Unofficial AI-translated English version

submitted to SPRUC on Mar 1 2024

SPring-8 Users Community　Trend Survey Report (FY2023)

Research Group: High-Resolution X-ray Imaging Group

<Activity of this year>

Sep 6 (Wed) 2023, 10:30-11:30 Group meeting, online

Meeting minutes submitted to SPRUC on Sep 8 (Please refer to that as well.)

Sep 26 (Mon) - 27 (Tue) SPring-8 Symposium 2023

26, 16:15-16:35 Request for the next plan (Mizutani, Tokai Univ)

27, 13:10-15:10 Poster session, Best practices of imaging study (Saiga, Tokai Univ)

Jan-Feb 2024 Trend survey

Feb 29 (Thu) 2024 6th BLs upgrade workshop

13:50-14:00 Request from our group (Prof. Matsumoto, Univ of Tokushima)

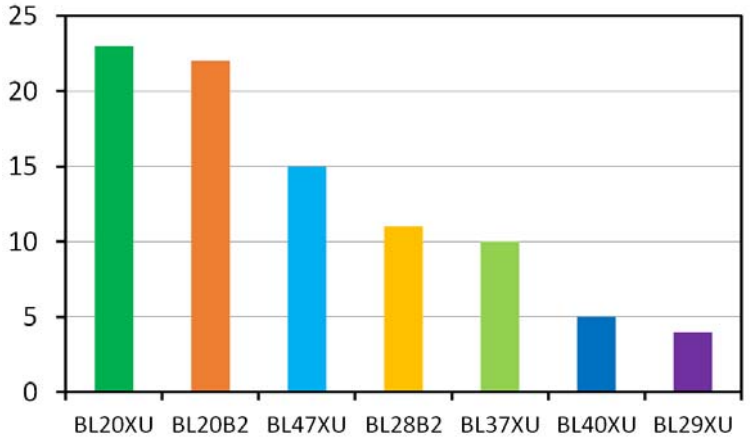
In this fiscal year's activities, as SPring-8-II is in sight, we held a workshop and conducted a survey to gather members' requests regarding the facility renewal. 68 responses were received in the online survey by Forms (attached separately). Responses were allowed for multiple responses, with the exception of item 7 below. Our group has over 1,200 members, and if we consider the number of responses as the number of groups, we believe that we were able to gather a considerable amount of opinions from our group. Based on the results of the surveys, study group's requests were presented at a total of three symposiums and workshops this year.

At the poster session of the SPring-8 Symposium 2023 and the 6th Workshop on BLs Upgrading, we reported best practices from both domestic and international research group members. A group from Monash University (Australia) showed that drug administration can be controlled from outside the body by visualizing the movement of magnetic particles in vivo, which is expected to lead to the development of drug delivery with reduced side effects. A group of the University of Tokushima has taken tomographic images of tumors with bone metastases and found that microvibration can reduce malignant transformation. If applied clinically, this could be a new preventive method against cancer metastasis. The fulfillment of the following requests from our group will enable even more advanced imaging research to be conducted, which will make a significant contribution to society and significantly raise the level of science and technology in Japan.

[Survey results]

1. Beamlines

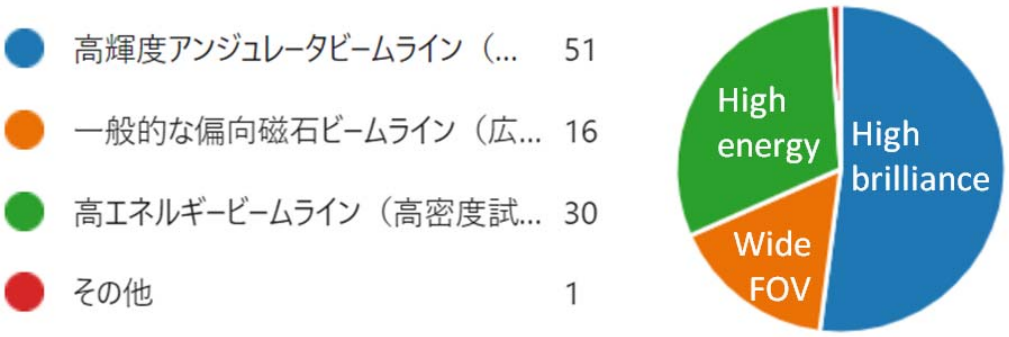
Shared imaging beamlines BL20XU, BL20B2, BL47XU, and BL28B2 are widely used. BL37XU, BL40XU, and BL29XU are the next most commonly used beamlines. This survey is hence considered to cover a wide range of imaging fields without being biased toward any one beamline user.



