A*Midex Initiative d'excellence Aix-Marseille

Labex OCEVU

Origins, Constituents and EVolution of the Universe

Postdoctoral Grants International Programme

Project proposal 2015

Laboratories involved:

- Centre de Physique des Particules de Marseille (CPPM)- UMR 7346
  163 avenue de Luminy, Case 902
  13288 Marseille cedex 09
  http://marwww.in2p3.fr/

- Laboratoire Charles Coulomb (L2C)- UMR 5221
  http://www.coulomb.univ-montp2.fr/

- Laboratoire Univers & Particules de Montpellier (LUPM)- UMR 5299
  http://web.lupm.univ-montp2.fr/
  Université Montpellier II, Place E. Bataillon, 34095 Montpellier cedex 5.

Duration of the postdoc contract *(years)*: **1 (renewable)**
Lab where the postdoc will be administratively located: CPPM

Collaborators:

Cristinel Diaconu (CPPM), diaconu@cppm.in2p3.fr
Lorenzo Feligioni (CPPM), Feligioni@cppm.in2p3.fr
Gilbert Moultaka (L2C), gilbert.moultaka@univ-montp2.fr
Steve Muanza (CPPM) muanza@cppm.in2p3.fr

OCEVU working group(s): Particle Physics

Project title: Probing the nature of Electroweak Symmetry Breaking at the LHC with the ATLAS detector

Description of the project
the proposal should not exceed 2 pages total (Arial 10 font)

The OCEVU ("Origins, Constituents and Evolution of the Universe") Labex, a research federation of French labs in Marseille, Montpellier and Toulouse, invites applications for a post-doctoral position based at CPPM Marseille to join its research program "Probing the nature of electroweak symmetry breaking at the LHC with the ATLAS detector".

The discovery of a new neutral boson at a mass of approximately 125 GeV constrains at different levels theoretical models that provide a mechanism for spontaneous electroweak symmetry breaking (EWSB). In several EWSB scenarios beyond the Standard Model, based on supersymmetry (SUSY) or on composite Higgs models, the third quark generation, and in particular the quantum effects due to the top quark, plays an important role in generating the EWSB potential. Large jet and b-jet multiplicities are striking signatures for the lightest scalar partner of the top quark, in both R-parity conserving and R-parity Violating (RpV) SUSY processes, where the stop pair production has a sizeable cross section.

The candidates are expected to have experience with hadron collider data analysis, ideally in the area of BSM signals searches, in order to recast SM analyses where the CPPM ATLAS group plays a leading role, in terms of new physics searches. She/he will also participate to the on-going collaboration between the CPPM ATLAS group and the IFAC [2] theory group, aimed at assessing LHC discovery reach in multi-b-jets final states from RpV stop decays, or in multi-W boson production from doubly charged Higgs decays in non-SUSY extensions of the SM.

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He or she will be demanded to participate on the going collaboration between the CPPM ATLAS group and the IFAC [2] theory group aimed at assessing LHC new physics discovery reach for the BSM models considered, mainly SUSY or more general extensions of the Higgs boson sector.

The position is for one year renewable, starting September 1st at the earliest, based in Marseille. Candidates for the position should hold a Ph.D. in Experimental Particle Physics since no more than three years. Informal enquiries should be addressed to Lorenzo Feligioni (CPPM, +33 4 91 82 76 21, lorenzo@cppm.in2p3.fr) and Gilbert Moultaka (L2C, + 33 4 67 14 35 53, gilbert.moultaka@univ-montp2.fr).

[1] The ATLAS (http://atlas.cppm.in2p3.fr) group at CPPM (http://marwww.in2p3.fr) consists of about forty-five staff physicists, postdoc, graduate students and engineers. The group is active in ATLAS since the beginning and played a major role in the design and construction of the pixel detector, the electromagnetic endcap calorimeters and the trigger system, and pursues an R&D effort for the pixel upgrades. Building on the group expertise with the identification of several physics objects (*b*-jets, electrons, missing energy), past activities focused on the analysis of the data delivered by the Large Hadron Collider in Run 1: Standard Model top quark measurements, Higgs boson studies and searches for new physics in final states with electrons plus missing energy and heavy flavoured quarks. The group focus is nowadays on its Run 2 physics program, which includes mainly ttH, multi-boson production and SUSY analyses.

[2] The IFAC theory group (http://www.coulomb.univ-montp2.fr/-Equipe-Interactions-fondamentales-?lang=en) is transverse to the two laboratories, L2C (http://www.coulomb.univ-montp2.fr) and LUPM (http://web.lupm.univ-montp2.fr). It comprises nine staff members and six non-permanent members, active in various subjects of low and high-energy theoretical particle physics, astro-particle physics and dark matter, cosmology and the early universe.

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