European Research Council
Established by the European Commission

Istituto Nazionale di Fisica Nucleare

Research Fellowship - POKER ERC project

INFN announces the opportunity for a two-years research fellowship in the context of the "POsitron resonant annihilation into darK mattER (POKER)" project. The fellowship is funded by the European Research Council (ERC) Starting Grant "POKER" under the European Union's Horizon 2020 research and innovation programme.

The goal of the project is to perform a new measurement at CERN to search for dark matter, by running a missing-energy experiment at the H4 beamline with a high-energy (100 GeV) positron beam. POKER will work in close contact with the NA64 collaboration at CERN, currently performing a complementary experimental program at the same facility using an electron beam. In particular, POKER is expected to make use of the existing NA64 beam tagging and hadron calorimeter system, while developing a new optimized active target with improved energy resolution.

In order to enhance the discovery potential of the experiment, POKER aims to replace the current electronic boards used to acquire signals from the NA64 detector with faster boards, capable of sustaining a larger date rate. This would allow to increase the intensity of the beam impinging on the detector, and thus the possible number of detected signals. As starting point for this R&D activity, we plan to use the "Waveboard" digitizer, a 12 channels, 250-MHz, 14 bits FADC digitizer recently developed by INFN-Rome and INFN-Genova[1]. The board is controlled by a Zynq SOC, embedding a Kintex-7 FPGA and a dual-core ARM CPU, that interfaces with the ADCs. A distinct M4 ARM processor controls all the other peripherals (DACs, HV regulators, PLLs) and communicates with the Zynq through UART.

The research fellow will be involved in the design of the new firmware of the board, according to the requirements dictated by the already-existing data acquisition system (DAQ) of the NA64 experiment. In particular, the current version of the firmware, developed for a purely triggerless DAQ setup, has to be modified to interface with the data/clock/commands distribution system of NA64, based on the UCF protocol[2]. The researcher will be in charge of the new firmware developing and test - this activity will be performed under the guidance of the "Waveboard" developers. He will also take part to the experimental characterization of the board performances in a test setup, using a detector prototype, as well as to the installation and commissioning of a first set of boards in the NA64 setup at CERN.

Interested candidates are encouraged to contact Dr. Andrea Celentano, PI of the POKER project (andrea.celentano@ge.infn.it). The position is expected to be effective starting from Spring/Summer 2021, following the official INFN recruitment procedures.

[1] See also: https://agenda.infn.it/event/17834/contributions/84335/attachments/60698/72043/230-Poster-musico-Musico_BDX_Poster.pdf
[2] Further details about the UCF protocol can be found here: https://ieeexplore.ieee.org/document/7543158

European Research Council
Established by the European Commission

Istituto Nazionale di Fisica Nucleare

Position details:

- Full-time position for two years.
- Net annual salary: 19.367,04€
- The position will be based in Genova - although the possibility to be based for a significant period at CERN can be also discussed.
- Benefits include:
    - Social security benefits (information is available on request).
    - 5000€ incentive if the selected candidate got his master from an institution other than Genova University **and** was not resident in Genova the three years previous to the start of this activity.
    - Lunch tickets.

The POKER project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No. 947715).