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Initiatives to Improve the Usage Environment for Japan's Advanced Research Equipment and Large-Scale Research Facilities

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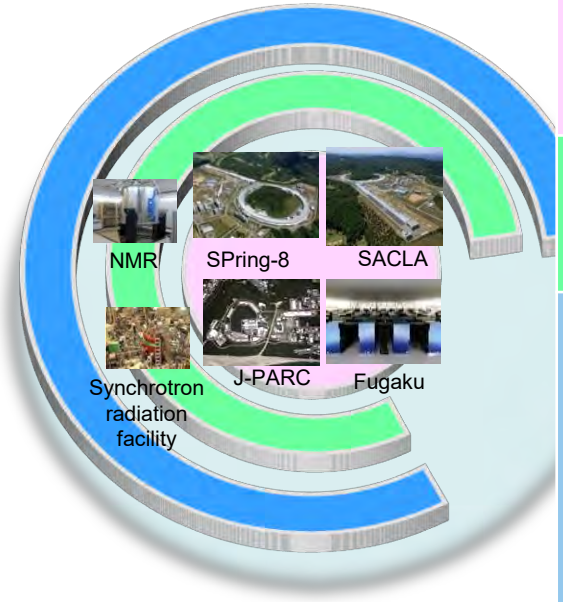
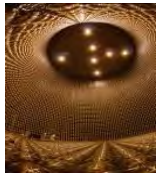
Sharing of the Research Facilities

- Research facilities and equipment, which are the foundation of all science and technology activities, are indispensable for research and development ranging from basic research to the creation of innovation, and it is important to maintain them and ensure their effective use.
- It is important to implement various initiatives according to the size and characteristics of the research facilities and equipment.




Subaru Telescope


Super-Kamiokande


ALMA

	Scale of equipment, etc.	Examples of equipment, etc.	Initiatives
Specific Advanced Large Research Facilities	Tens of billions of yen or more	SPring-8, SACLA, J-PARC, Fugaku	Position the large-scale facilities in the “Act on the Promotion of Public Utilization of the Specific Advanced Large Research Facilities” and implement nationwide public utilization. * Planned addition of a next-generation synchrotron radiation facility (NanoTerasu)
Large research facilities and equipment	Hundreds of millions to billions of yen	Synchrotron radiation facility, high field NMR	One of Japan's leading large research facilities and equipment to be made into a platform, and promotion of public utilization from all over the country while aiming for remote control and automation.
Research equipment and devices that are managed in a distributed manner by each laboratory	Several million yen to hundreds of millions of yen	Electron microscope, X-ray analyzer	・From distributed management of research facilities and equipment by each laboratory within the university to a framework that strategically maintains and operates the institution as a whole. ・Formulation of “Guidelines on Promoting Public Utilization of Research Facilities and Equipment”. ・Implementation of “rule improvement” through competitive research funding reform (EX. public utilization of large research facilities and equipment purchased with competitive research funds, and purchase of shared equipment by combined use of research funds, etc.)
University joint utilization organizations and joint utilization/joint research centers (university-affiliated research centers)	-	National Museum of Japanese History, National Astronomical Observatory of Japan, University of Tokyo - Institute for Cosmic Ray Research	Conduct joint research by jointly using research facilities based on a request from the research community.

Project to promote sharing of the advanced research infrastructure

(Proposed) FY2023 budget: 1,179 million yen
(Previous fiscal year budget: 1,180 million yen)

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Background / issues

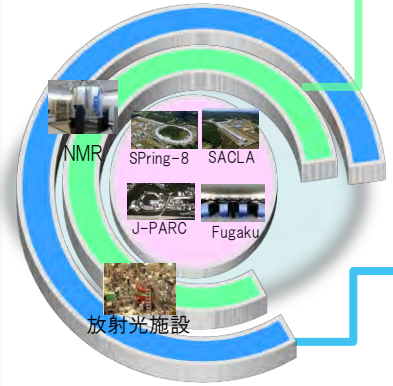
○ **The facilities, equipment and devices possessed by industry, academia, and government are invaluable infrastructure functioning as a driving force for science, technology and innovation.**

○ **It will be vital for leading domestic research infrastructure to function as platforms to enable their nationwide utilization, as well as systems for the continuous maintenance of this research infrastructure, their shared utilization by a wide range of researchers, and the continuous securing and upgrading of human resources possessing the expertise to serve as the cornerstone of their operation.**

○ **The Guidelines on Promoting Public Utilization of Research Facilities and Equipment, formulated by MEXT in March 2022, will be utilized, and the promotion of further initiatives for the open utilization of research facilities and equipment will be required.**

Overview of projects

Promoting public utilization of research infrastructure in line with fields and organizations; creating environments where all researchers will be able to focus on their research.



Advanced Research Facilities Platform Program (from FY2021, 5-year support)

To ensure access nationwide to leading domestic research infrastructure (large-scale research facilities and equipment that can be shared by industry, academia and government), improved convenience by all-in-one “one-stop service” as well as allowing automatic remote access to facilities.

