

2017 HGF - GSI - OCPC - Programme

for the involvement of postdocs in bilateral collaboration projects

Part A:

Title of the project:

Readout chain for self-triggered front-end ASICS

Helmholtz Centre and institute:

GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

Project leader:

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Web-address:

<http://www.fair-center.eu/for-users/experiments/cbm.html>

Department: (at the Helmholtz centre or Institute)

Compressed Baryonic Matter

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Description of the project (max. 1 page):

Context:

CBM does not employ traditional hardware triggers, the front-end ASICs are all self-triggered and ship the data of all hits to the first level event selector (FLES) which will perform a fast online reconstruction, identify events of interest and send only those to permanent storage. One consequence of this concept is a very high data rate to be transported from the detector to FLES, at total of about 1 TByte/sec and up to 1 Gbit/sec per ASIC. CBM will use either the existing GET4 ASIC or the upcoming picoTDC ASIC as digitiser for the TOF system, the STS-XYTER ASIC for the Silicon Tracker (STS), the SPADIC ASIC for the Transition Radiation Detector (TRD), all of them with a GBTx compatible e-link interface. The different chamber types of the Muon System (MUCH) will also be equipped with these ASICs. The readout chain uses CERN GBTx data concentrator ASICs which aggregate data streams from FEE ASICs to high-speed optical links. These optical links are terminated in custom FPGA-based Common Readout Interface (CRI) boards which handle all protocol levels, perform a first stage of data pre-processing, format the data stream into containers suitable for further handling in the

DAQ system, and send data to the entry node, e.g. via a PCIe link.

Project:

Development of the FPGA firmware for the CRI boards. This is the central transport hub in the CBM DAQ system and has to handle data streams from the FEE ASICs but also the controls communication as well as the clock distribution and time synchronization. This combination makes it as challenging as interesting project. Focus will be on the TOF readout chain. The work is done in the context of the CBM DAQ integration team at GSI.

Description of existing or sought Chinese collaboration partner institute (max. half page):

The CBM experiment cooperates already with Tsingua University (Beijing), USTC (Hefei), CCNU (Wuhan) and CTGU (Yichan). The focus of the Chinese contribution to CBM is the TOF detector system. The TOF readout chain is currently developed in co-operation with GSI and these institutes. A continuation of this work after return to the China would be highly welcome.

Required qualification of the post-doc:

- PhD in Physics or Electronics Engineering
- Experience with FPGA design; good skills in VHDL and/or (System)Verilog and implementation tools chains (Vivado/Quartus); good skills in system simulation and verification.
- Additional skills in high-energy physics instrumentation, especially electronics are highly welcome, but not mandatory.

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:

- PhD degree not older than 5 years
- Very good command of the English language
- Strong ability to work independently and in a team