2018 HGF – GSI – OCPC – Programme

For the involvement of postdocs in bilateral collaboration projects

Part A:
Title of the project:
Picosecond Frontend Electronics for the PANDA Barrel DIRC
Helmholtz Centre and institute:
GSI Helmholtz Center for Heavy Ion Research GmbH
Project leader:
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Description of the project :
The PANDA experiment at FAIR in Darmstadt, Germany, will study anti-proton induced reactions in the charmonium energy region with unprecedented energy resolution and luminosity. One major challenge is to identify the reaction products by dedicated detector systems. PANDA will use two Cherenkov detectors based on the DIRC principle for charged particle identification in the target spectrometer. The high interaction rate of up to 20 MHz needs a data acquisition which can cope with the time-tagged streams of data from the various front-end electronics of the PANDA sub-detectors. The Barrel DIRC uses a front end electronic where the time of arrival of single photons from 10000 pixels of Microchannel PMTs is measured by FPGA-based TDCs and with FPGA-based discriminators. The readout electronics were developed at GSI and the experimental evaluation of the performance

will take place in the DIRC electronics lab at GSI.
The challenge is to reliably measure small signals in the millivolt region with high efficiency and a timing precision of 100 picoseconds or better for a large number of channels. Procedures for determining the discriminator thresholds need to be developed and implemented in the existing software framework and tested with a picosecond laser pulser system. Walk corrections of the discriminator outputs have to be applied in order to achieve the best possible system timing resolution. Ultimately, the front-end electronics has to work in a magnetic field of about 1 Tesla in a space-limited, actively cooled detector volume and has to survive radiation levels of 100 rad.

The candidate will be involved in the implementation and testing of the different front electronics parts. The proper grounding scheme and prevention of noise pickup are required for maintaining excellent timing precision for a system with many channels. Software packages need to be developed to handle the efficient control and monitoring of the Barrel DIRC readout system.

Description of existing or sought Chinese collaboration partner institute:

None.

Required qualification of the post-doc:

- PhD in Physics
- Language requirement: English

Part B:

Documents to be provided by the post-doc:

- Detailed description of the interest in joining the project (motivation letter)
- Curriculum vitae (CV)
- copies of degrees as a proof of education qualification
- List of publications (if any)
- 2 letters of recommendation

Part C:

Additional requirements to be fulfilled by the post-doc:

- Very good command of the English language
- Strong ability to work independently and in a team