Open Postdoctoral Researcher Positions

at Department of Applied Physics, The University of Tokyo,
or Institute for Science and Engineering, Waseda University
in Tokyo, Japan

[Position summary]

Applications are invited for postdoctoral researcher positions at Department of Applied Physics, the University of Tokyo, or Research Institute for Science and Engineering, Waseda University. The postdoctoral researchers will conduct research on **mechanism of strongly correlated superconductivity and nature of strongly-correlated topological materials by taking advantage of large-scale parallel computers with *ab-initio* electronic structure approaches and/or data-driven approaches based on spectroscopic data provided by collaborations with experimentalists.**

[Location of institution]

Hongo campus of the University of Tokyo or Nishi-Waseda campus of Waseda University, Tokyo, Japan

[Term]

One year with possibility of extension after review up to March 2023

[Expected start date]

From April 1st, 2020 or later

[Required qualification]

Ph. D. in a relevant field such as condensed matter theory, and computational physics

[Job/Project description]

[1] Research on mechanisms of high-temperature superconductivity, theoretical search for quantum spin liquid phases in topological materials and/or studies on nature of fractional excitations in strongly

correlated electron systems. Studies are directed to reveal universality and material-dependent properties by *ab-initio* exhaustive studies on diverse compounds supplemented by thorough parameter search to cultivate and control functionalities.

or

[2] Research on mechanisms of superconductivity and topological properties through reliable inference of experimentally hidden properties by utilizing cutting-edge experimental spectroscopic data.

Depending on research interest of applicants, the following subjects are provided:

(1) Comprehensive analyses on *ab initio* effective Hamiltonians of strongly correlated materials to clarify fundamentals and nature of high-temperature superconductors and/or topological matter by high-accuracy numerical methods (optionally updates, developments and tuning of open-source software HΦ, mVMC, RESPACK and other software to realize large-scale and efficient parallel computation developed by *ab initio* calculation methods.)

(2) Combining machine learning and/or data-driven methods with the above *ab initio* studies, studies to extract hidden physical quantities such as self-energy and spectral properties of fractional excitations from spectroscopic experimental data.

In this project, ample large-scale parallel computer resource is available. Tight collaborations with expert experimentalists on strongly correlated electron systems for the spectroscopic methods (such as angle-resolved photoemission, scanning tunnel microscope, and resonant inelastic X-ray scattering) are scheduled. Target materials are copper-oxide, iron-based, and other unconventional high-T_c superconductors, and topological materials such as iridium oxides and ruthenium halides.

Applicants who are strongly motivated to work on one or several of the above diverse physical subjects or methodologies are highly welcome.

[Required application materials]

1. Curriculum vitae with photo and email address
2. Summary of research achievement (around two pages, letter size)
3. Publication list and list of invited talks
4. Name(s), affiliation(s), and email address(es) of one or more person(s) who may provide a reference letter
5. Research interests and plan of *ab-initio* or machine-learning approaches for strongly correlated electron systems (around one page, letter size)

[Application details]

The open position will be closed when it is filled. All applicants are encouraged to apply in the earliest convenience. Successful applicants will be contacted for a job interview after a screening process.

Submit the application with all the required materials via email. The materials should be converted into pdf format (hopefully in a single pdf file) whose size should be less than 10MB in total, in which the materials should be arranged in order from 1. to 5.

Inquiry and application to;

yamaji@ap.t.u-tokyo.ac.jp (Youhei Yamaji, Department of Applied Physics, University of Tokyo)

or

imada@aoni.waseda.jp (Masatoshi Imada, Research Institute for Science and Engineering, Waseda University)