(Main initiatives)
- ○Establishment of one-stop service centering on coordinating organization, mutual cooperation for use of each organization’s facilities
- ○Sharing of knowhow and data for remote use and automation of experiments; upgrading of technology
- ○Assignment, training of professional staff

Core Facility Building Support Program (from FY2020, 5-year support)

Strengthening of ”supervisory department” functions for entire university, research organization; strategic introduction of research facilities, equipment, building of mechanisms for updating, sharing facilities.

(Main initiatives)
- ○Aggregation/networking of shared campus facilities, uniform regulations, system development
- ○Putting together, organizing technical staff, providing opportunities for exchanges across fields, organizations
- ○Improving regional research capability through mutual use of equipment by nearby universities, companies, public research organizations, etc.

Project scheme

Govt → commission → Univ., NRDA, etc.

Support targets organizations:
Univ., NRDA, etc.

Project scale
ARFPF: 60 to 100 million yen/year
Core Facility: 40 to 60 million yen/year

Ripple effects of projects

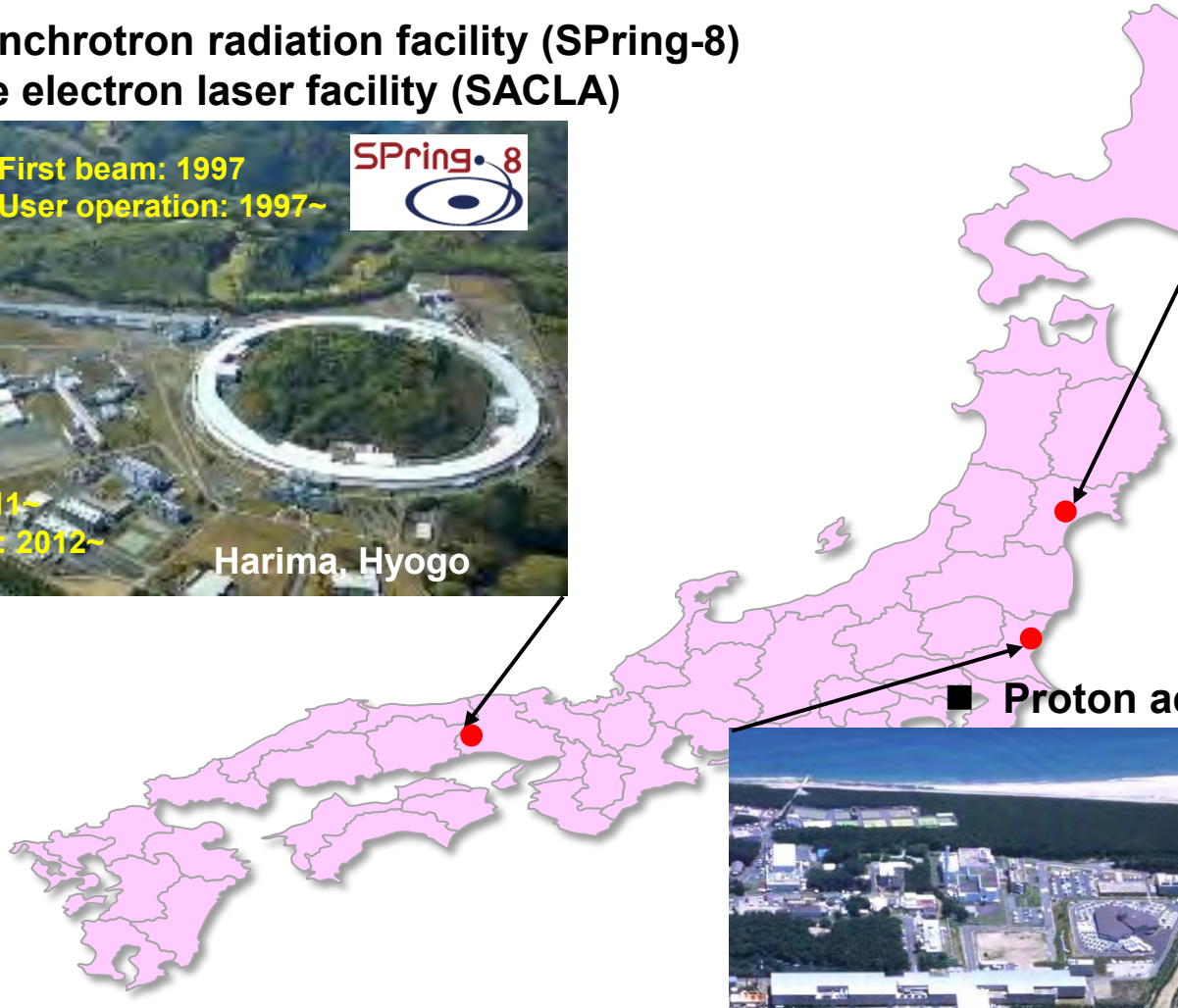
- ✓ Reduced burden on equipment owners and users (unified maintenance, better support)
- ✓ Increased number of users, time, improvement of use efficiency, convenience
- ✓ Integration of fields, expansion of emerging fields, strengthening industry-academia-government collaboration (use by other fields, promotion of joint research)
- ✓ Faster establishment of research environment for young researchers (support for laboratory start-up)

National Large-Scale Research Facilities in Quantum Beam Science

- There are three national large-scale research facilities in quantum beam science, in Japan.
- In addition, a new one is under building.

