



Laboratoire des 2 Infinis – Toulouse
(CNRS/IN2P3 and Université Paul Sabatier – Toulouse III)

We invite applications for a tenure track position in the ATLAS team of L2IT. This type of position (*Chaire Professeur Junior*) was recently created in France. After a pre-tenure period of 3 years, the *Professeur Junior* is eligible for a full, tenured professorship at Université Paul Sabatier – Toulouse III. The position comes with an attractive package (contracts for a post-doc plus a student, small teaching load during the pre-tenure period).

A detailed description of the position can be found here:

https://www.galaxie.enseignementsup-recherche.gouv.fr/ensup/ListesPostesPublies/FIDIS/0311384L/FOPC_0311384L_4756.pdf

Deadline for applications: May 23rd 2022

Please do not hesitate to contact Jan Stark (stark@in2p3.fr) if you have any questions.

Part of the description of the position is reproduced below:

The Laboratoire des 2 Infinis – Toulouse (L2IT) is a joint research unit (“*unité mixte de recherche*”, UMR) of the French national center for scientific research (CNRS) and Université Toulouse III - Paul Sabatier. It was created on January 1st, 2020. Within CNRS, the unit is led by IN2P3. The objects of study of the researchers and engineers at L2IT are the two infinities - the infinitely small and the infinitely large - and the relationships between the phenomena that govern each of them. We pursue our research in large international collaborations, for example at CERN in Geneva and on the LISA project for space-based satellites. Modeling, simulation and data analysis are the key activities of L2IT. L2IT develops these innovative aspects of research on the two infinities in close collaboration with experts from institutes in the fields of computing, artificial intelligence, physics and astronomy and astrophysics based in Toulouse.

In 2012, a new fundamental particle was discovered by the ATLAS and CMS experiments at CERN, a European laboratory in Geneva. Its properties are consistent with those predicted for the Higgs boson. Following this discovery, the Nobel Prize in physics was awarded to P. Higgs and F. Englert. Since then, the properties of this particle are studied experimentally. The production of a few Higgs bosons was sufficient to prove its existence. The precise study of its properties requires a hundred times more data. The experimental complex at CERN is being improved and

its operations will continue for the next two decades. A key result that ATLAS and CMS are expected to deliver is a measurement the interaction of the Higgs boson with itself: its self-coupling. This peculiar, hypothetical property of the Higgs boson is predicted to be a consequence of the potential postulated by P. Higgs, and it has not yet been observed. Isolating the rare signature of this interaction from the experimental backgrounds is extremely complex and requires the development of innovative analysis techniques. The person recruited on this junior professorship will integrate the ATLAS collaboration and will lead these developments, in collaboration with our partners in Toulouse, in France and abroad. He or she will put a particular emphasis on the $H H \rightarrow b \bar{b} \gamma \gamma$ and $H H \rightarrow b \tau \tau$ channels. Improvements of the experimental complex, including the ATLAS detector, are essential for the measurement of the Higgs boson self-coupling. The laboratories in France that work on the ATLAS experiment are strongly involved in the design and the construction of a new internal tracking detector that will be installed to cope with the deluge of data expected starting in 2027. L2IT is contributing to this French effort - in its own way, i.e. by developing machine learning algorithms for the reconstruction of charged particle tracks from the raw data of this detector. The person recruited on this junior professorship will become a major actor in these algorithm developments.