

Job description:

We are looking for a postdoctoral researcher to work on the LUXE experiment at DESY-EuXFEL starting November 2023. The position will be based in Valencia. The successful candidate will join the AITANA group and take a leading role in the calorimetry R&D and detector production/commissioning for the high granular electromagnetic positron calorimeter of the LUXE. In addition, simulation studies for performance and optimization of the detectors will be performed. The candidate will also take part on the physics studies and preparation of the data taking of the LUXE experiment.

The IFIC AITANA group

The AITANA group at IFIC (UV/CSIC) in Valencia is active in the ATLAS and MoEDAL experiments at the CERN Large Hadron Collider, in the development of accelerator and detector technology for a future electron-positron Higgs factory and the LUXE experiments and in axion searches with RADES. The ATLAS analyses focus on searches for new physics, especially supersymmetry, and top quark precision measurements. The group is deeply involved in prospect studies for future colliders in the same areas. Detector R&D on highly granular calorimetry is performed within the CALICE collaboration and integrated pixel sensors are being developed within the AIDAInnova project. Accelerator R&D aims at the development of high-gradient RF cavities and beam instrumentation, both within the ILC and CLIC projects and for medical applications.

More information about the group is available on the webpage:

<https://aitanatop.ific.uv.es/aitanatop/>

LUXE

The AITANA group joined the LUXE (Laser Und XFEL Experiment) in 2022.

LUXE [1] is a new experiment proposed at [DESY](#) and the European XFEL to study Quantum Electrodynamics (QED) in the strong-field regime where QED becomes non-perturbative.

Already in the 1930s Heisenberg and Sauter realized that perturbative approaches lose validity if an electron enters an electric field, strong enough to accelerate an electron to an energy comparable to its rest energy over the distance of the (reduced) electron Compton wavelength. One then enters the strong-field regime of QED and novel phenomena occur. Among these are the production of electron-positron pairs by field-induced tunneling out of the vacuum, signalling the onset of strong non-linearities in the optical properties of the vacuum. The field strength in question is called the Schwinger field and has a value of 1.3×10^{18} V/m, and corresponds to the work needed to create a particle pair over a Compton wavelength, with pair production being exponentially suppressed at lower field strengths.

The goal of LUXE is to reach the Schwinger field by using a high energy electron beam (from the European XFEL, with $E=16.5$ GeV) and a high-power laser, and to study then the interactions of the high energy electrons or photons with the laser photons. In particular, in photon-laser interactions it is expected that pairs of matter and antimatter will be produced and their rate will increase with laser intensity. Measuring the dependence of the rate on laser intensity is a primary goal of LUXE.

LUXE also offers new opportunities to directly search for new particles from physics beyond the Standard Model (BSM). The Compton process yields a very high flux of high-energy photons which can mix with BSM particles in the mass range between about 10 MeV and 1 GeV. LUXE can also serve as a sensitive beam-dump experiment to search for such BSM particles when placing a

detector a few meters behind the photon beam dump. Furthermore, new particles could be produced directly in the beam-laser interactions

[1] <https://luxe.desy.de/>

Requirements

Candidates are expected to hold or are about to obtain a doctorate in experimental particle physics to be considered for this position. We are looking for ambitious candidates, interested in developing his/her research together with the PhD students, other postdoctoral researchers and senior staff members of the group. Experience in detector instrumentation and data analysis is expected, but candidates are encouraged to explore new directions beyond their immediate background. The candidate needs to possess excellent English communication skills, while Spanish or Valencian are appreciated, but not required.

Applications

Interested candidates should send their up-to-date CV, including a summary of their PhD research and subsequent research experience, and should arrange for up to three letters of reference to be sent to Dr. Adrián Irles. Inquiries can be directed to Dr. Adrián Irles (adrian.irles@ific.uv.es). Selected candidates will be contacted for an online follow-up interview. **The position will remain open until filled.**

Contact:

- Dr. Adrián Irles (adrian.irles@ific.uv.es).

Letters of Reference should be sent to:

- adrian.irles@ific.uv.es

More Information:

- <https://aitanatop.ific.uv.es/aitanatop/>