

# RIKEN (1917-)

- **First and Largest national research Institute in Japan**

Number of researchers (~2800, ~17% non-Japanese), Total budget (~740M USD)

- **All fields in natural sciences**

Physics, Chemistry, Life, Mathematics, Engineering, Information, Computation, ...

- **Big facilities**

Light source (SPring-8), Supercomputer (FUGAKU), Heavy-Ion Accelerator (RIBF)

A: Sendai Campus  
B: Tsukuba Branch  
C: Wako Branch (Headquarters)  
D: Tokyo Campus  
E: Yokohama Branch  
F: Nagoya Branch  
G: Keihanna Campus  
H: Osaka Campus  
I: Kobe Branch  
J: Harima Branch



SPring-8/SACLA



FUGAKU



RIBF

A: RIKEN Facility Office at RAL (UK)  
B: Europe Office (Belgium)  
C: Singapore Office (Singapore)  
D: Beijing Office (China)  
E: RIKEN BNL Research Center (USA)

RHIC



RAL










RIKEN-Berkeley Center

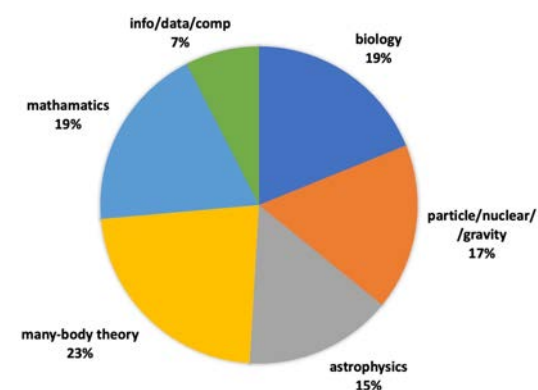
Mathematician, Physicist, Biologist, Computational & Information Scientists

under one roof

(currently about 120 researchers)



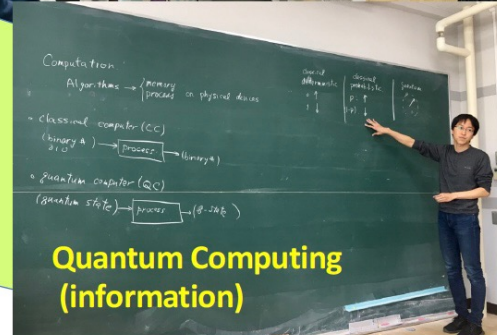
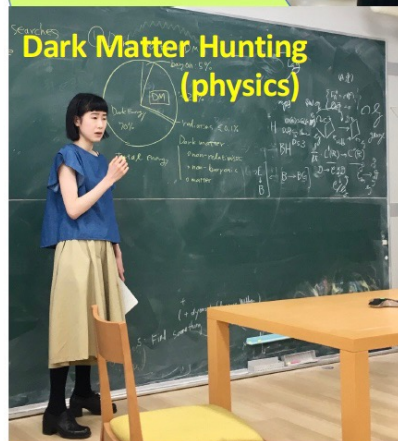
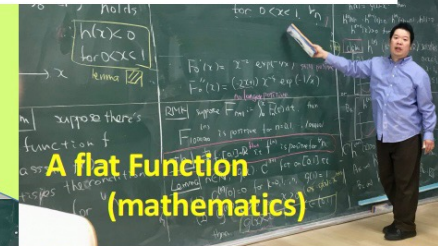
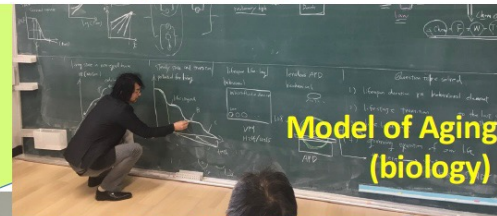
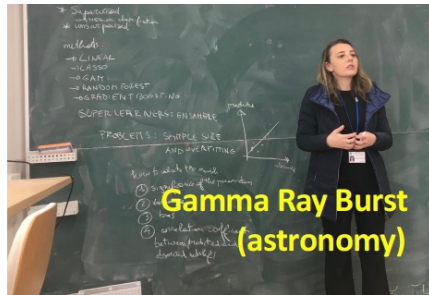
| Director  |   | Deputy Director   |   |  | Coordinator   |   |
|---|---|---|---|--|---|---|
|  |  |  |  |  |  |  |
| S. Iso<br>(Phys.)   | T. Tada<br>(Phys.)  | C. Beauchemin<br>(Biology)  | S. Nagataki<br>(Astro.)   | Y. Kawahigashi<br>(Math)   | Y. Hidaka<br>(Phys.)  | T. Nagai  |





