

September 30, 2022, Prague

The Institute of Experimental and Applied Physics, CTU in Prague, Husova 240/5 110 00 Praha 1, announces the job vacancy:

**Post-doc researcher for project: Measurement of anomalies in angular correlation of electron and positron internally produced in excited  $8\text{Be}$  and  $4\text{He}$**

Workplace: CTU in Prague, Institute of Experimental and Applied Physics

Work period: 18 months

Employment type: Full-time

Expected starting date for the position: 10 /2022

Salary based on conditions of the call (~ 62 000 CZK/month).

**Responsibilities:**

- Theoretical prediction for the distribution of the angle between electrons and positrons originating in internal pair creations is a monotonic featureless decrease with the opening angle. Recent studies on excited Theoretical prediction for the distribution of the angle between electrons and positrons originating in internal pair creations is a monotonic featureless decrease with the opening angle. Recent studies on excited states of  $8\text{Be}$  and  $4\text{He}$  nuclei, made in ATOMKI, Hungary, however, revealed deviations from this expectation. If true, such a result may have a fundamental impact: the anomaly can be explained by introducing a new short-lived neutral boson that can still fit into known experimental and

theoretical constraints. Although serious work has been done on the theoretical side, an independent laboratory has not yet verified these results. However, relevant experiments are currently being prepared worldwide, now including the Institute of Experimental and Applied Physics (IEAP). A construction is ongoing of a suitable Time-Projection-Chamber-based (TPC) spectrometer for light charged particles, utilizing magnetic field as a means for energy measurement, and supplemented by a Multiwire Proportional Chambers (MWPC) and Timepix3 pixel detectors to reach unprecedented spatial and angular resolution. The goal is to either confirm or refute the above-mentioned anomaly. The detector development and testing takes place within our Van-de-Graaff accelerator facility.

- An important part of this research project is the Monte Carlo simulation of the experiment, which can further improve the understanding of the experimental system, namely its limits and possible artifacts, and provide better insight on the necessary steps of data reconstruction. The aim of the research position will be to perform needed simulations of the  $e^+e^-$  pairs creation, possible X17-particle creation, and how the experimental system will record the events. The simulations will be based on a framework developed for this experiment. The selected candidate will use the framework, analyze its data and further develop the existing tools.

**Requirements:**

- The candidate should be familiar with Monte Carlo simulation tools, such as GEANT4 and/or similar.

Good collaboration skills will be valued, as he will work in close interaction with theoretical, experimental and instrumentation physicists.

**Mandatory documents:**

- Application
- Professional CV with a reference to publishing activities in English/Czech
- Copies of diplomas
- Documents proving activities outside of CZE for at least 2 years in the past 3 years or studying of Ph.D. (can be listed in the CV)
- Brief description of the candidate proposed research work, justification of its necessity and benefits for the candidate and the IEAP CTU workplace. □ Consent to the processing of personal data for the purpose of this tender.

**Contact:**

The application and listed mandatory documents can be sent till **31.10.2022** to the email address [martina.vanisova@utef.cvut.cz](mailto:martina.vanisova@utef.cvut.cz).