2. Request for a new imaging beamline

Since the imaging beamlines are very crowded, we recognize as a research group that it is appropriate to add a new imaging beamline. We asked for opinions on what kind of beamline you would like to see added. The majority requested a high-brilliance undulator beamline. In fact, half of beamtimes at BL20XU are used for proprietary studies, and BL47XU has a high competition rate, which seems to reflect the result. In addition, beamline staffing is also needed in conjunction with the beamline expansion. The increase in the number of staff will enable the detailed implementation of the proprietary studies and pick up needs that are not currently being monetized. This would be desirable not only for the imaging field but also for the facility operation.

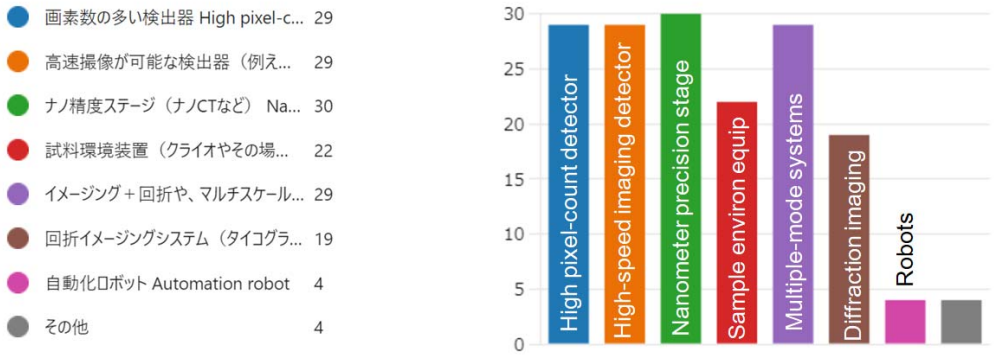
Based on these results, we request the addition of a high-brilliance undulator beamline for imaging and an increase in the number of beamline staff.



3. Equipment in the experimental hatch to be maintained in the future

The most common request was for nano-precision stage required for nanometer-resolution CT, etc., followed by requests for detector with a large number of pixels, high-speed imaging detector capable of over 100 kHz, and multiscale/multimode measurement system. However, there are changes in requests from year to year, and it is difficult to prioritize each device and equipment. Since the surveyed equipment each received a considerable number of responses, no matter which equipment is installed, there is a need for effective use of it.

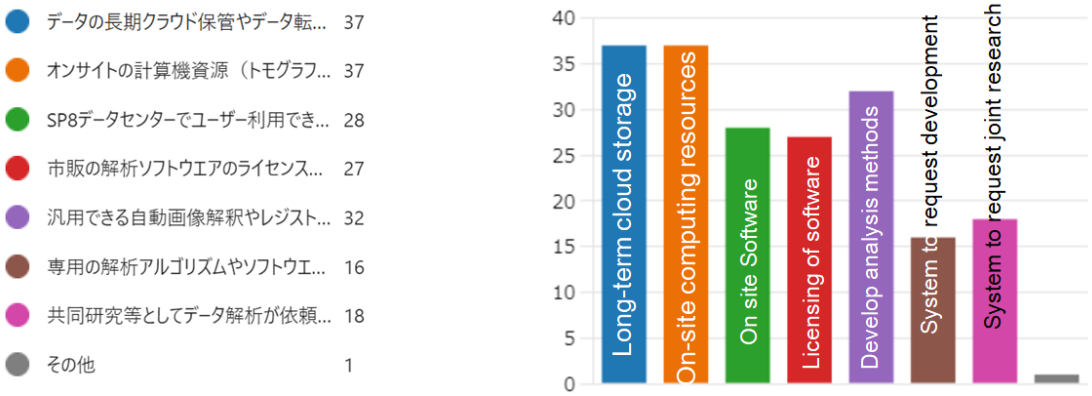
Based on the results, we request that the following devices be installed one by one, starting with those that are technically feasible.



4. Future requirements for data and its analysis

For hardware, there are many requests for long-term data storage, computer resources for data processing, and other items that are considered technically feasible. In the area of software, there are a wide range of requests for licensing, algorithm development, and so on. In terms of systems, there is a need to establish a system for consulting on dedicated software development and joint research.