# Under One-Roof Activities 1: Coffee Meetings

Coffee Meeting on Every Friday 12:30- and 15 min. talks



New collaborations among different fields



# Under One-Roof Activities 2: Colloquiums

## Astro chemistry

iTHEMS Colloquium

**Mirror symmetry and KAM theory**

Prof. Kenji Fukaya  
(Simons Center for Geometry and Physics,  
Stony Brook University, USA)

2021 **4/16** 13:30 am - 15:00 am (JST) Through Zoom

iTHEMS Colloquium

**Geometry (形): Inconspicuous regulator that determines the fate of cells**

Prof. Sungmin Seirin-Lee  
(Professor, Hiroshima University)

2022 **12/14** 10:00 am - 11:30 am (JST) Through Zoom

iTHEMS Colloquium

**The Unreasonable Effectiveness of Quantum Theory in Mathematics**

Prof. Robert Dijkgraaf  
(Director, Institute for Advanced Study in Princeton)

2020 **11/26** 10:00 am - 11:30 am (JST) Through Zoom

iTHEMS Colloquium

**Smart heuristics of a single-celled organism**

Prof. Toshiyuki Nakagaki  
(Professor, Research Institute for Electronic Science,  
Hokkaido University)

2025 **3/7** Friday (JST) 14:00 - 15:30 Okachi Hall & via Zoom

iTHEMS Colloquium

**Chemical and isotopic analyses of samples returned by the Hayabusa2 mission from the asteroid Ryugu**

Prof. Tetsuya Yokoyama  
(Professor, Department of Earth and Planetary Sciences,  
School of Science, Institute of Science Tokyo)

2025 **8/1** Friday (JST) 14:00 - 15:30 3F Large Conference Room, Administrative Headquarters, RIKEN Wako Campus & Zoom

iTHEMS Colloquium

**Quantitative Population Dynamics in Interdisciplinary Biology**

Prof. Shingo Iwami  
(Professor, Nagoya University)

2021 **7/8** Thursday 10:30 am - 12:00 am (JST) Through Zoom

Geometry

Cell dynamics

Math from Phys.

Single-celled organism

Population dynamics

Physics and Society

iTHEMS colloquiums

<https://ithems.riken.jp/en/ac/colloquiums>

iTHEMS Colloquium

**Bridging physics and society**

A case study of collective memory dynamics by socio-econophysics approach

Dr. Yukio Sano  
(Associate Professor, Institute of Systems and Information Engineering,  
University of Tsukuba)

2023 **11/20** Friday (JST) 15:00 - 16:30 Okachi Hall & via Zoom

iTHEMS Colloquium

**Finding Gravitational Waves from the Early Universe**

Prof. Eiichiro Komatsu  
(Director, Max Planck Institute for Astrophysics, Germany)

2021 **9/27** Friday 16:00 - 17:30 (JST) via Zoom

Gravitational waves

Quantum gravity

Turbulence

Epidemiology

Optimal transport

Infectious diseases

Quantum information

iTHEMS Colloquium

**The eyes have it: Influenza virus infection beyond the respiratory tract**

Dr. Jessica Belser  
(Research Manager, Influenza Division,  
US Centers for Disease Control and Prevention (CDC),  
USA)

2023 **7/11** Thursday (JST) 14:00 - 15:30 Okachi Hall & via Zoom

iTHEMS Colloquium

**From the Black Hole Conundrum to the Structure of Quantum Gravity**

Prof. Yasunori Nomura  
(Director, Berkeley Center for Theoretical Physics,  
University of California, Berkeley, USA)

Limited to 40 people (onsite)

2022 **7/26** Thursday (JST) 15:30 - 17:00 3F Large Meeting Room, RIBF Bldg.

