Design, optimization, simulation and analysis of systematics for the positron tagger of the ENUBET tagged neutrino beam

The ENUBET group at **INFN**-Padova[1] (Istituto Nazionale di Fisica Nucleare), has an immediate opening to appoint a postdoctoral research associate to work on the **ENUBET** project (**E**nhanced **N**e**U**trino **BE**ams from kaon **T**agging, ERC-Consolidator Grant, G.A. 681647, 2016-2021[2]). The appointment will be for three years, starting as soon as possible.

- **Contract type and duration**: 3 years full-time, fixed term. Senior post-doc. INFN researcher (Art. 36, III level).
- **Salary**: 45.000 € gross/year + pension and social security benefits
- **Job location**: INFN-Padova, Physics and Astronomy Department[3], via Marzolo 8, Padova, Italy.
- **Tasks**: the work will be performed within the ENUBET Working Package 5 (Systematics assessment). ENUBET aims at demonstrating the feasibility of a 1% systematic error on the ν_e cross section by monitoring positrons emitted at large angles by K_{e3} decays in an instrumented decay tunnel. The role of the candidate is central in this program and her/his activities will focus on:
  - developing a full simulation of the positron tagger with the GEANT4 software.
  - implementing the information from test beams in the simulation to get a close description of the real detector in order to master the systematics.

[1] INFN Padova, http://www.pd.infn.it/indexEN.html
[2] http://cordis.europa.eu/project/rcn/200776_it.html
[3] http://www.dfa.unipd.it

  - developing high level algorithms to evaluate signal/background separation and impact of event pile-up.
  - assessing of the radiation exposure of the tagger instrumentation from neutrons produced in hadronic decays of kaons and pions using simulation codes
  - assessing the systematic uncertainty on the predicted neutrino flux after inclusion of the positron tagger information
  - performing a critical evaluation and optimization of the overall tagger design
  - working in a distributed group of collaborators, acting as interface with colleagues involved in the implementation of the hardware solutions and designing the hadron beam-line.

- **Requirements**:
  - Experience and interest in applying and/or developing and devising successful models, techniques and methods.
  - PhD in Physics and a research experience at postgraduate level of at least three years in experimental neutrino physics preferentially with accelerator-based beams
  - Experience with data analysis for neutrino detectors
  - Working experience in the simulation of particles and detectors (i.e. with GEANT4)
  - Working experience with simulation of backgrounds and radiation damage (i.e. from neutrons).
  - Skills in high-level data-analysis for propagation of uncertainties and assessment of systematic effects.
  - Self-responsible, timely work in accordance with mutually defined objectives, while also integrating into a team.
  - Communicative and collaborative personality.
  - Ability to mentor, assist and guide research directions of PhD and/or undergraduate students.
  - English is the working language and an additional knowledge of Italian is advantageous.

- **Application**: please provide a motivation letter next to a CV in English, your list of publications and references in one single pdf-file by sending it to the ENUBET Principal Investigator, A. Longhin (**andrea.longhin@pd.infn.it**).

- **Selection process**: candidates are expected to attend an interview either in person at the Padova Physics Department or using a remote connection. The selection of the candidates will be based on the evaluation of the documents sent with the application and on the interview. The interview will focus on the candidate's own research, curriculum and publications.

- **Useful bibliography**

  - *A novel technique for the measurement of the electron neutrino cross section*, A. Longhin, L. Ludovici, F. Terranova E.P.J. C, April 2015, 75:155, arXiv://1412.5987.
  - *A compact light readout system for longitudinally segmented shashlik calorimeters*, A. Berra et al. Nucl. Instrum. Meth. **A**830 (2016), 345-354.

- This position is advertised on:

  - the ENUBET web page (http://enubet.pd.infn.it/pos.html)
  - Euraxess jobs (http://ec.europa.eu/euraxess/index.cfm/jobs/index)