No
Frequency region/power
Brief description of the rf sources

Do you use lasers in your experiment?
☐ Yes ☐ No
Laser-type(s)
Max. power/energy
Class
Repetition rate

Is there any other special safety aspect to be considered in connection with your proposal?
☐ Yes ☐ No
Description

If the proposal is selected, further detailed information, e.g. on the biological samples, will be requested.