iTHEMS Colloquium

**How is turbulence born: Statistical mechanics and ecological collapse in transitional fluids**

Dr. Hong-Yan Shih  
(Assistant Research Fellow,  
Institute of Physics, Academia Sinica, Taiwan)

2022 **4/22** Friday 15:00 - 16:30 (JST) via Zoom

iTHEMS Colloquium

**The Epidemiology and Economics of Physical Distancing during Infectious Disease Outbreaks**

Prof. Tray Day  
(Professor, Head of Department,  
Department of Mathematics and Statistics,  
Queen's University, Canada)

2022 **12/14** Wednesday 11:00 am - 12:30 noon (JST) via Zoom

iTHEMS AP Joint Colloquium

**Scaling Optimal Transport for High dimensional Learning**

Dr. Gabriel Peyré  
(Research Director,  
CNRS/École Normale Supérieure,  
France)

2023 **1/24** Tue. 17:00 - 18:30 (JST) via Zoom

iTHEMS Colloquium

**Emergence of Extreme Universe from Quantum Information**

Prof. Tadashi Takayanagi  
(Professor,  
Yukawa Institute for Theoretical Physics,  
Kyoto University)

2023 **4/17** Monday 16:00 - 17:30 (JST) via Zoom

# Under One-Roof Activities 3: Study/Working Groups

## Study Groups

The study groups are formed to promote information sharing among researchers. Activities of a study group are financially supported by iTHEMS, upon the review of the proposal to form the study group.

 Download the proposal form (Word 172KB)

### [iTHEMS-phys Study Group](#)

The main purpose of the "iTHEMS-phys" study group is to keep a regular seminar series and sometimes have an intensive lecture or workshop on any topics...

### [iTHEMS Biology Seminar Study Group](#)

We are holding regular seminars and other activities on topics related to biology. Our aim is to lower the boundaries between biology and...

### [Quantum Gravity Gatherings](#)

Quantum Gravity Gatherings will offer an intensive lecture series on various approaches to quantum gravity as an opportunity for people of different...

### [Quantum Computation Study Group](#)

The goal of this study group is to learn and discuss quantum computation and its related fields from various perspectives, facilitated by fostering...

### [Interdisciplinary Math Study Group](#)

The aim of this study group is to cultivate opportunities for delving into mathematics, encompassing both fundamental principles and the...

### [Computationally-driven Solutions for Healthier Lives \(ComSHeL\)](#)

Our purpose is to leverage computational and analytical methods to enhance our understanding of health, diseases, treatments, and medical...

### [iTHEMS Cosmology Forum](#)

Providing a forum to discuss cosmology emerging

### [iTHEMS-ABBL Joint Astro Study Group](#)

The purpose of this SG is to foster collaboration

## Working Groups

The working groups are formed to explore novel possibilities of the interdisciplinary collaborations. Activities of a working group are financially supported by iTHEMS for one to two years, upon the review of the proposal to form the working group.

 Download the proposal form (Word 172 KB)

### [iTHEMS math-phys Working Group](#)

iTHEMS Mathematical Physics Working Group (November 1st 2021-).

### [DEEP-IN Working Group](#)

"DEEP learning for INverse problems (DEEP-IN) in Sciences" working group (April 1st, 2024 - )

### [Information Theory Working Group](#)

Our goal is to provide a clearer overview of wider theoretical disciplines on the basis of information theory, by making close connections across fields...

### [Asymptotics in Astrophysics Working Group](#)

The aim of this study group is to bring together physicists and mathematicians to share techniques and tricks from the textbook "Advanced...



Extension of MEMORANDUM OF UNDERSTANDING  
BETWEEN

Mathematical and Physical Sciences Division,  
University of California, Berkeley,

AND

Interdisciplinary Theoretical and Mathematical Sciences Program, RIKEN,  
Japan

CONCERNING

Collaboration, Cooperation, and Exchanges in the Fields of Theoretical  
Physics, Nuclear Astrophysics,  
Mathematics, and Quantum Information

1. Objective

The Participants intend to explore future collaborations in the fields of theoretical physics, nuclear astrophysics, and related computational sciences.

