# Report on selection of candidates for ENIGMASS post-doc allocated to STEREO-LPSC group

## 1. Publication of the position

The document announcing and describing the position is appended at the end of this document. It was first published mid of September 2013 with a deadline on 31th of October in :

- ENIGMASS web page
- GDR Neutrino
- Double Chooz collaboration

The information was also spread to other STEREO group leaders, in particular at ILL.

In November 2013, it was decided to extend the deadline until 15th of January. An additional information was published in :

- IN2P3 letter
- CNRS postdoc portal
- GRD neutrino

The information was also spread to ANTERES, BOREXINO, NEMO and OPERA goup leaders in France and in other countries.

In February 2014, it was decided to extend the deadline until the position is filled.

## 2. Candidates

Five applications were received after the first call. The candidates came from various experiments: CMS, CODALEMA, INO, Proton-Therapy. We received letters of recommendations for four of the candidates.
List of candiates: W. El Kanawati, D. Sabes, A. Rebai, A. Ghosh, T. Thakore

Three more applications were received at the end of the second deadline. The candidates came from DEAP, ANTARES and Ion Sources. We received letters of recommendation for two of them (DEAP and ANTARES) .
List of candiates: J. Tiang, G. Lambard, S. Bouat

Nine applications were received after the 15th January deadline. Five of them came from IN2P3 thematic areas (SPIRAL, nEDM, Double-Chooz, OPERA and DAMA) the others concerned other topics such as micro-electronics, geology or plasma physics and were not considered. We received letters of recommendations for four of the candidates.
List of candidates: R. Boussai, V. Helaine, V. Vladymirov, A. Cucoanes, S. Castellano

## 3. Selection

The members of the selection committee (all STEREO-LPSC) were

- A. Stutz
- J.S Réal
- F. Montanet
- J. Lamblin

All members participated to all selection steps

When no letter of recommendation was received, the application was not considered further.

At the end of the first call (30th of October), we selected two candidates to be interviewed at LPSC (CMS, Proton-Therapy), but the CMS candidate found a position in the meantime and was not applying anymore.
The interview of Wassila El Khanawati (Proton-Therapy) occurred on 9th October 2013.

As she was the only candidate we decided to extend the deadline until 15th of January.

The interview of the 2 new selected candidates had to be done remotely. Both interviews occurred on 14th of January.

On 16th of January, the committee agreed on the following order:

1. Guillaume Lambard : He is a specialist on indirect search of dark matter with ANTARES, but during the interview he demonstrated a strong knowledge on experimental physics with photomultipliers.
2. Wassila El Khanawati : She has a strong knowledge in gamma spectroscopy, and neutron physics. She knows very well GEANT4 and MCNP software, but has only few hardware knowledge.

Jian Tiang was a good candidate. He came from a neutrino theory training background. Although he worked within the DEAP project in its construction period, he did not show a deep knowledge in experimental physics and data analysis during the interview. For this reason, the committee decided not to include him in the final list.

On 30th of January, Guillaume Lambard decided to refuse the position. In the meantime Wassila El Khanawati found a position and was not applying anymore.

The committee decided to consider further applications as they arrive. Among the four admissible applications we received since February, we invited three of the candidates (nEDM, OPERA, Double Chooz) for an interview at LPSC. The interviews occurred on 3th of April and 16th and 23th of May.

On 24th of May, the committee agreed on the following order:

1. Andi Cucoanes: He knows very well reactor neutrino physics as he is involved in Double-Chooz and Nucifer experiments. He has a strong knowledge on reactor neutrino flux systematics and sensitivity contours. The arrival of this candidate on the STEREO-LPSC group should boost the STEREO program.
2. Victor Hélaine: During the interview, he demonstrated that he is very comfortable with experimental developments. He showed a strong interest and motivation to join the LPSC group and the jury is convinced that he can take responsibilities in the construction, data taking and data analysis phases of the STEREO project.
3. Mykhailo Vladymyrov : He knows neutrino physics very well as he is involved in the OPERA project especially in nuclear emulsion data treatment During the interview he showed also a strong interest to come to Grenoble.

On 28th of May, Andi Cucoanes decided to refuse the position. On 30th of May Victor Hélaine accepted the position and plans to join the STEREO-LPSC group on 1th of October.

**Postdoctoral position open by the ENIGMASS LABEX in 2013**
http://enigmass.in2p3.fr/spip.php?rubrique61

**Search for sterile neutrinos at the ILL reactor**

The discovery of neutrino oscillations is a major achievement in the recent history of elementary particles. It implies that the most abundant matter particles in the universe are massive and that the three neutrino states alternately change from one type to another as they travel. A large experimental program is ongoing to measure accurately the parameters of the neutrino-mixing matrix. A recent work published by CEA-Irfu has triggered a worldwide renaissance in the search of sterile neutrinos. In this work 19 published neutrino measurements at short distance (10-100 m) from reactors have been reanalyzed after a re-evaluation of the predicted reactor neutrino flux had revealed a bias in the previous calculations. The result is a mean deficit of 7% of detected neutrinos with respect to predictions, with a statistical significance of 3 sigma. This is called the reactor neutrino anomaly and it combines nicely with another (long-standing) anomaly in the detection of electronic neutrinos from intense beta-decay sources. By analogy with the already measured deficits of reactor neutrinos induced by their oscillations in the solar and atmospheric sectors, this new deficit at short distance can be interpreted as the existence of a new neutrino state, a light sterile neutrino. This new neutrino with no ordinary weak interactions could only be „visible" by its mixing with the three ordinary neutrinos. If proven, the existence of this particle would be a major discovery, with deep impact in particle physics and cosmology.

The goal of the Stereo experiment is to answer the question of the existence of a sterile neutrino with a mass around 1 eV. Data taking and first results are expected in 2015. The proposed measurement takes place at short distance from the 58 MW research reactor of the "Institut Laue-Langevin" (ILL) in Grenoble, France. If a sterile neutrino exists then one should observe a distortion of the energy spectrum of the reactor electron antineutrinos induced by the mixing with the new sterile state. Therefore the analysis of the Stereo measurement is based on the comparison between the shape of the detected energy spectrum and a reference shape as predicted with no oscillation. For an unambiguous interpretation of the results, the Stereo detector is designed to exploit the expected evolution of the spectrum distortion both in energy and in distance.

The characteristics of the high flux reactor of ILL are very favorable to a neutrino experiment at short baseline. The 58 MW core, a cylinder of 40 cm diameter and 80 cm height, is very compact and the center of the detector can stand 8 m only from the center of the core. The detection of the few MeV reactor antineutrinos will rely on the mature technique of liquid scintillator. The main challenge is the rejection of the gamma and neutron backgrounds induced by the reactor at such small distance from the core.

The schedule of the experiment is built around the long reactor stop of mid-2013 to mid-2014. The start of the data taking is foreseen in late 2014 for one year data taking.

The LPSC team is in charge of the muon veto, the data acquisition and the slow control. The candidate will have a leading role in the muon detector work package, but also in all important aspects of the project with the advantage of being located at LPSC only at a few hundred meters from the ILL. The first year will be dedicated to the fabrication,

installation on site of the detector and preparation of the analysis software. The second and third year will focus on data taking and analysis.
This postdoc is funded by the CNRS ENIGMASS labex and available from November 2013. Candidates are expected to have a PhD on physics. Previous experience on neutrino physics is preferable although not mandatory. To apply for this postdoc please email Dr. A. Stutz at anne.stutz@lpsc.in2p3.fr including your CV, previous research statement and reference letters before Thursday 31th of October 2013.