

225-PRECIE-PDI22

Predocctoral position in Experimental Particle Physics at CIEMAT (Madrid)

Direct search for dark matter with liquid argon detectors

The CIEMAT-Física de Partículas (CIEMAT-FP) Unit hosts a **new predocctoral position for an outstanding young MSc graduate interested in working in the CIEMAT-FP group collaborating in the DEAP-3600 and Darkside-20k experiments towards a PhD Thesis.**

The dark matter research group of CIEMAT's High Energy Experimental Physics Division plays a leading role in the direct search for WIMPs, one of the frontiers of modern physics. Our group is involved in the analysis of the DEAP-3600 experiment at SNOLAB in Canada, developing advanced software algorithms for physics analysis based on machine learning techniques. At the same time, our group is deeply involved in designing and constructing the DarkSide-20k detector at the LNGS laboratory in Italy. This experiment will be the most sensitive for direct detection of dark matter in operation during the next decade. We play leading roles in several software and hardware activities such as Monte Carlo simulation, background calculation, and detector construction.

Within the scope of the DarkSide-20k experiment, the group is leading the construction of the DArT detector in the Canfranc underground laboratory (Laboratorio Subterráneo de Canfranc), whose goal is to measure the radioactive contamination of argon extracted from underground sources. This project will allow the intrinsic background of DarkSide-20k to be reduced by many orders of magnitude, improving the experiment's sensitivity.

The Ph.D. student is expected to work in analyzing physics data, acquiring essential knowledge in background calculation/rejection and rare-events research experiments in general. The proposed activity, carried out under the supervision of the CIEMAT Dark Matter group, will include the contribution to the R&D carried out by the group in the development of new technologies for the future generation of argon detectors.

The research plan foresees working along four main topics:

- Data analysis of the DEAP-3600 experiment with machine learning techniques.
- Radiopurity measurement of DarkSide-20k detector materials and calculation of the experiment background.
- Measurement of the radiopurity of the underground argon in LSC with the DArT experiment.
- Construction of a scintillation wavelength sensitive particle detector with argon

The student will be involved both in data analysis activities with advanced machine learning techniques and in the construction and test in our laboratory of new particle detectors based on liquefied noble gas technology. He/she will be invited to present the results of his/her research in the DEAP-3600 and DarkSide collaboration meetings and at international conferences. Attendance to topical schools and specialized workshops is also foreseen. It is expected that he/she will contribute to the writing of the scientific papers documenting the research results to be published in high-impact journals.

For any further questions, please contact Roberto Santorelli (Roberto.Santorelli@ciemat.es)

The CIEMAT Particle Physics Unit is an affirmative action/equal opportunity employer. Eliminating gender inequalities by promoting equal opportunities for men and women is a core compromise of our group and it is our commitment to establish the necessary actions to close the gender gap.