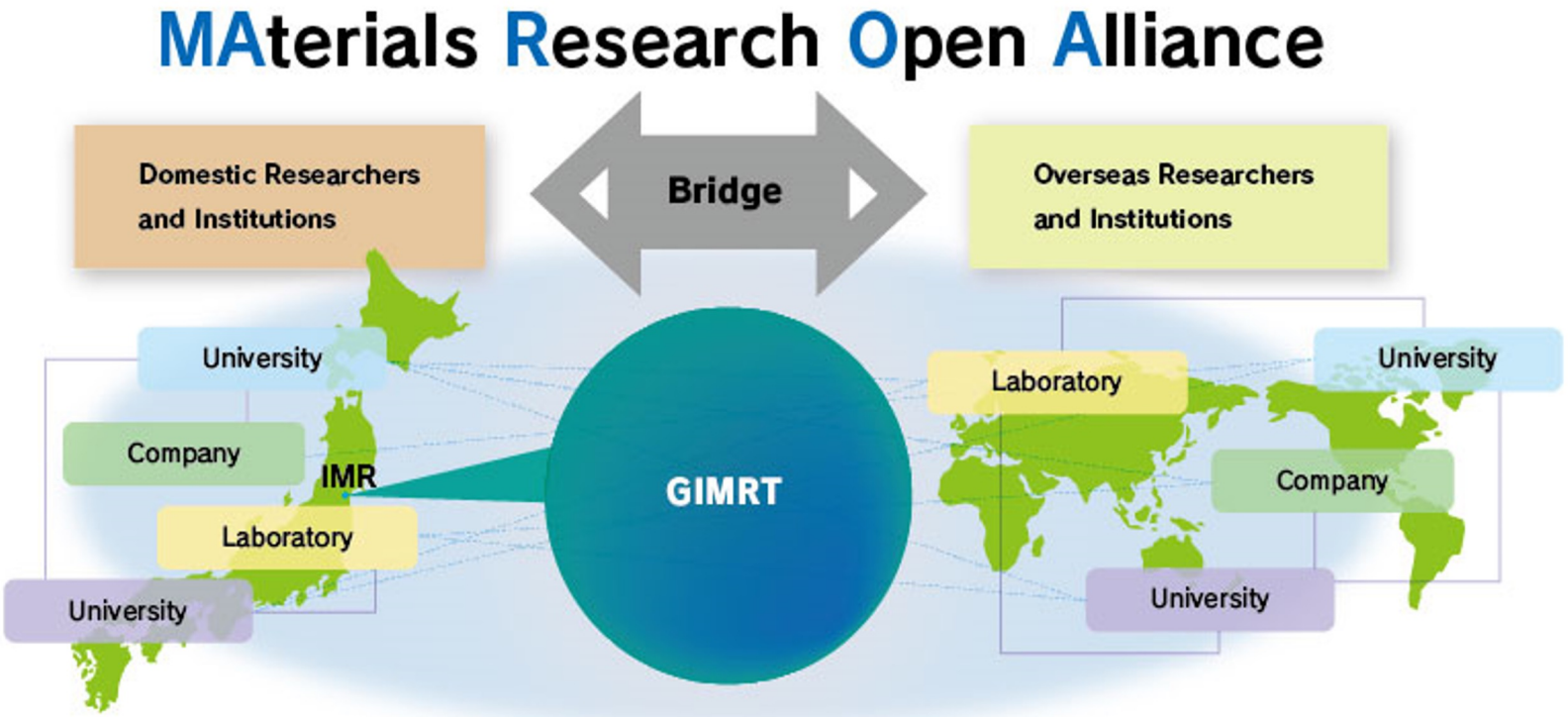
Outline of GIMRT program

Global Institute for Materials Research Tohoku (GIMRT)

Renewed for GIMRT II (FY2022-2027)

GIMRT is the bridge for multi-core collaboration research to establish international Material Sciences Open Research Alliances, in which Domestic and Overseas researchers and university/institutes collaborate

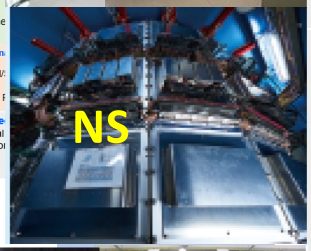


GIMRT-II-Combining short and long research visits

Challenge for re-accelerate international collaboration

GIMRT- I
Single visit
single year

GIMRT-II
Combining short visit, long stay(guest researcher), cross appointments



Multi core collaboration
Bridge Proposal

Community formation
Workshop and event

Research visit for overseas
Research Stay of young

Coordination
Joint project
Joint laboratory

Linkage

Package

Single Visit/Short Term
Facility type user

Long-residential stay
Guest Researcher
Student fellowship
Cross-appointment

Combine

GIMRT-II
Involving more researchers

Global IMR Tohoku

Main Programs of GIMRT II

Single Visit
Type S

Standard research visit to IMR

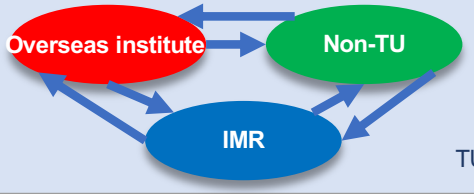
- Access to IMR facilities and collaboration with IMR research groups
- For a few weeks
- Multiple visits/Multi persons visit available (Ph.D student can be collaborator)

Combination with Bridge or Covis program is available

Bridge
Type B

Multi-core Research Collaboration

- **for Overseas researchers**
  - Visit IMR together with non-TU collaborators
  - Visit both IMR and non-TU institutes
- **for non-TU domestic researcher**
  - Invite a researcher from overseas institute to own institute
  - Work together at IMR and at J-PARC, SPring-8 etc.



