

Notes to foreign researchers on CALL FOR PROPOSALS.

The impact of the spread of COVID-19 infection is unpredictable. When applying the Research Project with Heavy Ions at QST-HIMAC, all participants must respect the following conditions.

- Participants must follow the rules and conditions both of your country and of Japan, especially regarding to overseas travels at the time of your visit to Japan.
- Participants must follow the rules determined by the QST at the time of your visit to HIMAC.
- Please contact your liaison at QST, or the HIMAC Collaboration Research Office, when you plan visiting Japan for conducting an experiment at HIMAC.
- There may be cancellation of beam time related to troubles caused by the COVID-19. Beam time or financial loss will not be compensated in any cases.

# CALL FOR PROPOSAL OF EXPERIMENTS AT "HIMAC"

## 1. Description

National Institutes for Quantum and Science and Technology (QST) - Quantum Life and Medical Science Directorate in Chiba, Japan, will accept proposals for experiments using Heavy Ion Medical Accelerator in Chiba (HIMAC) during the period from September 2022 through March, 2023. Although HIMAC is an accelerator designed for medical applications, beam time is available for research projects beyond the scope of medical sciences.

\* "Notes to foreign researchers on CALL FOR PROPOSALS." is attached. Please be sure to read it before applying.

\* There is no penalty for cancellation of beam time due to various restrictions caused by COVID-19.

## 2. Address for Submission of Proposals

Additional information and instructions for submission of proposals are available from the Program Coordinator at the following address.

E-mail : himac\_riyou@qst.go.jp  
Surface mail : Department of Accelerator and Medical Physics  
National Institutes for Quantum Science and Technology  
4-9-1 Anagawa, Inage-ku, Chiba 263-8555, JAPAN

## 3. Deadline for Submission of Proposals

June 17, 2022

## 4. Description of Facilities

Four experimental halls are available for research at HIMAC. These include facilities for Biology, Physics, Secondary-Beams, and Medium-Energy Beams.

HIMAC is used for medical application between 7:00 and 21:00 from Tuesday through Friday. Other research can be performed at night during the week and all day Saturday. Daytime on Monday is reserved for maintenance and accelerator development.

## 5. Eligibility

Any persons with research experience as well as graduate students are eligible to be participants in the experiments, no other restriction is imposed. However, it is required that "one or more scientists from QST-Chiba join the research group" to provide administrative and technical advice. Please contact the Program Coordinator for assistance in identifying this local person at QST (liaison at QST) before the submission.

## 6. Spokesperson

One of participants in the proposal should be identified as the spokesperson. All correspondence with QST should be through this spokesperson.

## 7. Review and Selection of the Proposals

A Program Advisory Committee (PAC) consisting of researchers inside and outside of QST will review all proposals. The final selection of approved experiments will be informed by the Managing Director of Quantum Medical Science Directorate based on recommendations from the PAC. The approval is valid for one year. Renewals for continuation or revised proposals must be submitted each year.

Beam time is scheduled every six months. The spokesperson and the liaison at QST for each experiment will work with a beam-time coordinator at QST to arrange preferred beam times.

## 8. Travel Budget

Approval of a proposal at HIMAC does not include or imply support for travel.

## 9. Submission

Necessary documents for submission include,

- (1) A summary of the proposal should be presented using the attached form: “Proposal for Research Project with Heavy Ions at QST -HIMAC”.
  - (2) Information describing details of the proposal should be presented on separate sheets in either Japanese or English using guidelines in the attached form: “Instructions for Preparation of Details of the Proposal”
  - (3) Application to become a collaborative researcher at QST using the attached form: “Application Form for a Collaborative Researcher”, “Oath concerning Research Misconducts”, and “Pledge for Security Export Control”.
- \* **Caution! Exporting samples, material, devices, and transferring all kinds of data and information are regulated by “Security Export Control”.**

## 10. Available Beams

Characteristics of typical beams are listed below. Additional ions or energies may be available in a limited manner upon request. Please contact the Program Coordinator for more information.

-- Physics --

Ion	Energy (MeV/u)								Intensity
									pps (particles / second)
He	100	180	230	-	-	-	-	-	<1.2 x 10 <sup>10</sup>
C	100	180	230	290	350	400	430	-	<1.8 x 10 <sup>9</sup>
N	100	180	230	290	350	400	430	-	<1.5 x 10 <sup>9</sup>
O	100	180	230	290	350	400	430	-	<1.1 x 10 <sup>9</sup>
Ne	100	180	230	290	350	400	600	-	<7.8 x 10 <sup>8</sup>
Si	100	180	230	290	350	400	600	800	<4.0 x 10 <sup>8</sup>
Ar	-	-	-	290	-	400	650	-	<2.4 x 10 <sup>8</sup>
Fe	-	-	-	-	-	400	500	-	<2.5 x 10 <sup>8</sup>

-- Secondary-Beams --

The same ions and energies as shown for Physics are available as primary beams. However the intensity is limited to one percent of that listed for Physics. The production rate of the secondary beams is variable.

