



## POST DOCTORAL POSITION ON T2K @LLR AND IRFU

The neutrino groups of Laboratoire Leprince-Ringuet (CNRS/IN2P3/LLR - Ecole Polytechnique, <http://polywww.in2p3.fr/accueil?lang=en>) and CEA/Irfu/SPP (<http://irfu.cea.fr/Spp/index.php>) are happy to invite applications for a two-year post-doctoral position.

The fellowship is founded by P2IO Labex (“Laboratoire d’Excellence”, <http://www.labex-p2io.fr/>) for a duration of two years, and can start as soon as possible (and no later than December 2017). The candidate is supposed to work in co-tutorship between LLR and Irfu teams, the two laboratories being 5km distant. LLR will be the primary supervisor and Irfu the secondary one.

### GENERAL CONTEXT

The correct description of neutrino-nucleus interactions is a key point for the precise measurement of neutrino oscillations at long baseline experiments, such as T2K and NOVA. The Post-Doc project aims at providing a precise characterization of neutrino Charged-Current Quasi-Elastic (CCQE) interactions with the T2K near detector data (ND280), with particular focus on Oxygen target. LLR and CEA/Irfu groups will share their expertise in the neutrino cross section measurements and modelling. The Post-Doc candidate will have the rare opportunity to work side-by-side with experimentalists and theoreticians in an international community that is growing up around this major topic of neutrino physics.

### THE TEAMS

The LLR group is strongly involved in T2K, WAGASCI and HyperKamiokande. The group is also engaged in JUNO and has just joined the SuperKamiokande experiment.

The Irfu group is strongly involved in T2K and T2K-2 and is engaged in future long baseline projects (DUNE and HyperKamiokande).

Beyond the already existing synergies due to their participation to the T2K experiment, recently a more deeper synergy between the LLR and SPP groups has been triggered by the common interest on neutrino cross-section study. Thanks to geographical proximity, the groups are designing and performing together the analyses for the CCQE measurements at ND280 and they are collaborating in designing the future upgrade of ND280, including the new module (WAGASCI) dedicated to neutrino-nucleus cross-section measurements on water.

Moreover, the tradition of excellence of Ecole Polytechnique and CEA represents an exciting and stimulating environment, allowing interactions with experts in different fields and experiments, as well as participation to advanced seminars.

### RESEARCH PLAN

The post-doc will own the responsibility of the simultaneous measurement of the cross sections of neutrino

and antineutrino CCQE-like interactions on Oxygen and Carbon, by exploiting the data of the ND280 Fine-Grained Detectors (FGD1 and FGD2). To this purpose, a substantial modification of the analysis framework developed in the last years for the previous T2K cross-section measurements is necessary, as well as a specific study of systematics effects to be taken into account when exploiting both the FGDs. This measurement will represent the most comprehensive study of CCQE-like interactions at ND280, thus guaranteeing excellent visibility to the post-doc.

The project will also include studies on neutrino interaction modelling and on the optimization of the near detector upgrade, in relation with the CCQE-like measurement on Oxygen.

The Post-Doc candidate will also participate to the T2K data taking at ND280.

## REQUIREMENTS

Applicants should have their PhD (in nuclear or particle physics) at the time of starting date; although not required, preference will be given to young graduated candidates, applying for their first post-doc.

The selected candidate is required not to have been employed (neither as PhD student nor as postdoc) in a P2IO laboratory (as LLR or Irfu) in the last two years.

A good experience in T2K and its physics would be an advantage.

## REQUESTED DOCUMENTS

Applicants should provide their curriculum vitae, a list of publications indicating their personal contributions, a description of their previous activities and a short statement of research interests, all in pdf format.

Moreover, applicants need to arrange for two letters of reference, to be sent directly to the contact persons listed below.

Priority will be given to applications received before the deadline of **April 15th, 2017**.

## CONTACTS

Candidates are encouraged to send their applications by email to:

LLR: Margherita BUIZZA AVANZINI - [buizza@in2p3.fr](mailto:buizza@in2p3.fr)

Irfu: Sara BOLOGNESI - [sara.bolognesi@cea.fr](mailto:sara.bolognesi@cea.fr)