TU = Tohoku University

Covis
Co-research visit

Team visit (combination of Long & Short stay)
for strong and sustainable co-research team

- Example

Residential type visit (Type G= Guest Professor)
+
Short-term intensive visit (Type S)

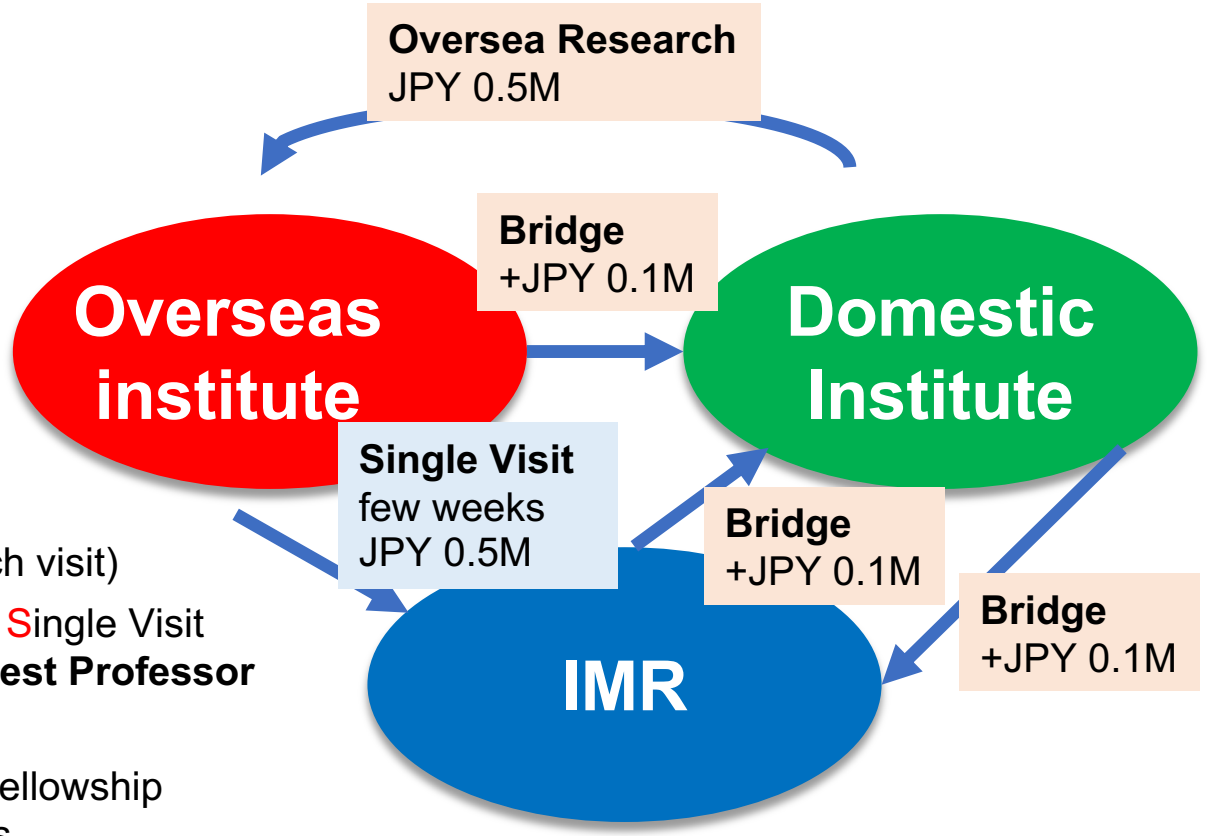
Oversea Research
Type O

For young scientist (under 40) in Japan

- Travel support (up to JPY 0.5M) to visit oversea institutes for research collaboration
- Experiment or discussion realizable only by visit, enlarge the network etc.
- For 2 weeks ~ 2-3 months

For other programs, please see the final page of File No.04

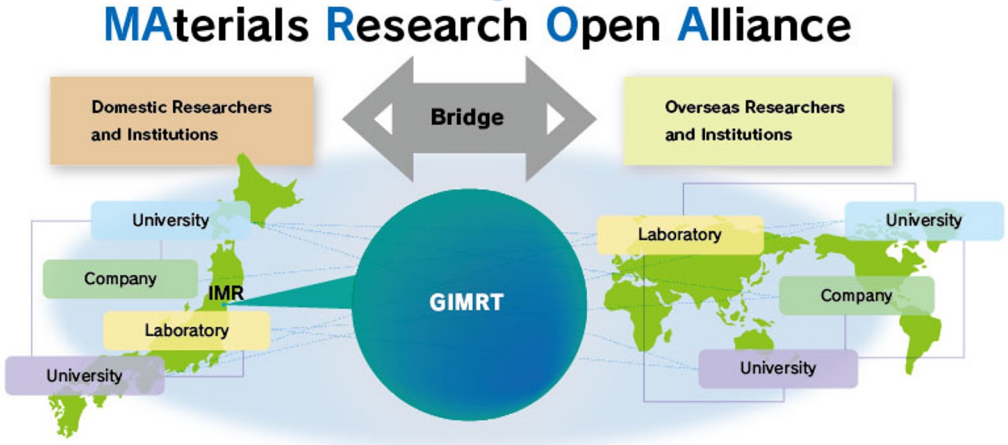
Support scheme of GIMRT Program



Covis
(Co-research visit)