2. Proposed Areas of Collaboration

The Participants intend to collaborate in the following areas

- a) lattice QCD and other computational many-body theory;
- b) tests of fundamental symmetries using nuclei and atoms;
- c) nuclear and neutrino astrophysics;
- d) pure and applied mathematics; and
- e) quantum information science.

The scope of activities and cooperation may be changed or extended upon mutual written consent of the Participants.

3. Proposed Forms of Collaboration

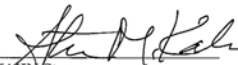
The Participants expect to collaborate through:

- a) Mutual visits including the exchange of research staff, graduate students and post-doctoral fellows;
- b) Joint workshops, seminars and other similar activities; and
- c) Exchange of scientific materials, publications, and information.

Any future collaborative research must only be undertaken pursuant to an appropriate written agreement therefore.

UCB MPS- RIKEN iTHEMS  
MOU  
(2023-2026)

Signed for UCB MPS

  
KAHN Steven  
Dean  
Mathematical and Physical Sciences  
Division

Date: Sept. 21, 2023

Place: BERKELEY, CA

Signed for RIKEN iTHEMS

  
HATSUDA Tetsuo  
Program Director  
iTHEMS, RIKEN

Date: Aug. 23, 2023

Place: Wako, Saitama, JAPAN

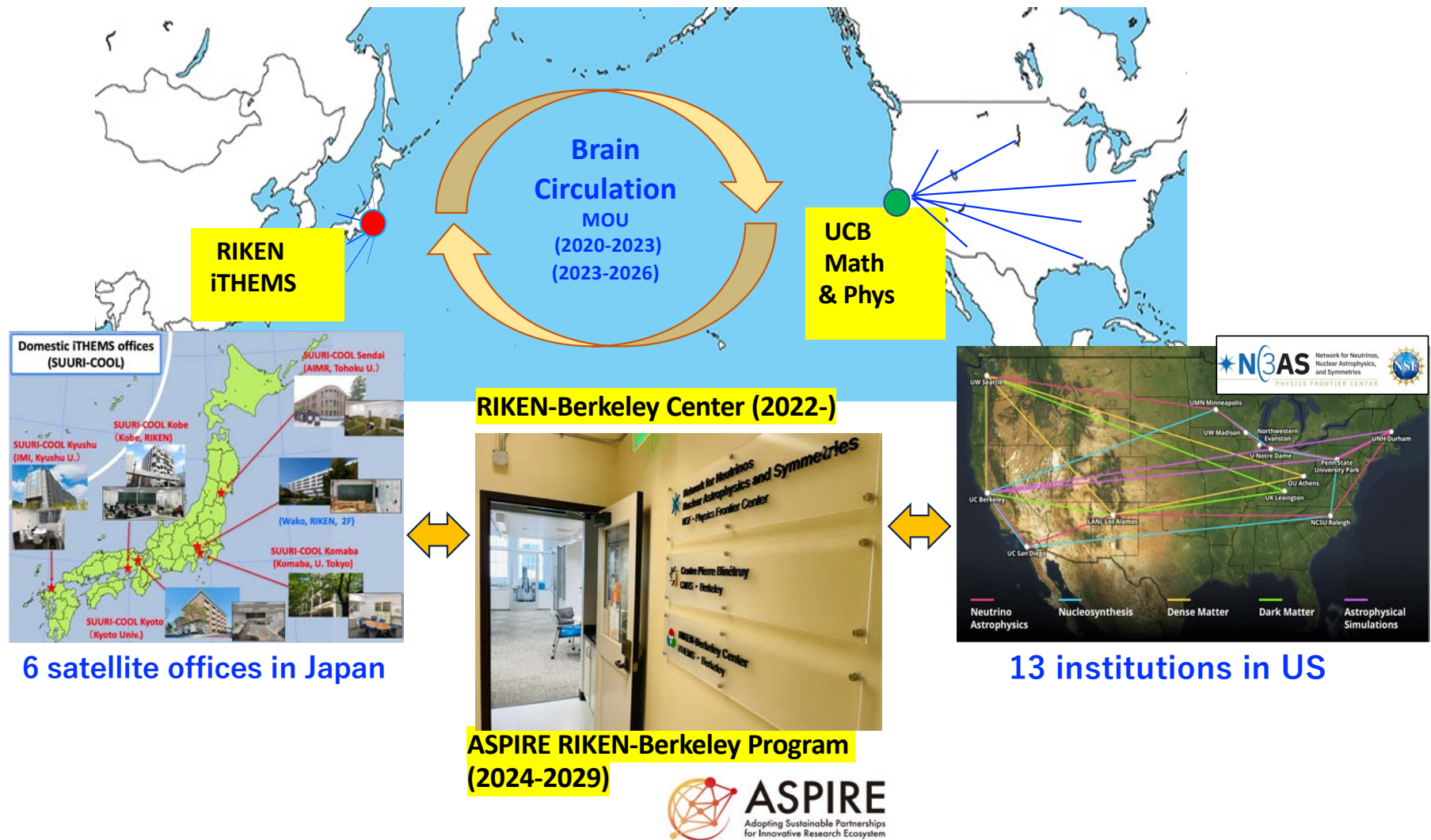
Contact persons

UCB: Wick Haxton

RIKEN: Tetsuo Hatsuda



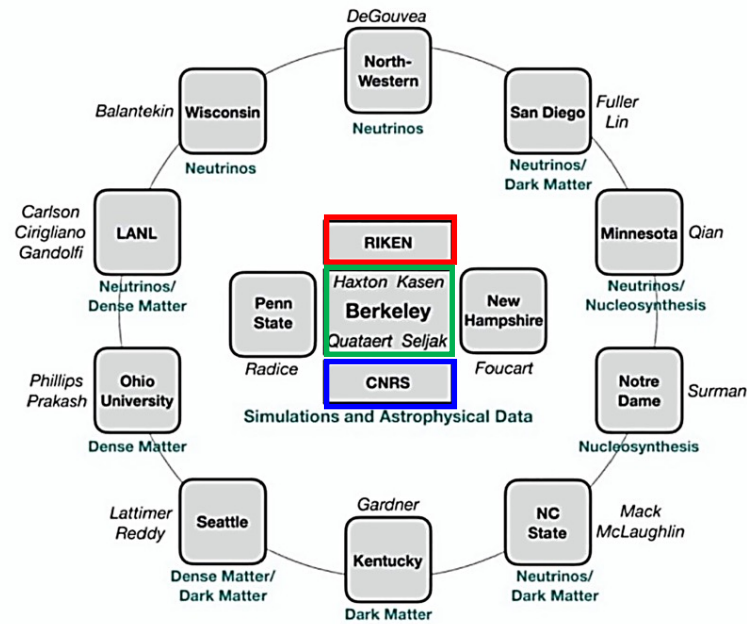
# Brain circulation across the Pacific



# RIKEN-Berkeley Center with N3AS



<https://n3as.berkeley.edu/>



## N3AS Domestic Partners



## N3AS International Partners

- CNRS APC/ Centre Pierre Binétruy