-- Medium-Energy Beams--

Ion	He, C, N, O, Ne, Si, Ar, Fe
Energy	6 MeV/u
Intensity	<2.0 x 10 <sup>12</sup> pps

-- Biology --

A large and uniform irradiation field is provided for Biology. The user can select a mono-energetic beam with a narrow Bragg Peak (MONO) or a beam with a broad “Spread-Out” Bragg Peak (SOBP).

Ion	energy (MeV/u)	field shape
He	150	MONO, SOBP60
C	290	MONO, SOBP60
C	135, 350, 400	MONO
Ne	230	MONO
Ne	400	MONO, SOBP60
Si	490	MONO
Ar	500	MONO
Fe	500	MONO

A diameter of the beam is 100 mm.

SOBP60 indicates an SOBP field with a thickness in depth of 60 mm. Maximum intensity is approximately 5 Gy/min. for a MONO beam and 3 Gy/min. for an SOBP beam.

# INSTRUCTIONS FOR PREPARATION OF “DETAILS OF THE PROPOSAL”

## Directions

Provide information relevant to “Details of the Proposal” using the following format:

- \* Information should be typed on A4-size white paper.
- \* The name of a spokesperson should be typed in the margin of the upper-right corner.
- \* The length of the document should be 6 pages or less, including figures and tables.
- \* Because black-and-white copies will be distributed to the PAC review committee, the use of color figures is discouraged.

## 1. Background and objectives of the proposal

Background and objectives of the proposal should be presented in a self-explanatory manner. You should be aware that some members of the PAC review committee may not be familiar to specific details of the research field. The necessity for using heavy-ion beams for these experiments, as well as additional merits for using heavy-ion beams in related disciplines, should be emphasized.

## 2. Experimental Methods

The details of the experiment, including the setup of equipments, handling of targets, beam-irradiation schedule, data acquisition, etc., should be explained. If special devices are to be used, details of including logistics relating to installation and operation of the device should be clarified. A description of ion species, the irradiation field-size, energies, intensities, and quality of beams should be included. Beam time schedules or critical timing restrictions should be mentioned.

Plans for future studies should be outlined if the experiments are expected to continue in a 2<sup>nd</sup> or 3<sup>rd</sup> year.

## 3. Progress up to this point (if this is a renewal application)

Progress of the experiments at HIMAC up to this point should be summarized.

Additional procedures are requested if the proposal is in the 4<sup>th</sup> consecutive year (19J\*\*\*, 19H\*\*\*). In this case, a more detailed summary of the last 3 years should be attached. This is a separate document with a length of around 3 pages. Contents overlapping with previous annual reports are acceptable.

## 4. Estimation of the beam time

The request for necessary beam time should be based on the experiment plan. This should include a description that emphasizes the feasibility of the entire experimental process.

## 5. Target material

### Biology Experiments

It is essential to characterize targets used for the experiments including *in vitro*, *in vivo* or other systems. The size, structure, and composition of any target containers should be described. Information relating to beam characteristics (e.g., size and uniformity) as well as absorbed dose and dose rates should be included.

For *in vitro* systems: any processing before and after irradiation, such as incubation, should be explained. This includes duration and necessary equipment.

For *in vivo* systems: the kind of animals, number of animals, and a method for transporting those animals, should be explained as well as handling and feeding procedures before and after irradiation.

Special attention should be devoted to the proposal when recombinant DNA, cells or animals are to be used. It is strongly recommended to contact the liaison person at QST-Chiba before submission in those cases.

### Physics Experiments

A list describing the desired targets should include the material, size, as well as desired ion, beam shape and intensity.

## 6. Safety Issues and Special Requirements

A detailed plan should be described if irradiated targets will be removed from a radiation-controlled area. Some procedures may be required for transporting irradiated targets that might be activated or contaminated.

Check the boxes on the front page of the Proposal for Research Project with Heavy Ions at QST-HIMAC if live animals, and/or recombinant DNA will be required. A detailed plan should be described. Additional documents and administrative work may be required for obtaining permission.

Check the boxes on the front page of the Proposal for Research Project with Heavy Ions at QST if hazardous materials or microorganisms will be required. The names and forms of such materials or microorganisms should be described. Also, safety measures when handling hazardous materials should be documented.

## 7. List of the publications

Papers published by participants should be listed using to the following instructions. This list should be succinctly related to the scientific objectives of this proposal. Failure to follow these instructions, or the inclusion of extensive or unnecessary information, may result in low scores.

- (1) The list of publications should be closely related to the proposal, and published during the last 5 years.
- (2) The list should be sorted chronologically from recent to old. Do not sort them according to authors.
- (3) A title, names of authors, name of journal, volume number, pages, year of publication should be included.
- (4) Authors who are also participants of this proposal should be underlined in the list.