Combination of Single Visit
and Visiting **Guest Professor**

Research Fellowship
2 months



An example of Covis

From CNRS (Centre national de la recherche scientifique), France

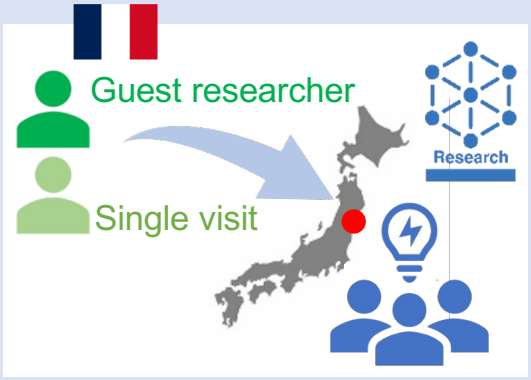
High Temperature Superconductors For Very High Field Magnets Beyond 30 T

Covis ~ Co-research visit ~

Effective output and continuation of the collaboration

Guest Researcher
Assoc. Prof. Arnaud BADEL
Period : Apr. - Oct.2022 (visit 3 times, total 59days)

Single Visit
Mr. Julien VIALLE (Graduate student)
Period : Jul.2022 total 9days



Paper
A High Performance Insulated REBCO Pancake With Conductive Cooling Capability IEEE Transactions on Applied Superconductivity
DOI: 10.1109/TASC.2023.3242219

Left : Assoc. Prof. BADEL
Right : Mr. VIALLE
With a Test module for High Tc Superconductor Coil

More in 2023

Design of Integrated Composite Electrode Composed of Porous Metallic Current Collector and Nanoscale Active Ceramic Material
Ilya Okulov, - IWT, Germany

Competing Interactions and Anisotropies in Complex Triangular Antiferromagnets
Michael E. Zhitomirsky, CEA-Grenoble,

An example of Bridge Domestic

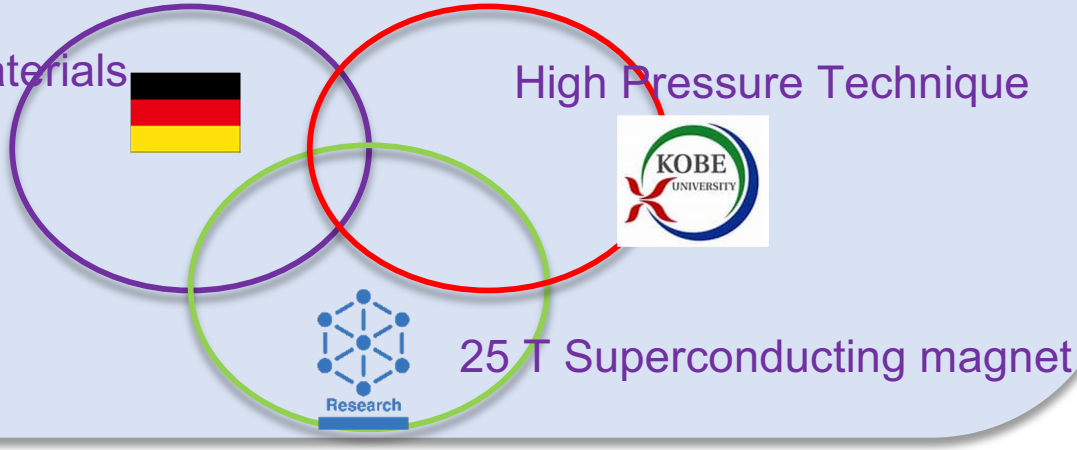
From University of Augsburg, GERMANY
Visited Kobe Univ. and IMR

Bridge Domestic
~ Visit IMR and Kobe university ~

Theme
Magnetic field-induced phase transitions in rare-earth-based paramagnets

Applicant
Dr. Dmytro KAMENSKYI
Period : Jul. - Aug. 2023 total 19days

Research Partner
Assist. Prof. Takahiro SAKURAI (Kobe Univ.)



Collaboration of 3 skillful groups produces a unique research

An example of Single Visit

From Stanford (SLAC National Accelerator Laboratory) , USA

Guest professor + Bridge, 2 sites visit

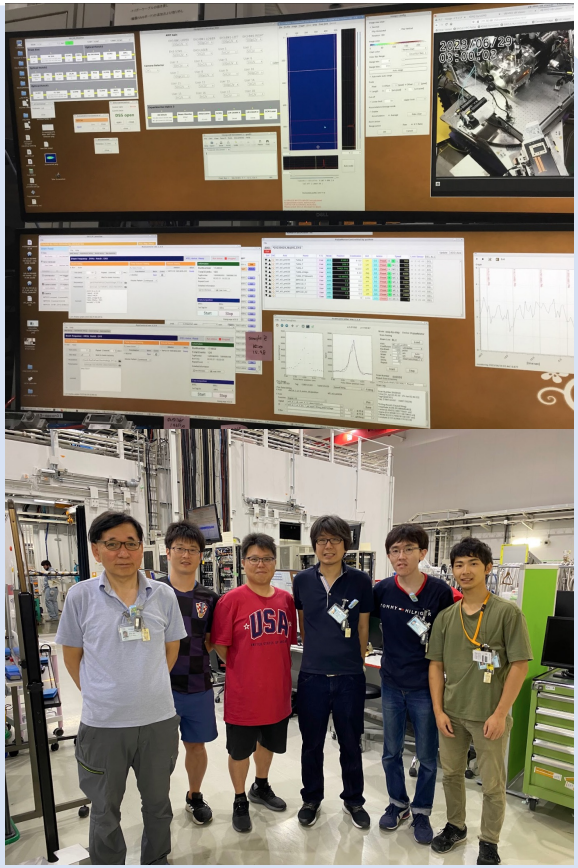
Visit IMR in Sendai and SACLA X-FEL facility
to conduct experiments and perform new R&D