- RIKEN-Berkeley Center



Radek Stompór  
(CNRS)



Hiro Nagataki  
(RIKEN)





# JST ASPIRE Program (2024-2029)

- RIKEN-Berkeley Mathematical Quantum Science Initiative -

PI: Tetsuo Hatsuda

RIKEN

Center for Interdisciplinary Theoretical and  
Mathematical Sciences (iTHEMS)  
Quantum Mathematical Science Team  
Team Director



Co-PI: Wick Haxton

UC Berkeley

NSF Physics Frontier Center (N3AS)  
Director

**iTHEMS**<sup>o</sup> RIKEN  
Center for Interdisciplinary  
Theoretical and Mathematical Sciences

<https://ithems.riken.jp/en>



**ASPIRE**

Adopting Sustainable Partnerships  
for Innovative Research Ecosystem

**N3AS** Network for Neutrinos,  
Nuclear Astrophysics,  
and Symmetries  
PHYSICS FRONTIER CENTER

<https://n3as.berkeley.edu/>



## RIKEN-Berkeley Mathematical Quantum Science Initiative

Thema leaders

|                    |     |     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |
|--------------------|-----|-----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------------------|
| <u>Doi</u>         | RBV | RBF |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Quantum Matter      |
| <u>Hatsuda</u>     | RBV | RBF |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Quantum Computation |
| <u>Nagataki</u>    | RBV | RBF |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Quantum Universe    |
| <u>Kawahigashi</u> | RBV | RBF |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Quantum Mathematics |

RBV =RIKEN Berkeley  
Visitor (1-3 months)  
RBF =RIKEN-Berkeley  
Fellow (1-3 years)

Haxton  
Lab.  
N3AS,  
UCB  
Phys.)

