

Título: The search for Dark matter candidates using the skipper CCDs: instrumental and phenomenological aspects

Centro: Instituto de Física de Cantabria (CSIC-UC)

Tipo: Predoctoral

Descripción:

The Experimental High Energy Physics and Instrumentation group at the Instituto de Física de Cantabria (IFCA, Santander, Spain) invites applications for one PhD position starting in 2024 in the Dark Matter group.

The Dark Matter group develops instruments with exquisite sensitivity and background rejection capabilities for dark matter and neutrino experiments. The group works with low-threshold, single-quanta skipper CCDs to directly detect dark matter. With the start of construction in 2024, our main focus is DAMIC-M, which will observe light-dark matter-electron scattering for the first time or set world-leading limits in the sub-GeV mass regime. In parallel, we will also be involved in sensor R&D for the larger, lower background OSCURA experiment to be constructed in 2028 at SNOLAB. There are opportunities for PhD fellows to lead various efforts within the projects, including CCD testing, underground detector construction, calibration studies, and physics analyses. The Experimental Particle Physics Group also has close connections with the Observational Cosmology group and the successful candidate will be encouraged to explore topics in Dark Matter phenomenology.

The main objective of the thesis would be The search for Dark matter candidates using the skipper CCDs: instrumental and phenomenological aspects. The task of the PhD student will be to set up image reconstruction algorithms of the raw data from the DAMIC-M detector, background studies and commissioning of skipper CCD detectors. At the same time, Monte Carlo simulations of some of the most prominent backgrounds (neutron, muon, etc.) must be cross-checked and consolidate the results obtained from real data. The candidate will also explore topics in Dark Matter phenomenology in collaboration with the Cosmology group. They will participate in the detector tasks that the group is involved in, such as software and data management. Short stays at other institutions from the collaboration will be highly recommended (University of Chicago, University of Washington, Modane Underground Laboratory, CERN, Fermilab, etc.).

We welcome highly motivated applicants with a solid astroparticle physics background and good computing skills.

Requirements: A master's Degree in Physics or similar. A motivated candidate with interests in both experimental and phenomenological physics. The candidates need to be active on the CSIC job bank.

Program call announcement: BOE-A-2022-15162: JAPRE 2023.

Funding Body: JAE-PRE grant via CSIC.

Starting Date: September 1, 2024 (It can be discussed).

PhD Directors: Dr. Núria Castelló-Mor (castello@ifca.unican.es) - Dr. Bradley Kavanagh (kavanagh@ifca.unican.es).

País: España