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

PART A

Title of the project: Compact low energy light ion driver for High Brilliance Neutron Source

Jülich's institute: Institute for Nuclear Physics 4 - Large Scale Equipment in cooperation with Jülich Centre for Neutron Science

Project leader: Prof. Mei Bai in cooperation with Prof. Thomas Brückel

Web-address: http://www.fz-juelich.de/ikp/EN/Home/KernphysikalischeGroszgeraete.html
http://www.fz-juelich.de/jcns/EN/Home/home_node.html

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

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

Currently, we have well established collaboration with the Institute of High Energy Physics at Beijing, as well as Institute of Morden Physics at Lanzhou. Both are leading institutes in China with direct access to the newly established UCAS (University of China Academy of Science). We are also interested in developing collaborations with other Chinese universities. There are three strong candidates:

- Institute of Applied Electromagnetic Engineering(IAEE) in Huazhong University of Science and Technology(HUST), Wuhan, China
- Tsinghua University, Beijing
- University of Science and Technology of China (USTC), Hefei

Required qualification of the post-doc:

- PhD in Accelerator Physics
- Experience with Lattice design, beam dynamics, space charge dominated beam
- Additional skills in strong numerical simulation, Beam dynamics with LINAC is a plus

PART B

Documents to be provided by the post-doc:

- Detailed description of the interest in joining the project (motivation letter)
- Curriculum vitae, copies of degrees

[1] Please add overleaf

- 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:

This project is to explore design options of a low energy high power light ion (proton / deuteron) driver for a future High Brilliance Neutron Source (HBS) at Forschungszentrum Juelich (see http://www.fz-juelich.de/jcns/EN/Leistungen/High-Brilliance-Neutron-Source/_node.html). In comparison to the traditional spallation neutron source, the proposed HBS aims at providing a very cost-effective design with innovative techniques. The Juelich Center for Neutron Science (JCNS) has been well recognized worldwide. While the colleagues in JCNS have been utilizing current neutron sources in Europe as well as in the USA, this future neutron source HBS on campus shall not only provide a nice complimentary neutron source to the European Spallation Neutron Source (ESS) at Lund, but also empower the surrounding universities to carry out effective research and education.

The challenge of the HBS project is to seek a cost effective compact accelerator design that allows a required robust operation for the neutron source. Currently, the approach of applying SRF LINAC as high power low to medium energy proton drivers has been pursued worldwide. High current low-beta SRF cavity has been demonstrated. However, the robust CW mode of operation has still yet not demonstrated due to microphonics as well as other technical challenges. Hence, careful study of SRF LINAC design with optimizing cavity, space charge effects etc. is desired. Other options for such a light ion driver including innovative ideas shall be evaluated including the cost effectiveness of construction as well as operations.

The success of this project not only directly benefits the HBS project, but also can potentially provide an innovative design for other applications such as

- high power drivers for neutrino production
- radioisotope production
- proton/ion radiotherapy that at the moment the wide application of this advanced technique has been calling for an accelerator design with not only compact but also low operation cost