Zaletel  
Lab.  
(UCB  
Phys.)

Briceño  
Lab.  
(UCB  
Phys.)

Walker  
-Loud  
group  
(LBNL  
NSD)

Rrapaj  
group  
(LBNL  
NERSC)

Kasen  
Lab.  
(UCB  
Phys.)

Nomura  
Lab.  
(UCB  
BCTP)

Voiculescu  
Lab.  
(UCB  
Math.)

Doi Hatsuda Nagataki Kawahigashi



PI:

T. Hatsuda

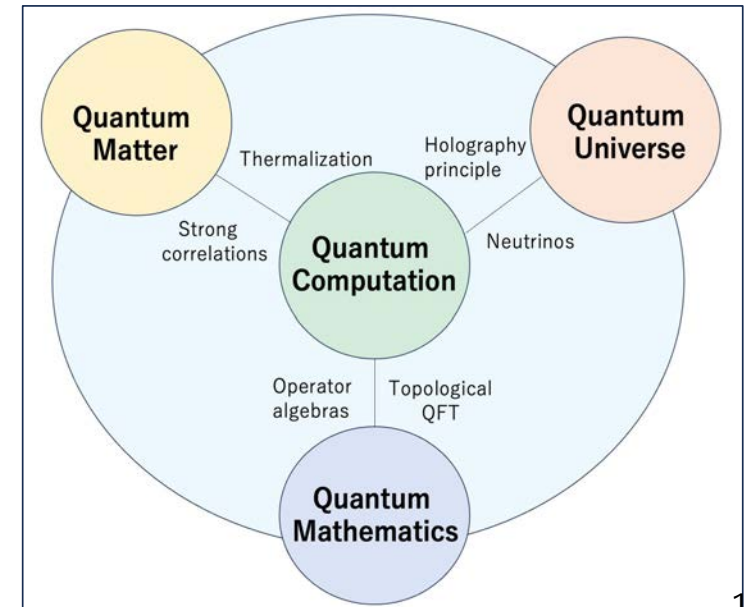
Co-PI:

W. Haxton



S. Aoki

Coordinator





## International Brain Circulation – current status -

### 1. **RIKEN-Berkeley Fellow** = long-term stay (**1-3 years in Berkeley**)

- Employed by RIKEN iTHEMS through international recruitment.
- Salaries are shared as **RIKEN : Berkeley = 2 : 1**.

#### **Past fellows:**

Jason Chang (2018/05/01-2021/11/14) → LinkedIn  
Yantau Wu (2021/06/01- 2024/08/31) → IoP, CAS, China  
Ermal Rrapaj (2022/11/01-2023/04/30) → NERSC, JBNL  
Maria Saez (2022/11/01-2024/05/31) → NSTRC, Argentina  
**Yuki Fujimoto** (2024/10/01-2025/06/30) → Niigata Univ., Japan



Jason



Yantau



Ermal



Maria



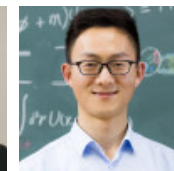
Yuki

#### **Current fellows:**

**Jan Schuette-Engel** (2023/07/01- )  
**Yan Lyu** (2024/03/01- )  
**Yuuka Kanakubo** (2024/10/01- )  
**Gabriele Di Ubaldo** (2024/10/01- )



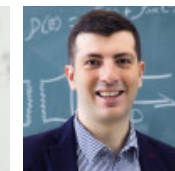
Jan



Yan



Yuuka



Gabriele

## 2. ASPIRE visiting Program: from RIKEN to Berkeley

--- Sending Junior Japanese postdocs and students (a few weeks – a month)

- 2023: 2 postdocs
- 2024: 4 postdocs, 2 students, 2 seniors
- 2025 (as of Aug.5): 6 postdocs, 2 students, 5 seniors

