Precision Higgs/top physics at the LHC and a future linear e+e- collider

Research Project / Research Group Description:
The ATLAS/future colliders group at IFIC is part of the ATLAS experiment at the Large Hadron Collider and of the proposal for a new energy-frontier installation.

The involvement in ATLAS is focused on top quark physics. The group has developed a novel method to measure the top quark pole mass in associated production of a top quark pair with a jet, and is performing the measurement using pp collision data collected by the experiment. The group also plays an important role in the searches and measurements in boosted top quark production, and in the in-situ calibration of the large-R jet response.

The group is deeply involved in the projects for a linear electron-positron collider with a center-of-mass energy of 250 GeV to several TeV. Such a machine enables precision measurements of the Higgs boson and the top quark and has exquisite sensitivity to physics beyond the Standard Model. Group members play an important role in the ILC and CLIC projects.

The IFIC group has made relevant contributions to studies of the physics potential of future colliders. The contributions to top quark physics include studies of the measurement of the top quark mass and electro-weak couplings, that form an important part of the Linear Collider physics case. The group has moreover led several studies into the jet reconstruction performance at electron-positron colliders.

The group is furthermore involved in the detector design and the development of novel vertex detector technology. The group is responsible for the design of the forward tracker in the ILD detector concept. The detector R&D focuses on the development of active silicon pixel detectors within the DEPFET collaboration and the development of silicon detectors with integrated cooling channels.

Job position description:
The successful candidate will join the ATLAS experiment and/or the linear collider projects and perform a world-class physics analysis. We offer an ideal learning environment in a group with a recognized trajectory in cutting-edge particle-physics projects. IFIC offers a high-quality programme of doctoral courses. The group offers a pleasant working environment. Expertise in the group comprises several students and post-docs active in the exploitation of LHC data and prospect studies of the physics potential of future installations, including the linear collider projects and future upgrades of the LHC, and detector R&D in the next generation of pixel detectors.

The candidate will work on precision measurements with beyond-the-Standard Model sensitivity in Higgs or top physics at energy-frontier collider experiments. The exact focus of the Ph.D. will be decided on the basis of the affinities of the candidate and the expertise present in the group. The Ph.D. work will include an analysis of data collected by the ATLAS experiment, or prospect studies for future colliders. In the case of highly motivated candidates, a combination of both will be considered. The Ph.D. work will build on previous experience in top quark mass measurements, in effective field theory interpretations of collider measurements, and/or the development of novel solutions for jet reconstruction at electron-

"la Caixa" Foundation
IFIC INSTITUT DE FÍSICA CORPUSCULAR
EXCELENCIA SEVERO OCHOA
This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 713673.

positron colliders. The candidate is expected to collaborate with and travel to CERN and KEK and Tohoku University in Japan.

Group Leaders: Juan Fuster Verdú & Marcel Vos
juan.fuster@ific.uv.es , marcel.vos@ific.uv.es
Research project/Research Group website
http://ific.uv.es

"la Caixa" Foundation

IFIC INSTITUT DE FÍSICA CORPUSCULAR

EXCELENCIA SEVERO OCHOA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 713673.