

Opportunity Title: Fusion and Plasma Physics - Postmasters Research Associate

Opportunity Reference Code: ORNL15-31-FMNSD

Organization Oak Ridge National Laboratory (ORNL)

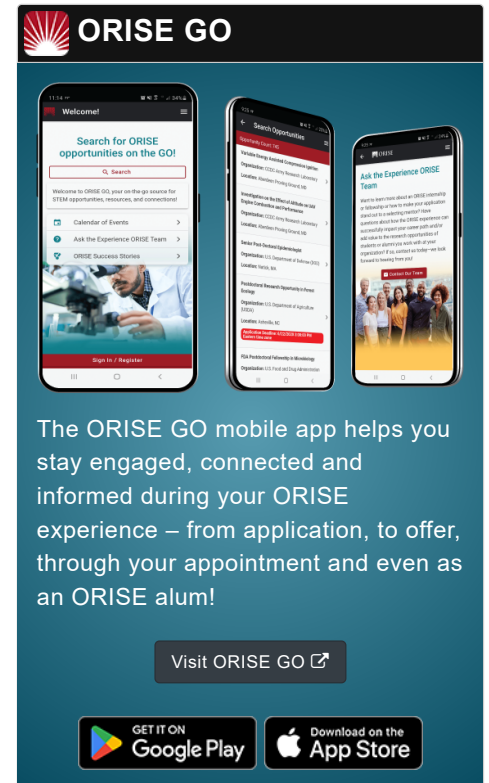
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Description This Fusion and Plasma Physics Master's Student will assist in research to improve the predictive capability of the onset condition of tearing modes in high beta steady-state discharges in tokamaks. When operating at high beta, in general above the no-wall MHD limit, tearing modes become a challenge, and $n = 1$ instabilities of this type usually appear below the ideal with-wall limit, limiting the duration and the performance of the plasmas. Predictive capability to avoid the tearing mode instability is crucial to realizing high beta steady-state scenarios for ITER, FNSF and DEMO. The MS Research topic will be to develop a MRE (Modified Rutherford Equation) solver that reproduces the tearing mode width for DIII-D Advanced Tokamak discharges reasonably well in a range of discharge conditions. The MRE solver coupled to the Integrated Plasma Simulator (IPS) will be extended by more comprehensive non-linear MHD modeling, such as: NIMROD and BOUT++ to guide the development of ITER steady-state scenarios on DIII-D. The Master's student will take key responsibilities of implementing, testing, and managing a set of MHD stability components in the IPS integrated modeling, including the MRE solver, TAEFL, NIMROD and BOUT++. This work will form the basis of the PhD research thesis project. Collaboration with the KSTAR team based on on-going involvement in the KSTAR program will also expand the user basis of the IPS integrated modeling tool. Validation of the IPS against both DIII-D and KSTAR experiments will play an essential role in developing the IPS integrated modeling tool.

Worksite location will be in San Diego, CA with the ORNL group located at General Atomics.

Qualifications Student will need a working knowledge of basic plasma physics as related to fusion energy research. Student will need a working knowledge of tearing modes in high beta steady-state discharges in tokamaks and some familiarity with large plasma simulation codes for tokamaks, such as: NIMROD and BOUT++. Student will need to be well versed in basic plasma physics, as well as familiar with writing and modifying large scale computer codes. A background in applied mathematics and large scale computing will be necessary.

This appointment is offered through the ORNL Postgraduate Research Associates Program and is administered by ORAU through the Oak Ridge Institute for Science and Education (ORISE). The program is open to all qualified U.S. and non-U.S. citizens without regard to race, color, age, religion, sex, national origin, physical or mental disability, or status as a Vietnam-era

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Associate

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veteran or disabled veteran

**Eligibility
Requirements**

- **Degree:** Master's Degree received within the last 60 month(s).
- **Academic Level(s):** Post-Master's.
- **Discipline(s):**
 - **Computer, Information, and Data Sciences** (1 )
 - **Mathematics and Statistics** (1 )
 - **Physics** (1 )

Affirmation

I certify that I have completed coursework towards a degree in science, technology, engineering, mathematics, or a related field.

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