Theme
Developing Resonant Soft X-ray Scattering Technique in Very High Magnetic Fields by Using Advanced Pulse Magnet Design

Applicant
Prof. Jun-Sik Lee (SLAC National Accelerator Laboratory)
Period : June-July 2023, total 31days

Procedure
IMR Development of new concept magnet for soft-X-ray scattering
SACLA Perform a high field X-ray diffraction at X-FEL facility

Overview
Out put of this collaboration will be used in other facilities including SACLA, PAL and EuroXFEL



At SACLA :
IMR, SLAC National Accelerator Laboratory, Ibaraki Univ. and UEC (The Univ. of Electro-Communications)

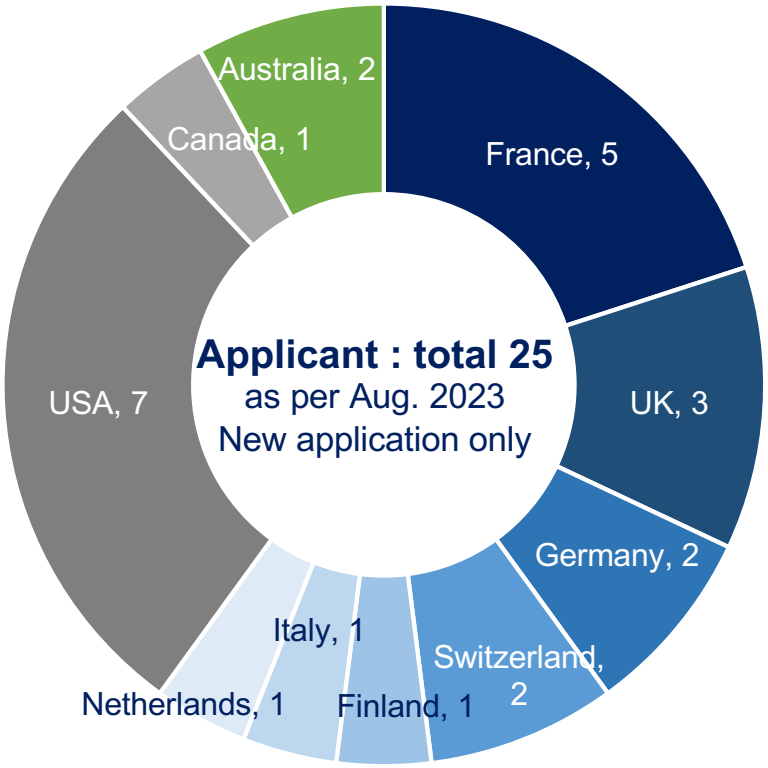
SACLA (**S**Pring-8 **A**ngstrom **C**ompact Free Electron **La**ser) : X-FEL facility in Harima Science Garden City, Hyogo, embedded in the SPring-8 accelerator and synchrotron complex.

Oversea Research

Support Program for Young scientist (under 40) in Japan

- Fostering of young researchers with international experience
- Contribution for formation of overseas research networks

Destination of applicants by country (2018~2023)



One of initial cases and outcome

Turk University, Finland

Name Assist. Prof. Yuya ISHIKAWA
Affiliation Fukui University
Period Jun.2019 total 16days
Theme Research on development of ultra low temperature/high frequency ESR/NMR double magnetic resonance equipment

Award
Young scientist award of the society of electron spin science and technology in 2022

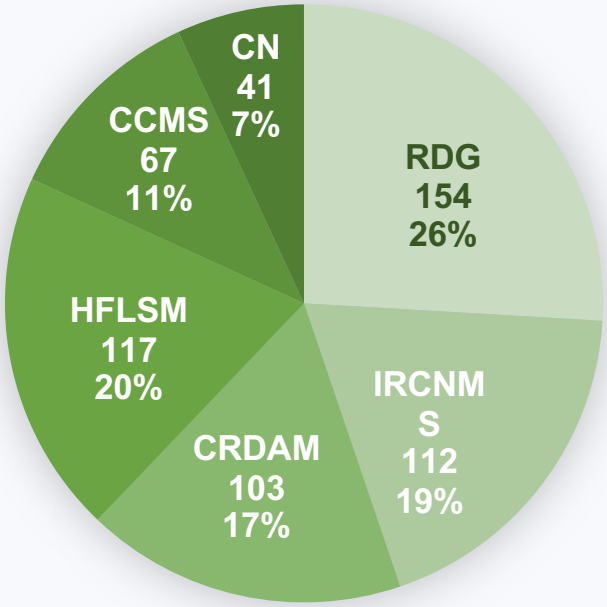
Paper *Physical Chemistry in May 2020*
Dynamic nuclear polarization and ESR hole burning in As doped silicon
DOI 10.1039/c9cp06859g

