



University of Sussex PhD Studentship on Higgs and Top Quark Properties – ATLAS Experiment

<http://www.sussex.ac.uk/epp/>

Probing the Higgs boson is a critical priority in the search for new physics at the Large Hadron Collider (LHC). To this end, collisions containing a Higgs and a top-quark pair ($t\bar{t}H$) are especially well motivated. The candidate will play a leading role in new differential measurements of $t\bar{t}H$. This will provide fresh sensitivity to the strength of the top-Higgs interaction and the Higgs self-interaction which are directly related to the stability of the Universe at a quantum level. Furthermore, the exact nature of the top-Higgs interaction could hold the answer to why we exist at all - why the Universe is matter-dominated.

Top quarks produced with lepton pairs ($t\bar{t}l\bar{l}$) are a key background to $t\bar{t}H$, but are also vital to probe one of the strongest hints of new physics to from the LHC – the flavour anomalies. The candidate will also measure $t\bar{t}l\bar{l}$ (where $l=e,\mu,\tau$) to test the universality of lepton couplings in the top sector. This will add vital additional information to understand the flavour anomalies seen in the B-sector.

The ATLAS-Sussex group has made significant contributions measurements of $t\bar{t}H$, $t\bar{t}W$ and $t\bar{t}Z$ so far in ATLAS: profiting from this experience in the group, the candidate will be ideally positioned to make large impact in this area, supported by contact with CERN-based experts.

Funding is available for a September 2023 start which includes a tax-free bursary (£17,668 per annum in 2022/23) and fully paid (at the Home student level) tuition fees for 3.5 years. Additional financial support is provided to cover short-term and long-term travel. Interviews of shortlisted candidates will be held in February and March initially and will continue until positions are filled. Applications from self-funded students interested in available projects are also welcome at any time of the year.

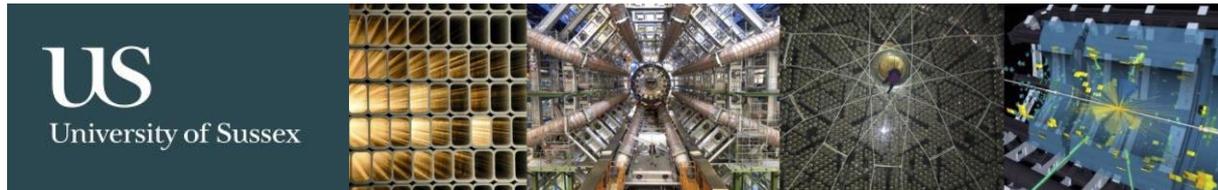
For more details about the project, please contact Dr Josh McFayden:
J.A.Mcfayden@sussex.ac.uk.

For practical questions about applications and/or eligibility for funding, please contact
mps-pgrsupport@sussex.ac.uk

For academic questions please contact the coordinator of EPP PhD admissions, Prof Iacopo Vivarelli: I.Vivarelli@sussex.ac.uk

Applications: <https://www.sussex.ac.uk/study/phd/apply>

Please state in the Finance section of the online form that you are applying for STFC EPP studentships.



University of Sussex PhD Studentship on BSM physics with the top quark – ATLAS experiment

<http://www.sussex.ac.uk/epp/>

The ATLAS group at the University of Sussex invites applications from talented and inquisitive students for a PhD place in Experimental Particle Physics, to join work under the supervision of Prof. Iacopo Vivarelli.

Lacking clear signals of physics beyond the Standard Model at the Large Hadron Collider, it is imperative to investigate whether small physics contributions from new phenomena may affect either rare or kinematically difficult Standard Model processes. Focusing mainly on the associated production of top and bottom quarks with vector bosons or missing transverse momentum from the production of invisible dark matter particles, the candidate will develop a strategy to use search techniques together with inclusive and differential cross section measurements sensitive to different Beyond the Standard Model processes, also using the framework of Standard Model Effective Field Theories. Given the current limits, advanced analysis techniques, possibly involving the use of machine learning techniques, will have to be explored.

The ATLAS-Sussex group has a remarkable track record in investigating new physics connected with third generation quarks, in particular in the area of supersymmetry and dark matter production. The group has also had significant contributions in measurements of $t\bar{t}Z$, $t\bar{t}W$, $t\bar{t}H$ production mainly in multilepton final states. Profiting from this expertise, the candidate will be ideally positioned to make large impact in this sector, also through close contact with CERN-based experts

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