The Cosmology and High-energy Astrophysics Section at the Leibniz Institute for Astrophysics Potsdam (AIP) invites applications for a Doctoral student position for a project on exploring the plasma physics of cosmic ray streaming and diffusion.

Overview

The project aims at studying a diverse set of problems associated with the plasma physics of cosmic-ray transport in galaxies. The PhD project aims at finalizing a combined fluid-particle-in-cell code for studying the physics of the cosmic ray streaming instability in the linear and non-linear regime. Using this code, the PhD student will run simulations with the goal of improving our understanding on how the instability saturates and study the impact of inhomogeneities on its growth rate and the cosmic ray scattering rate. The final goal of this work is to derive effective cosmic ray transport coefficients that improve CR hydrodynamics descriptions in cosmological simulations of galaxy formation.

The AIP is located in the beautiful Potsdam/Babelsberg area, at the southwestern border of the Berlin metropolitan region. About 130 scientists at AIP work on a variety of topics in astrophysics spanning from solar physics to cosmology, as well as on the development of new computational algorithms, technologies and instrumentation for astronomical spectroscopy and ground-based telescopes.

Your tasks

- Finalize the combined fluid-particle-in-cell code for plasma physical simulations
- Verify the code implementations with analytical solutions and full particle-in-cell simulations
- Improve existing algorithms for accuracy and efficiency
- Carry out state-of-the-art calculations of the cosmic ray streaming instability to study the growth phase, the saturation regime, and the impact of inhomogeneities
- Analyse simulations and develop conceptually transparent models of effective cosmic ray transport coefficients for hydrodynamical cosmic ray models, potentially with the aid of information-theoretical approaches

Your profile

- Master degree in Physics or Astrophysics
- Thorough background in Astrophysics, Physics and Computational Methods
- Very good to excellent programming skills (e.g. C/C++ and Python)
- Hands-on knowledge of plasma particle-in-cell simulations and excellent knowledge of plasma physics
- Experience in information field theory methods are of advantage
- Self-motivation, creativity, flexibility and the ability to work alone and in a team are highly appreciated
Conditions

The AIP is an equal opportunity employer and particularly encourages women to apply. It values diversity. The appointment is part-time for the duration of 48 months and planned to start by September 1, 2020. Salary and social benefits are calculated based on the German public service scale (TV–L).

To apply, please send a single PDF (up to 10 MB), with your Curriculum Vitae (including publication list), cover letter, your bachelor and (preliminary) master certificate that includes your grades, a list of references (2 or more) and statements on education and skills to cpfrommer@aip.de. For questions on the offered position please contact Prof. Dr. Pfrommer at the address below. Review of applications will continue until the position is filled.

Contact

Prof. Dr. Christoph Pfrommer
email: cpfrommer@aip.de
Leibniz–Institut für Astrophysik Potsdam (AIP)
Cosmology and High-energy Astrophysics Section
An der Sternwarte 16
14482 Potsdam
www.aip.de