Application Statistics

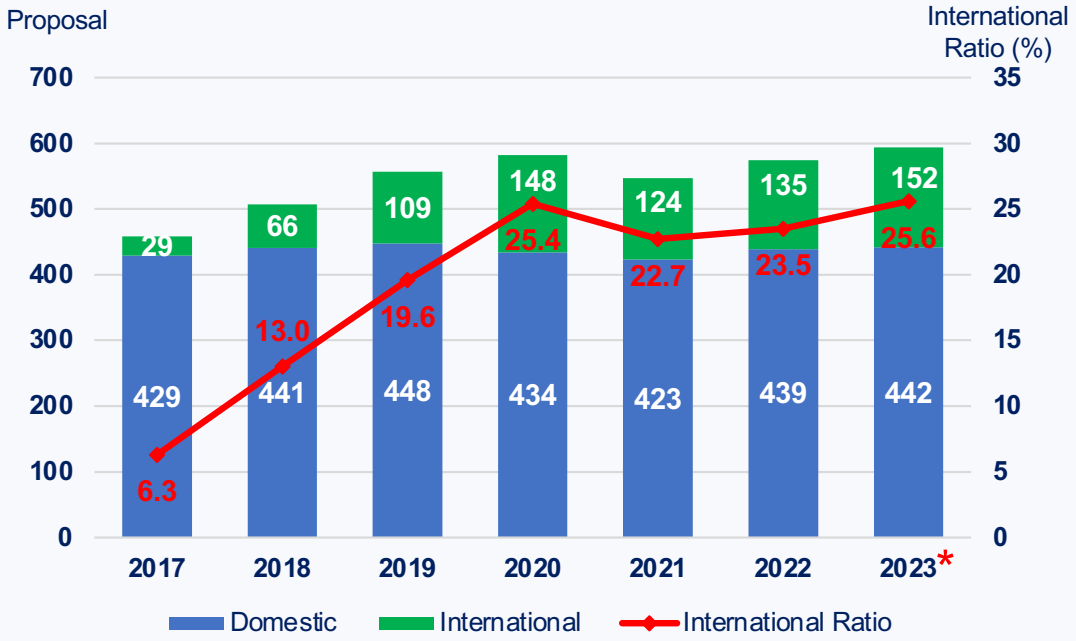
* as per END/JUL.

	RDG			IRCNMS			CRDAM			HFLSM			CCMS			CN			Total
	Domestic	Int'l	**Total**	Domestic	Int'l	**Total**	Domestic	Int'l	**Total**	Domestic	Int'l	**Total**	Domestic	Int'l	**Total**	Domestic	Int'l	**Total**	
2021	103	41	144	78	43	121	84	11	95	94	10	104	44	12	56	20	7	27	547
2022	97	30	127	69	67	136	82	11	93	96	17	113	67	6	73	28	4	32	574
2023*	105	49	154	72	40	112	90	13	103	88	29	117	55	12	67	32	9	41	594

Ratio by group (2023)*



Time trend and International Ratio



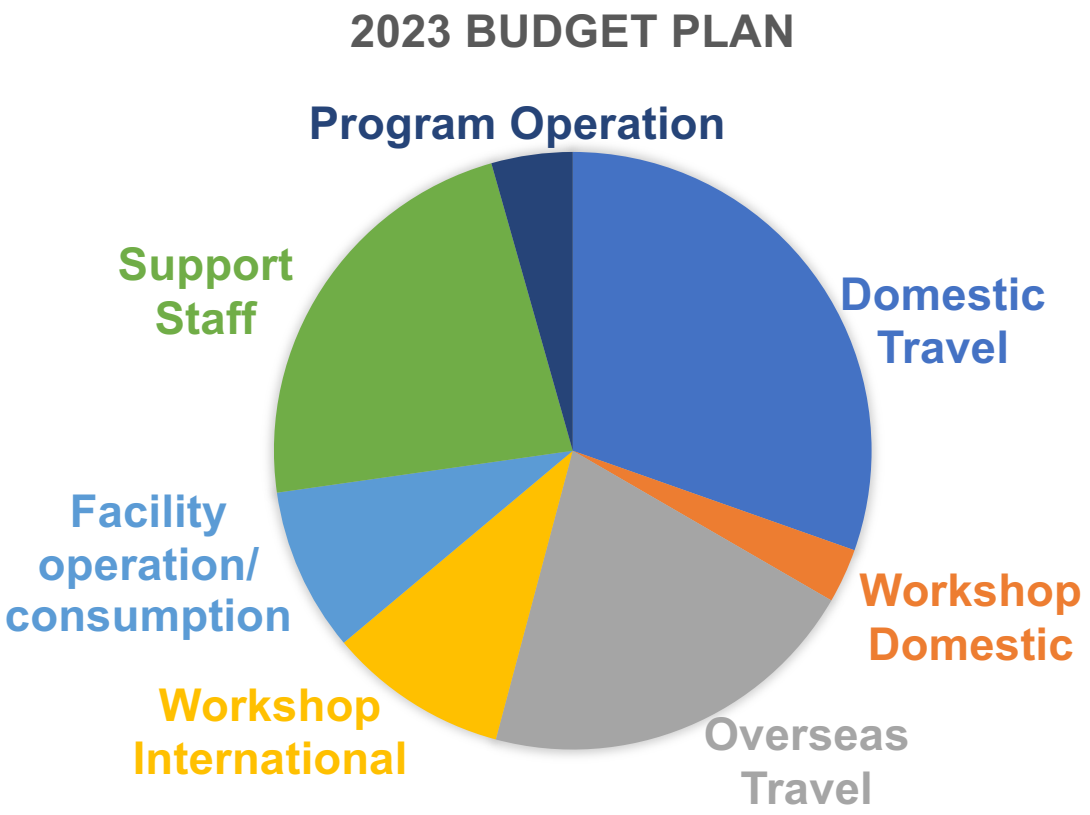
RDG : Research Divisions and Groups
IRCNMS : International Research Center for Nuclear Materials Science
CRDAM : Cooperative Research and Development Center for Advanced Materials
HFLSM : High Field Laboratory for Superconducting Materials
CCMS : Center for Computational Materials Science
CN : Center of Neutron Science for Advanced Materials