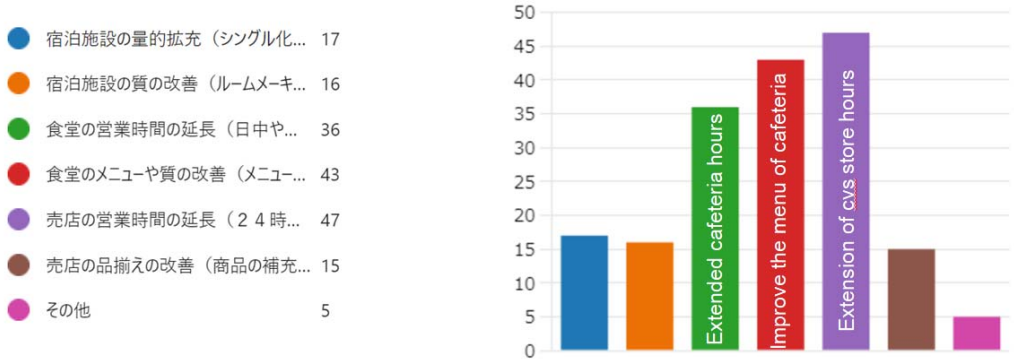
Based on these results, we request that computational resources for long-term data storage and data processing be developed first, and that the software and systems be enhanced so that they can be used effectively.



5. Requests about the user's living environment

There are many requests for extending the hours of the cafeteria and the convenience store, and for improving the cafeteria menu. For extended hours for the convenience store, for example, unmanned store or avatar customer service is possible ideas. Although there were not many requests for accommodations in this year's survey, there are changes from year to year, and we do not believe as a study group that these requests should be taken lightly.

Based on these results, we request that priority be given to extending the operating hours of the cafeteria and convenience store in particular, and that the living environment, including lodging, be improved sequentially.



6. Comments on measures to increase facility staffing

In last year's survey, we received multiple comments suggesting that the number of facility staff should be increased. This year we asked about measures to achieve this. Of the comments we received this year, 12 were in favor of increasing the number of staff or the measures to do so, and 8 said that they did not need support or that an increase in staff was unnecessary. While experienced users are able to perform routine measurements and handle a certain degree of troubleshooting on their own, we believe that extensive support for new users is necessary in order to obtain good results.

We received the following suggestions for specific measures. Based on the results, for example, consideration of a post-doctoral fellowship system or a system of secondment from companies are considered as candidates for measures to be taken.

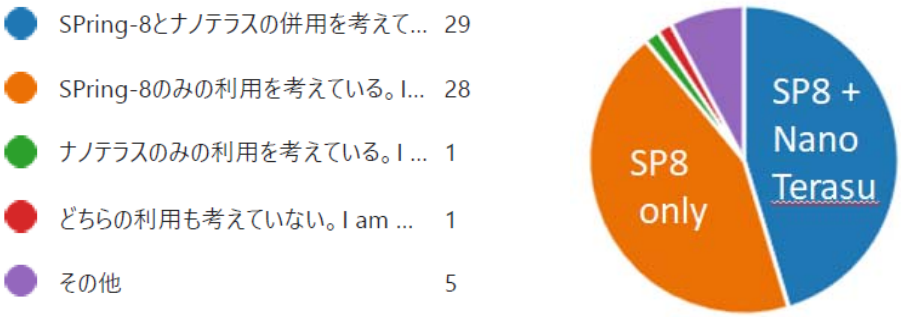
* Recruit and train a recent graduate student user
* Perhaps through a funding concept of research cooperation between Japan and EU.
* call for undergraduates/PhD students to participate in the beamline management assistance
* Investigate what kind of personnel are needed apart from the skills of the current staff and submit a written opinion.

* We believe that the shortest way to do this is to actively bring young people to experiments and introduce them to our staff.
* To strengthen ties with industry, we will increase information provision activities to them, leading to increased revenues.
* Short-term (about one month) secondment system. A system of assistance from a general company that also serves as training. We would be happy to cooperate with you if you have such a system.
* Collaborative approach with external groups: hosting people onsite
* I understand that you are still moving forward with this project, but would a shared recognition of the current situation and a shared vision for the future be a stepping stone?
* crowdfunding
* Improvement of staff working conditions; improvement of living environment around SPring-8.

7. Use of NanoTerasu

Since the NanoTerasu will start operation in FY2024, we asked about the prospects for the use of synchrotron radiation facilities in the X-ray imaging field. About half of the users plan to use both SPring-8 and Nanoterrace, and half plan to use SPring-8 alone, In the imaging field, the use of SPring-8 will continue to be essential.

In addition, beamlines for imaging and CT applications have not been installed at the NanoTerasu, with the exception of some beamlines such as those for tychography, and there is information that they are not high priority in future plans. Considering the results, about half of the SPring-8 imaging beamline users are also considering using the NanoTerasu. Hence, the development of imaging beamlines at the NanoTerasu is required.



8. Other requests

(This item includes individual requests, so we would like to refrain from describing them here. We have informed SPRUC and the facility of all requests.)