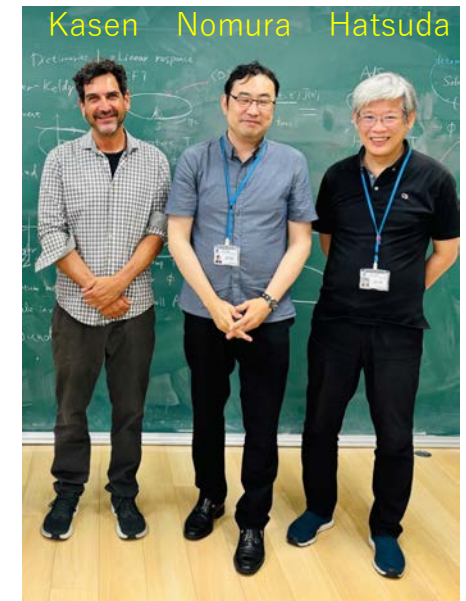
## 3. ASPIRE Invitation Program: from Berkeley to iTHEMS

### Seniors (\*co-PI) :

- |                                 |                                |
|---------------------------------|--------------------------------|
| • Gordon Baym (UIUC)            | 2024/2/10-3/21, 2025/3/2-31    |
| • Daniel Kasen (UCB)*           | 2025/1/1-6/30                  |
| • Baha Balantekin (WU, Madison) | 2024/6/16-6/21, 2025 July      |
| • Ermal Rrapaj (LBNL)*          | 2024/6/16-6/21, 2025/1/27-31   |
| • Yasunori Nomura(UCB)*         | 2024/6/24-8/20, 2025/6/25-8/15 |
| • Wick Haxton (UCB)*            | 2025 October                   |
| • Dan-Virgil Voiculescu (UCB)*  | 2025 December                  |

### Juniors:

- FY2024: 4 postdocs from the US team (short term)
- FY2025 (as of July 31): 3 postdocs from the US team (short term)





#### 4. ASPIRE RIKEN-Berkeley Workshop

- Mutual participation in the annual meetings of iTHEMS and N3AS

**2024:**

N3AS Annual Meeting (2024/6/1-2) at UC Berkeley  
8 members from iTHEMS participated



**2025:**

iTHEMS Annual Meeting (2025/7/24-25)  
at RIKEN Wako Campus  
4 members from N3AS participated



**2025:**

N3AS Annual Meeting (2025/8/4-5) at UC Berkeley  
10 members from iTHEMS are participating

- Joint workshops supported by ASPIRE



Joint N3AS-iTHEMS Meeting on Quantum Information Science in Multimessenger Astrophysics (2024/6/16-18) at RIKEN Wako

<https://ithems.riken.jp/ja/events/joint-n3as-ithems-meeting-on-quantum-information-science-in-multimessenger-astrophysics>



Theories of Astrophysical Big Bangs 2025 (2025/2/17-19) at RIKEN Wako

<https://ithems.riken.jp/en/news/theories-of-astrophysical-big-bangs-2025-on-february-17-2025>

RIKEN - LBNL Workshop on Quantum Information Science (2024/9/3-6) at LBNL

<https://ithems.riken.jp/en/news/riken-lbnl-workshop-on-quantum-information-science-on-september-3-6-2024>



From Quarks to Neutron Stars: Insights from kHz gravitational waves (2025/4/23-24) at U. Tokyo Hongo Campus

Co-hosted with ASPIRE program: "Japanese-Australian Gravitational Wave Collaboration"  
<https://ithems.riken.jp/en/news/from-quarks-to-neutron-stars-insights-from-khz-gravitational-waves-on-april-23-2025>





## N3AS Summer School

Multi-Messenger Astrophysics

2025 Summer School in Santa Cruz: **July 11-20, 2025**



3 students/postdoc  
from Japan supported by ASPIRE

## Multi-Particle Reactions

July 14 - August 1, 2025

Organized by Phys. Dep. UCB and LBNL  
(sponsored by ASPIRE Program)

## Summer School

July 14 -25, 2025

## Workshop

July 28 - August 1, 2025

2 senior researchers  
4 postdocs from Japan supported by ASPIRE

# Brain circulation across the Pacific