Budgets Plan FY2023

FY2023

1=JPY1,000

Domestic Travel	37,432
Workshop Domestic	3,630
Overseas Travel	25,600
Workshop International	12,000
Facility operation/ consumption	10,910
Support Staff	28,130
Program Operation	5,409
Total	123,111



Allocation Policy for Proposal
Travel budget
Domestic 3 visit/year~ average JPY120,000
Oversea JPY 500,000 – 700,000

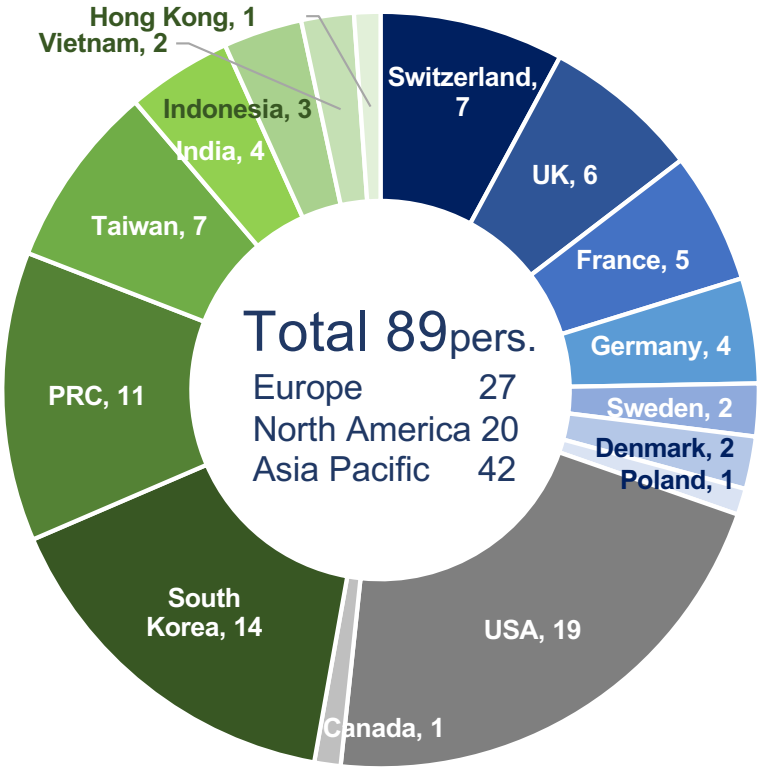
Workshop Domestic JPY 1.0M
Workshop International JPY 1.5 – 2.0M

Onsite research activities

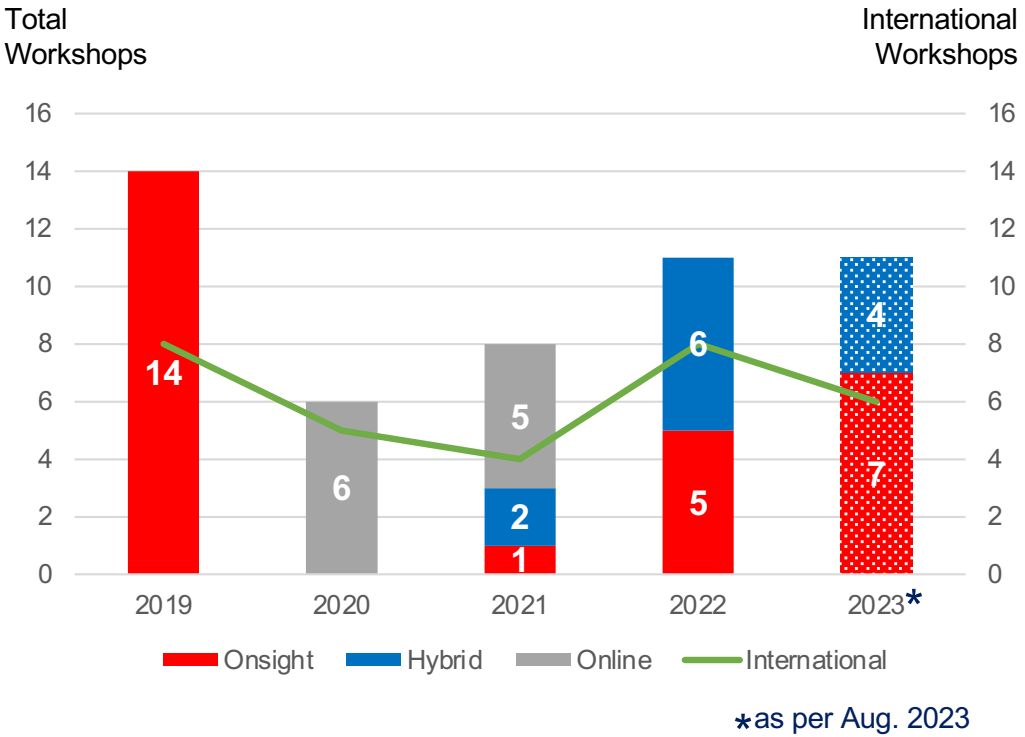
Visitors from Overseas

1st half of FY2023 (Apr. ~ Sep.)

