

# ***First Circular***



The 2<sup>nd</sup> International symposium on  
**Clustering as a Window on the Hierarchical Structure  
of Quantum Systems**  
**--CLUSHIQ2022 (EMMI Workshop)--**

**Sendai, Japan, Oct 31- Nov 3, 2022**

The 2<sup>nd</sup> international symposium on Clustering as a Window on the Hierarchical Structure of Quantum Systems (CLUSHIQ2022) is held **in Sendai International Center in Sendai, Japan, from Oct 31 to Nov 3, 2022**. This is the second of this series following the successful meeting in Beppu, Japan, in January 2020. The symposium is held in a hybrid form with in-person and online participants (in-person participation is encouraged). The symposium is supported by the JSPS grant-in-aid for scientific research on innovative areas (Clustering as a Window on the Hierarchical Structure of Quantum Systems) and EMMI (The ExtreMe Matter Institute, GSI).

This symposium discusses why our material world has a hierarchical structure: quarks, hadrons, nuclei, atoms, and molecules. We focus on “clusters and strong correlations” in each hierarchy, which may provide keys to understanding the hierarchical structure universally. We also discuss characteristic features of correlations/clustering in each hierarchy. Participants are expected from a wide range of fields: hadron-, nuclear-, atomic- and molecular physics.

The scientific program will be devoted to the latest experimental and theoretical research and developments on quantum particles and clusters in each hierarchy and its interrelations, including the generality and universality through the hierarchies. The topics will thus include the following subjects:

1. Exotic hadrons using high-energy heavy-ion collisions,
2. Lattice QCD/ab-initio calculations
3. Exotic nuclei, alpha clusters, multi-neutron clusters, NN correlation
4. Three nucleon force, many-body force
5. Hyper nuclei, strangeness, hyperon-nucleon interactions
6. Ultracold atoms and exotic atomic/molecular states/phases, quantum simulation

## 7. Efimov physics, few-body physics.

The symposium comprises presentations by invited speakers (mostly in-person participation confirmed) and contributed poster presentations with a 5-min oral presentation each.

### Invited Speakers:

Jurgen Schukraft (CERN, Switzerland)

Laura Fabbietti (Technische Universität München, Germany)

Craig Roberts (Nanjing University, China)

Hartmut Schmieden (Universität Bonn, Germany)

Nir Barnea\* (The Hebrew University of Jerusalem, Israel)

Maytal Duer (Technische Universität Darmstadt, Germany)

Evgeny Epelbaum (Ruhr-Universität Bochum, Germany)

Doerte Blume (University of Oklahoma, US)

Niels Kjærgaard (University of Otago, New Zealand)

Ana P. Majtey (National University of Cordoba, Argentina)

Sonia Bacca (University of Mainz, Germany)

Marek Karliner (Tel Aviv University, Israel)

Joachim Maruhn (Goethe Universität Frankfurt, Germany)

Dmitry S. Petrov (Université Paris-Saclay, CNRS, LPTMS, France)

(\* To be confirmed)

### Venue:

The symposium is held at **Sendai International Center in Sendai**, Japan.

<http://www.aobayama.jp/english/>

The city of Sendai plays the role of the capital in the north-eastern region of Honshu Island of Japan (Tohoku Region), with about one million inhabitants. It has also been the cultural center of this region since 1600 when Date Masamune, the Great Lord of this region at that time, built Sendai Castle (Aoba castle) and the city. Although the city was once destroyed in WW II, one can find some remains from such era, such as the Aoba Castle site, Osaki-Hachimangu Shrine, Rinnoji Temple, and Zuihoden. It is a very scenic city full of green along the main streets, Hirose River, and the mountains on the city's west side. One can find Sendai is a very vibrant and convenient city, with nice shopping areas with numerous small shops along the arcade streets, shopping centers, hotels, and nice restaurants. One can move around the city using the two major subway lines crossing at the Sendai Station. The main campus of Tohoku University is also on the

subway line. The city boasts of a gourmet city as Sendai is famous for beef tongue dishes and seafood, the latter owing to the location of Sendai close to a number of fishing hubs (Ishinomaki, Kesenuma, etc.) for fishing ships from the Pacific Ocean. From the city, only a one-hour train- or bus ride, one can go to one of the most scenic places in Japan, “Matsushima”, along the Pacific Coast (Matsushima is one of the Three Scenic Views in Japan: Others are Miyajima near Hiroshima city and Amano-Hashidate in the north of Kyoto). One can also go to one of the nice onsens (Japanese hot-spring baths) from Sendai within one-hour. One can find more information about Sendai city in

<https://www.japan-guide.com/e/e5150.html>

<https://discoversendai.travel/>

<https://www.city.sendai.jp/koryu/foreignlanguage/en/sendai/history.html>

The city of Sendai is conveniently located, about a 1.5-hour bullet train ride from Tokyo. The participants from abroad are recommended to fly into Tokyo Haneda or Tokyo Narita airport, move to Tokyo Station, and take a bullet train (Shinkansen) to Sendai.

From Haneda: Haneda Airport (Monorail, ~20 min)→Hamamatsucho-(JR Yamanote or Keihin-Tohoku Line (~5min) →Tokyo-(JR Tohoku Shinkansen: Bullet train 1.5-2 hours)→Sendai

From Narita: Narita Airport-(JR Narita Express ~ 1 hour)→Tokyo-(JR Tohoku Shinkansen: Bullet train 1.5-2 hours)→Sendai

\*Shinkansen(Tokyo←→Sendai): Hayabusa/Komachi: 1.5hours, Yamabiko: 2 hours

From Sendai Station to Sendai International Center, it takes about 5 min by Subway Tozai-Line (T07: Sendai→T04: International Center) (~15min including walks).

[https://www.kotsu.city.sendai.jp/images/sbway/route\\_map.pdf](https://www.kotsu.city.sendai.jp/images/sbway/route_map.pdf)

#### **Local Organizers:**

The conference is organized by the board members of the project “Clustering as a Window on the Hierarchical Structure of Quantum Systems” (JSPS grant-in-aid for scientific research on innovative areas):

Takashi Nakamura (Chair, Tokyo Institute of Technology)

Kenta Shigaki (Hiroshima University)

Hiroaki Ohnishi (ELPH, Tohoku University)

Hirokazu Tamura (Tohoku University)

Yoshiro Takahashi (Kyoto University)

Munekazu Horikoshi (Osaka Metropolitan University)

Emiko Hiyama (Tohoku University)  
Kimiko Sekiguchi (Tokyo Institute of Technology)  
Yosuke Kondo (Tokyo Institute of Technology)  
Toshiyuki Takahashi (KEK)  
Atsushi Hosaka (RCNP, Osaka)

**Registration:**

Registration will open soon, sometime in July. The registration deadline is **Sep. 30**, but if you wish to give a poster presentation with a 5min talk, and/or to ask for financial support, please register yourself by **Sep. 5**.

**Important Dates:**

**Deadline for Registration: Sep.30**

**Deadline of Submission of abstract: Sep.5**

**Deadline of financial support request: Sep.5**

(If you wish to give a poster presentation with a 5min talk and/or to ask for financial support, please register yourself by Sep.5.)

**Further information will be given at**

<http://be.nucl.ap.titech.ac.jp/cluster/symposium/334/>

**Contact: clushiq2022-contact@mail.nucl.ap.titech.ac.jp**