2016 Jülich – OCPC – Programme
for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project: Receiver ASIC development for the detector at Jiangmen Underground Neutrino Observatory

Jülich's institute: Central Institute of Engineering, Electronics and Analytics 2 - Electronic Systems

Project leader: Prof. Dr. Stefan van Waasen; Christian Grewing

Web-address: http://www.fz-juelich.de/portal/EN/AboutUs/organizational_ structure/Institutes/CentralInstituteEngineering/_node.html

Description of the project (max. 1 page)[1]**:** see overleaf

Description of existing or sought Chinese collaboration partner institute (max. half page)**:**
We look for collaboration partners in China at comprehensive research bases of particle and astroparticle physics, accelerator physics and technology, radiation technologies and applications, as well as for nuclear analytical techniques and interdisciplinary research. Research units dealing with electronic science and technology are also welcome.

Required qualification of the post-doc:

- PhD in Electronics Science and Technology
- Experience with application board design for particle detectors, design plug-in boards, including the schematic, PCB design and simulation
- Additional skills in high speed digital signal design and practiced experience in high speed circuit design. Experienced in Free Programable Gate Array (FPGA) design with verilog language. Skilled in using electronic measure instrument, such as oscilloscope, signal generator, etc. Good knowledge of the project requirements due to earlier experiences with particle detectors would be of advantage.

PART B

Documents to be provided by the post-doc:

- Detailed description of the interest in joining the project (motivation letter)

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[1] Please add overleaf

- Curriculum vitae, copies of degrees
- List of publications
- 2 letters of recommendation

PART C

Additional requirements to be fulfilled by the post-doc:

- Max. age of 33 years
- PhD degree not older than 5 years
- Very good command of the English language
- Strong ability to work independently and in a team

Description of the project: (max. 1 page)

The Jiangmen Underground Neutrino Observatory (JUNO) is a multipurpose neutrino experiment designed to determine neutrino mass hierarchy and precisely measure oscillation parameters by detecting reactor neutrinos from the Yangjiang and Taishan Nuclear Power Plants, to observe supernova neutrinos, study the atmospheric, solar neutrinos and geo-neutrinos, and perform exotic searches with a 20-thousand-ton liquid scintillator detector of unprecedented 3% energy resolution (at 1 MeV) at 700-meter deep underground.

(http://english.ihep.cas.cn/rs/fs/juno0815/ATEjuno/201309/t20130912_109433.html)

The Electronic Systems Team of the Central Institute of Engineering, Electronics and Analytics (ZEA-2) is developing in cooperation with the III. Physics Institute of RWTH Aachen University the concept of new detector electronics for this project. This consists of a new smart intelligent sensor approach which includes the main receiver and digital signal processing in the detector photomultiplier tubes so that the costs and power consumption can be reduced by minimizing the cables that are needed to build the detector. At the ZEA-2 Integrated Systems Team as well as at the Nano- and Microelectronic System Team a new integrated circuitry (IC) is developed in a standard silicon CMOS technology which combines the special needs of the detector with a concept that makes as far as possible use of standard components in order to reduce the costs and development risks. The development is done in cooperation with the electronics division of the IHEP in Beijing, who are in charge of the overall electronics of the detector. Monthly conference calls and meetings 3 times per year are organized to make sure that the IC meets the requirement specification that is written as a joined work of IHEP, RWTH Aachen and Jülich's ZEA-2.

For the development of a verification and application setup for the prototypes of the IC, as well as to prepare the production tests for the ca 20000 integrated circuits that will be used in the detector an experienced postdoc is searched.