■ 8 GeV Synchrotron radiation facility (SPring-8)
■ X-ray free electron laser facility (SACLA)

□ Next-generation 3GeV SRF (NanoTerasu) (Under construction)



■ Proton accelerator research complex (J-PARC)


SPring-8
(Super Photon ring-8 GeV)
(Solving-Problems ring-8 GeV)
8 GeV storage ring for SR light source
With 1500 m circumference surrounded by experimental building
Total area: 1,410,000 m² (141 ha)
Altitude: 280-290 m from the sea level
RIKEN

Features of SPring-8

- The highest energy (8 GeV) dedicated SR source
- Use in-vacuum undulators as standard insertion devices (IDs)
- 4 long straight sections for exotic IDs
- 300 m long and 1000 m long beamline capability
- Co-location with XFEL (SACLA)

- Counter-clockwise circulation of electron beam

RIKEN

What is “NanoTerasu” ?

NanoTerasu

Nanometer-scale World

Illuminate, Light Up

Total budget for Construction

～38 billion Yen (270 million USD)

“Pubic- Private/regional partnership”

QST, PhoSIC, Miyagi Pref., Sendai City, Tohoku Univ., Tohoku Economic Federation

Construction: 2018FY-2023FY

Users Operation Start: 2024FY

NanoTerasu project

2018 Selection of the regional partners

2018 Concluded a cooperation agreement with National Institutes for Quantum Science and Technology (QST)
and regional partners

2019 QST started development of accelerators and the partners started land reclamation.

2021 Start to carry accelerators into the building in December

2023 Completion of the building in March

2023 First Beam

Expected to start operation in 2024

Act on the Promotion of Public Utilization of the Specific Advanced Large Research Facilities

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*** NanoTerasu will also be newly added as a facility under this bill**

[Purpose]

By taking measures to promote the shared use of advanced large research facilities by researchers, as well as strengthening the foundation of research, etc., contribute to the progress of science and technology by aiming for a variety of knowledge of researchers through interactions between as institutions relating to the research and researchers.

"Specific advanced large research facilities"

Of the large research facilities that require a vast amount of expenses, demonstrate unparalleled performance in the field of advanced science and technology, and maximize their value by being used in a variety of research in a wide range of fields, specific facilities indicated on the right)

Specific synchrotron radiation facility

SPring-8 & SACLA

Specific neutron facility
J-PARC Neutron Beam Facility

Specificd high-speed computer facility
Supercomputer Fugaku

Facility construction, maintenance, etc.

Utilization in a wide range of fields

User
(Universities, independent institutions, etc., private sector)

Utilization needs

Selection of users, fair implementation of usage support

Recruitment of usage tasks

Facility establisher

- ❖ **RIKEN**
  - SPring-8・SACLA
  - Supercomputer Fugaku
- ❖ **Japan Atomic Energy Agency**
  - J-PARC
- ❖ **National Institutes for Quantum and Radiological Science and Technology**
  - Nano Terasu ← Undecided

Cooperation

Registered Institution for Facilities Use Promotion

In order to ensure fair and efficient sharing, an institution that has specialized knowledge in facility utilization research other than the main installer itself will carry out the utilization promotion work.

- o User selection work (selection of implementation tasks based on the opinions of outside experts)
- o Utilization support work (utilization support such as information provision and consultations)

* Current registered facility user institution names

・SPring-8・SACLA	:JASRI
・J-PARC	:CROSS
・Supercomputer Fugaku	:RIST
・NanoTerasu	← Undecided

3 GeV high-brightness synchrotron radiation facility NanoTerasu

Approval of implementation plan

National government (Ministry of Education, Culture, Sports, Science and Technology)

Formulation of basic policies for promoting public utilization

Registered by the Minister of Education, Culture, Sports, Science and Technology for each category of facility

Approval of implementation plan

Approval of work rules, order for improvement

Summary

- MEXT promotes further initiatives for the open utilization of research facilities and equipment, and the Guidelines on Promoting Public Utilization of Research Facilities and Equipment is formulated.

- In Japan, there are three large-scale research facilities in quantum beam science (SPring-8, SACLA, and J-PARC). In addition, the next-generation SRF (NanoTerasu) is under construction.

- MEXT welcomes the use of these facilities, which are open to a wide range of users both domestically and internationally.