Estimated data late in Aug. 2023



Number of Workshops



*as per Aug. 2023

The direct on-site exchanges produce opportunities for the creation of new collaboration

Symposium, Conference and Workshops in 2023

【File No. 04】

GIMRT supports JPY1.0 ~ 2.0 Million for each event

International

- Workshop on Resonant Inelastic and Elastic X-ray Scattering (RIXS/REXS)
  Date : 2nd – 4th Aug. 2023
  https://www.qst.go.jp/site/3gev-eng/workshop23-en.html

- The 18th International Workshop on Biomaterials in Interface Science
  Date : 4th Aug. 2023
  http://www.imr.tohoku.ac.jp/en/public/events/detail---id-625.html

- REIMEI-GIMRT workshop "Quantum Beams Study of the Dynamics of Rare Earth Garnets"
  Date : 7th – 8th Aug. 2023
  https://asrc.jaea.go.jp/soshiki/gr/spinenergy/workshop/reimei2023/index.html

- The 7th Symposium for the Core Research Clusters for Materials Science and Spintronics
  The 6th Symposium on International Joint Graduate Programs in Materials Science and Spintronics
  Date : 28th Nov. – 1st Dec. 2023
  https://www.crc-ms.tohoku.ac.jp/en/news/2023/11/Symposium2023_index.html

Domestic

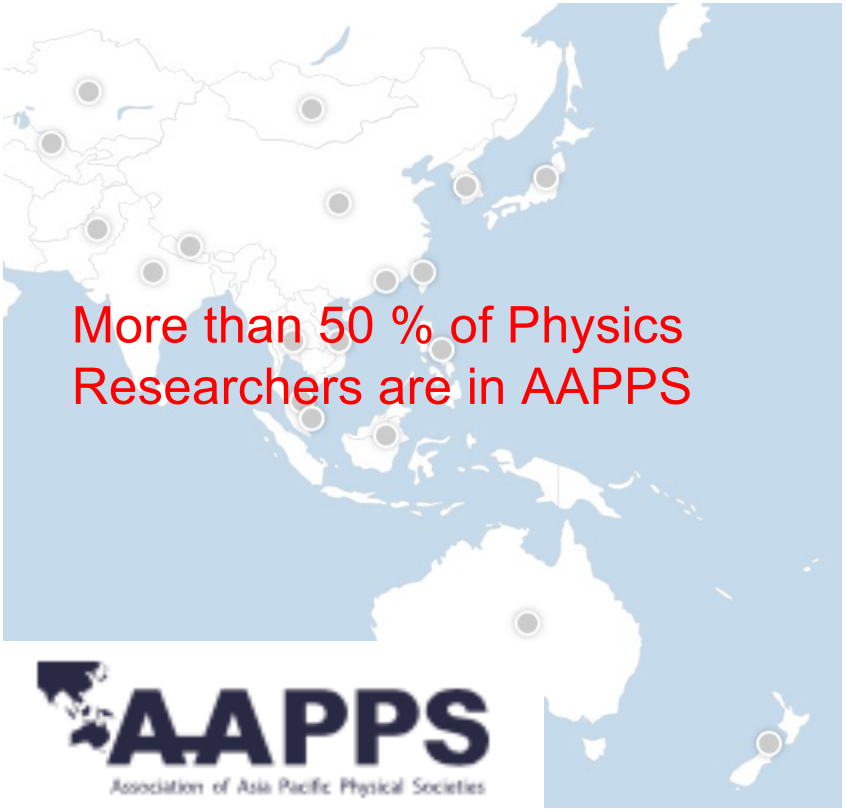
- Present status and future issues of studies on emergent properties in strongly correlated materials
  Date : 22nd – 23rd Apr. 2023
  http://onoselab.imr.tohoku.ac.jp/test0422-0423.html

- Materials Development Using Computational Science and Informatics 2023
  Date : 23rd – 24th Aug. 2023
  https://kumagailab.imr.tohoku.ac.jp/workshop2023/

- Workshop on extremely high field solid-state-NMR
  Date : in the second half of October. 2023
- High Magnetic Field Collaboratory Summer School
  training-camp-style
  "Innovative high magnetic field science and experimental technique"
  Date : 7th – 8th Dec. 2023
- Future of Biomaterials from Young and Mid-career researchers in Tohoku
  Date : 22nd Dec. 2023
- KINKEN WAKATE(Young Researcher) 2023 : Advances in Strongly Correlated Electron System
  First time abroad
  Date : 10th – 12th Oct. 2023. in Grenoble

GIMRT-II Contribution to Research Community

Formation of Asia-pacific condensed Matter Physics Network

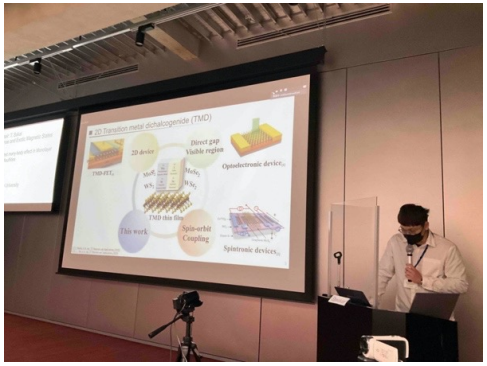


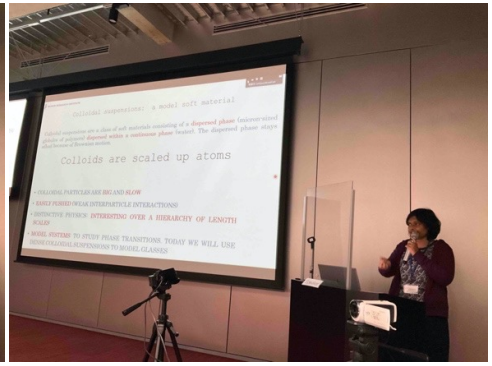
2017-2019
Communications and discussion with GIMRT users

