Postdoctoral Positions in Computational Quantum Many-body Physics and Materials Science in Saitama, Japan

Research topics

Several postdoctoral positions are available in computational quantum many-body physics and/or materials science at Saitama University in Japan. The successful candidate will work on the following research projects:

- **Project 1: Grant-in-Aid for Transformative Research Areas B "Computational materials science based on quantum-classical hybrid algorithms" (Head PI: Prof. Shinaoka, FY2023-2025)**
  Prof. Shinaoka is leading this project, which comprises three research groups: A01, A02, and A03. The focus of research group A01, led by Prof. Shinaoka himself, is on developing and applying first-principles methods for strongly correlated materials. Collaborators in the A01 group include Ryosuke Akashi (QST), Atsushi Hariki (Osaka Metropolitan University), Motoharu Kitatani (Hyogo Prefectural University), and Takashi Miyake (AIST).

  Research groups A02 and A03 are led by Prof. Tsuyoshi Okubo (Univ. Tokyo) and Prof. Wataru Mizukami (Osaka Univ.), respectively. Overall, this project will provide many opportunities for collaboration on various topics (ranging from many-body physics to quantum information) within Japan.
- **Project 2: JST FOREST program "Development of first-principles methods based on quantum embedding theories at the two-particle level" (PI: Prof. Shinaoka, Basically 7 years from FY2024)**
  This project focuses on developing first-principles methods based on extensions of the dynamical mean-field theory to non-local correlations. Close collaborations with research groups at TU Wien are expected.

The successful candidate could choose their research theme based on their interests. Some examples of potential research themes are:

- Quantum tensor train approach to quantum field theory (SciPost Phys. Lect. Notes 63 (2022); PRX 13, 021015 (2023); arXiv:2303.11819v1)
- First-principles calculations of superconductivity in high-pressure hydrides (PRL 117, 075503(2016); PRB 105, 104510(2022))
- First-principles calculations of X-ray spectroscopy based on dynamic mean-field theory (PRX 11, 041009 (2021); PRX 12, 011017 (2022); PRX 13, 011012 (2023))
- Theoretical extension and application of dynamic mean-field theory for non-local correlation effects (PRL 130, 166002 (2023))

Applicants are also welcome to propose their research themes. Necessary expertise will be provided as needed, and we welcome applications from researchers in other fields. These grants will cover international business traveling expenses (international conferences, etc.). There are no teaching responsibilities.

Collaboration

Prof. Shianoka and group members in Project 1 have many ongoing collaborations in Japan and internationally. We will provide opportunities for domestic and international collaborations. The location also provides easy access to RIKEN and the campuses of the University of Tokyo, further enhancing opportunities for collaboration and professional development.

Location

Department of Physics, Saitama University (255 Shimo-Okubo, Sakura-ku, Saitama City, Saitama Prefecture 338-8570, Japan). Direct bus access is available from the nearest train stations (Kita-Urawa, Minami-Yono, and Asakadai stations). It takes approximately 40 minutes from Kita-Urawa station to Tokyo station by local train.

Contract Period

Until March 31, 2027. However, contract renewals will be conducted annually at the end of each fiscal year (end of March), and may not be renewed depending on work performance. Employment may be extended beyond April 2027, depending on budget, progress, and performance.

Starting Date

The starting date is tentatively set for April 1st, 2024, but it is negotiable depending on the candidate's availability.

Eligibility

Applicants must have a Ph.D. (or expect to obtain one by the starting date) and not hold another job.

Salary and Benefits

Salary will be provided daily according to experience and abilities, following Saitama University regulations. For example, the starting salary for a recent Ph.D. graduate would be approximately 4.8 million JPY. In comparison, someone with six years of experience would receive around 5.3 million JPY (including bonuses in June and December). Insurance, commuting allowance (up to 55,000 JPY/month), dependent allowance, and housing allowance (up to 28,000 JPY/month) will be provided. In the second year, the bonus in June will be fully paid and thus will be increased by approximately 500,000 JPY. Insurance, commuting allowance (up to 55,000 JPY/month), dependent allowance, and housing allowance (up to 28,000 JPY/month) will be provided.

Application Deadline

January 31, 2024. The selection process will start on June 1, 2023, and the position will be closed as soon as a suitable candidate is found.

Application Documents

Please submit your CV, list of publications, a summary of research achievements, and contact information for two references to the e-mail address below.

Selection Process

Candidates will be selected based on their application documents and an interview (remote interviews are possible for applicants living far away).

Contact

Hiroshi Shinaoka, Associate Professor at Department of Physics, Saitama University, 255 Shimo-Okubo, Sakura-ku, Saitama City, Saitama Prefecture 338-8570, Japan.
Email: **shinaoka@mail.saitama-u.ac.jp**