Laboratório de Instrumentação e Física Experimental de Partículas

Optical Studies for Performance and Optimization of DUNE and the LZ Dark Matter Detector

This R&D work focus in the study and measurement of the optical properties of materials used in the different particle physics detectors such as the LUX-ZEPLIN (LZ) dark matter experiment or the Deep Underground Neutrino Experiment (DUNE). In the case of dark matter experiments, the energy deposited by a hypothetical dark matter particle is usually very low (<10 keV), requiring detectors with very low energy thresholds. To achieve this, we need to understand very well the optical properties of the detector medium and the respective surrounding surfaces to be able to select the best possible materials and describe with accuracy the light collection in the detector. This includes properties such as the reflectance of the inner surfaces, roughness which affects the reflectance, absorption, scattering length, fluorescence, etc. The successful candidate will measure some of these properties, playing a leading role in the current R&D experimental work in the LIP-Coimbra laboratory.
The work is part of the project funded by the Portuguese Foundation for Science and Technology (FCT). The candidate will be part of a team of experimentalists in the LZ experiment dedicated to several aspects of R&D, data analysis, experiment monitoring and control. The Portuguese team associated to this project has a long and strong record of involvement in DM experiments and R&D in liquid xenon detectors.

The conditions are the following:
1. Main Research Area: Physics
2. Specific Research Area: Experimental Particle Physics

3. Number of fellowships: 1

4. Profile: The applicant should have a recent PhD degree in physics, physics engineering or a related field. The candidate should have experience in programming and good command of English language, both oral and written. Experience with optical instrumentation, cryogenic systems, simulation tools such as GEANT4 and data analysis will be advantageous (but not mandatory). Preferential factor is a relevant curriculum in experimental physics.

5. Place of Work: LIP Coimbra, Department of Physics of the University of Coimbra, Rua Larga, Coimbra, Portugal.

6. Duration: 12 months, starting in **1 September 2019**, following the regulations of the FCT https://www.fct.pt/apoios/bolsas/docs/RegulationFellowships.pdf and the internal LIP rules for fellowships. The candidate will be strongly encouraged and supported to apply for a longer term funding during this period.

7. Scientific Supervision: Doctor Cláudio Silva, LIP, Department of Physics of the University of Coimbra, Portugal.

8. Selection and Attribution Criteria: Short-listed candidates will be invited for an interview, which may be conducted by video-conference. The selection criteria will be: candidate's *curriculum vitae*, its relevance to the needs of the research project and the recommendation letters (55%), and interview (45%). LIP reserves the right to not fill the vacancy open in the present call if no suitable candidate is found.

9. Salary: The salary will follow the reference table for FCT fellowships within Portugal. This can be found at https://www.fct.pt/apoios/bolsas/valores.phtml.en.

10. Formalization of Application: Applications must be formalized, necessarily, by submitting the following documents: *curriculum vitae*, a one-page statement of research interests, copy of the PhD certificate and other documents the candidate may consider relevant to his/her application, from **July 10th until August 10th 2019 at 17:30,** to the email claudio@coimbra.lip.pt (c.c. bolsas@coimbra.lip.pt). **Candidates should arrange for at least one letter of recommendation to be sent directly to claudio@coimbra.lip.pt.**

11. Selection Panel: Doctor Cláudio Silva (LIP), Professor José Pinto da Cunha (LIP), Doctor Francisco Neves (LIP).

12. Legislation: A fellowship contract will be celebrated according to the “Regulations for Research Grants of the Foundation for Science and Technology” in force, (https://www.fct.pt/apoios/bolsas/docs/RegulationFellowships.pdf) and to the LIP Grant regulations approved by FCT, and to the Status of Scientific Research Fellow (Law no 40/2004 of 18 of August, and its successive amendments)