2020
Asia-Pacific Workshop on Research in High Magnetic Field
Round Table of Condensed Matter Physics in Asia-pacific

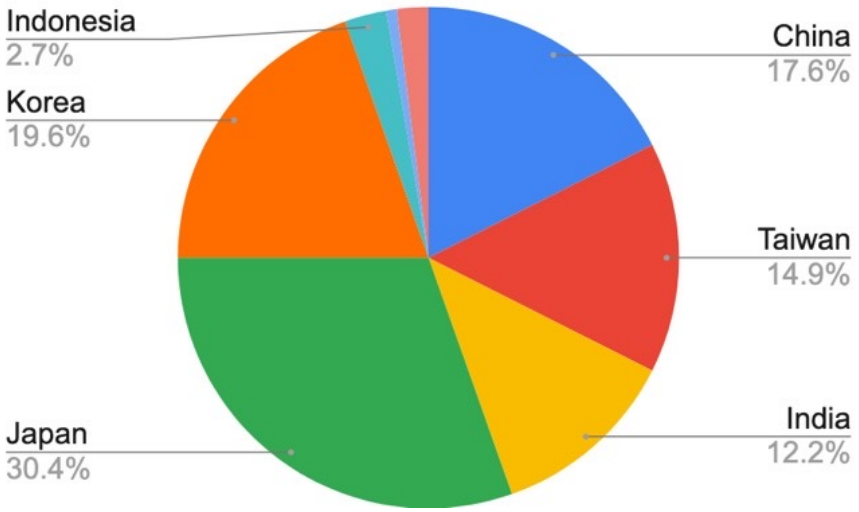
2021
Condensed Matter Physics Division Founded
Asia-Pacific Conference on Condensed Matter Physics 2021

2022
Asia-Pacific Conference on Condensed Matter Physics 2022





Ratio of participants by country at AC2MP 2022



Supports and conditions of GIMRT Program

Type	Period	Support	Support for multi-core collaboration
Single Visit	a few weeks	~ JPY 0.5M	Can visit non-TU Institute with justification
Bridge Domestic	a few weeks	Add ~ JPY 0.1M/each	For Japanese participating at IMR
	a few weeks	Add ~ JPY 0.1M/each	For Japanese participating at non-TU institute
Bridge Overseas	a few weeks	Add ~ JPY 0.5M/each	Combining single visit and overseas research
Bridge Special	a few weeks	Add ~ JPY 0.5M/each	For special research program conducted at overseas institute such as material irradiation at foreign reactors.
Oversea Research	Standard >2 weeks	~ JPY 0.5M	Support for young scientist of Japan to perform Research at Overseas Institutes
International Workshop	-	JPY 1.5~2.0M	Language English, Travel support of Overseas and domestic Participants
Challenging Project	Several weeks to 1 year	~ JPY 0.5M	For those who can visit IMR many times or can stay for longer period by combing with other programs
Covis (Co-research visit)	a few months & a few weeks	standard salary, relocation travel ~ JPY 0.5M	Combination of Single Visit and Visiting Guest Professor

Type	Period	Support	Qualifications
Visiting Guest Professor	1-6 months	standard salary relocation travel	Full, Assoc. and Assist. Professors and equivalent position at home institute
Research Fellowship	2 months	JPY 0.25M /month	Doctor course student. One can stay longer, but upper limit of support is JPY 0.5M in total.
Integrated Joint Project	Two year	~ JPY 10.0M	For outstanding research conducting by an international research team

Japan High Magnetic Field Collaboratory

【File No. 09】

High Magnetic Field Collaboratory Steering Committee

Three core institutions

HFLSM
IMR, Tohoku Univ.

MGL
ISSP, Univ. of Tokyo

AHMFL
G. S. of Science, Osaka Univ.

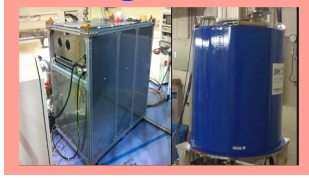
Co-operation of three advanced facilities as single national laboratory

Steady field facility with supper conducting and hybrid magnets	Pulsed Field facility with destructive and non-destructive magnets	Multi-extreme conditions and co-operating magnets

Evaluate and certify superconducting materials
Industry Collaboration

Cooperative Institutes
MPRC, Kobe Univ.
FIR-UF, Fukui Univ.
RFHMFE, Osaka Pref. Univ.
Interdisciplinary Research

Co-operating Magnets



Other large scale facility

SPring-8 J-PARC

Support by users from more than 90 institutions (User community "High Magnetic Field Forum")

March, 2019, MOU for the Collaboratory
October, 2019, 1st call for Joint Proposal
April, 2020, Unified Steering Committee

2022FY
108 groups for steady field
93 groups for pulsed field
(including 3 Collaboratory proposals)

33T cryogen-free superconducting magnet

Magnets (HTS-REBCO): 19 T

- Robust REBCO pancakes
- Inner dia. ≈ ϕ68mm
- Max. hoop stress < 400-500 MPa

Magnets (LTS): 14 T

- CuNb/Nb_3Sn & NbTi
- Rutherford solenoids
- Inner dia. ≈ ϕ320 mm
- Max. hoop stress < 300MPa

Cooling system

- Conduction cooling with He circulation
- Shield: 1-stg GM cryocooler x 2
- HTS: 4K-GM cryocooler x 4
- LTS: GM/JT cryocooler x 1

33T-CSM (ϕ32 RT bore)