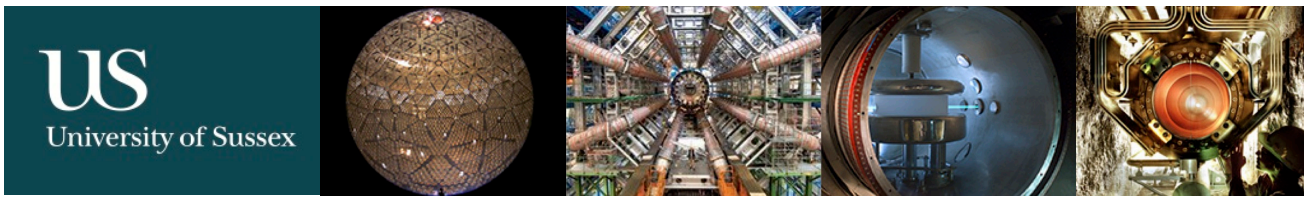


PhD Studentships in Experimental Particle Physics at University of Sussex

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

The University of Sussex Experimental Particle Physics group plays a critically important role in a number of experiments at the frontiers of our knowledge of particle physics, with main involvement in: the ATLAS experiment and its upgrades at the CERN Large Hadron Collider, the SNO+ neutrinoless double beta decay experiment at SNOLAB (Canada), the NOvA, DUNE, and SBND neutrino oscillation experiments at Fermilab (USA), and the Neutron EDM experiment at PSI (Switzerland).

We are presently offering fully funded studentships for the topics listed below available to UK and EU nationals for a September 2019 start. Funded studentships cover a tax free bursary (£14,777 per annum in 2018/19) and home/EU fees for 3.5 years. Additional financial support is provided to cover short-term and long-term travel. We also welcome applications from self-funded non-EU students interested in our experimental programme. Interviews of shortlisted candidates will be held in February and March.

For academic questions please contact the coordinator of EPP PhD admissions, Dr. W. Clark Griffith: W.C.Griffith@sussex.ac.uk

For practical questions about applications and/or eligibility for funding, please contact Rebecca Foster at: mpsresearchsupport@sussex.ac.uk

Applications: http://www.sussex.ac.uk/pgapplication
Please state in the Finance section of the online form that you are applying for STFC/MPS EPP studentships.

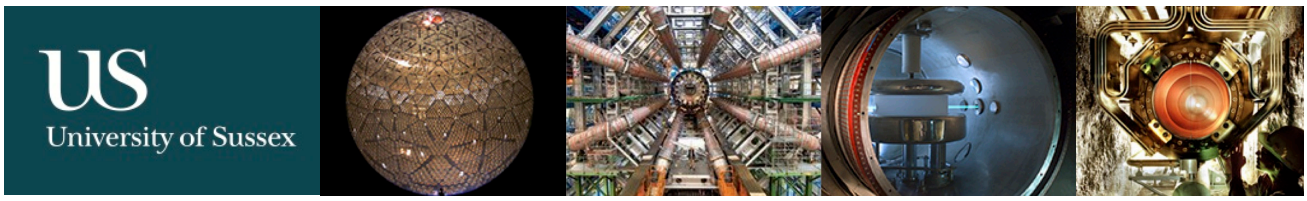
Available Projects:

Investigating BSM contributions to processes with top quarks in ATLAS

Lacking clear signals of physics beyond the Standard Model, it is crucial to investigate whether small new physics contributions may affect rare Standard Model processes. Focusing mainly on the associated production of top quarks with vector bosons, the candidate will further develop a strategy to use inclusive and differential cross section measurements sensitive to different contributions in 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 in association with tops and bottoms. The group has also had significant contributions in all measurements of ttZ production in three-lepton final states performed so far in ATLAS: profiting from this role of the group, the candidate will be ideally positioned to make large impact in this sector, also through close contact with CERN-based experts. (Supervisor: Prof. Iacopo Vivarelli, i.vivarelli@sussex.ac.uk)

Fermilab SBND liquid argon neutrino detector commissioning and analysis

A number of experiments have shown anomalies in neutrino oscillation results, hinting at a possible additional neutrino state beyond the three present in the Standard Model. The Short Baseline Neutrino programme at Fermilab aims to settle the question of whether or not the anomalies are real or not, with a set of three large liquid argon TPC neutrino detectors: ICARUS, MicroBooNE, and the Short Baseline Near Detector (SBND). SBND will begin taking data in 2020, and this project will involve helping with final installation and optimisation of the detector, and analysis of initial data. The detector technology used in SBND also provides the basis for the far detector planned for the next generation long baseline oscillation experiment, DUNE, and this project will also involve helping determine the final design for this future mega-experiment. (Supervisor: Dr. Clark Griffith, w.c.griffith@sussex.ac.uk)



PhD Studentships in Experimental Particle Physics at University of Sussex

Precision flavour physics measurements with the ATLAS detector

Precision measurements in known sectors of the Standard Model can pinpoint discrepancies with respect to its predictions, therefore producing indications of new physics. The flavour sector is one of the richest well-modelled precision domains where hints of discrepancies are being investigated. Thanks to the high luminosity provided by the LHC, the ATLAS experiment can achieve unprecedented precision in some of these measurements. The Sussex ATLAS group is currently involved in the search for the very rare disintegration of B mesons into two muons, as well as exploring lepton flavour violation-related observables. You will build on the experience of the existing Sussex ATLAS group analyses in the flavour sector and additional indirect searches for new physics. The efficient collection of large samples is the foundation for detection of such effects with sufficient sensitivity. You will therefore participate also in the development of the ATLAS trigger High Luminosity upgrade. Due to the centrality of CERN-based activities in this project, frequent and possibly also extended trips to CERN and collaborating institutes are envisaged. (Supervisor: Prof. Alessandro Cerri, a.cerri@sussex.ac.uk)

Machine Learning for precision Standard Model measurements: preparing for Run 3 at the Large Hadron Collider

A PhD project is available to join the Sussex team working on the ATLAS experiment at the Large Hadron Collider. The student will work on exploiting Machine Learning techniques for precision measurements within the Standard Model of particle physics, and will spend a fraction of their time working on technical aspects of the trigger system used for collecting events of interest in the LHC Run 3 beginning in 2021. Regular contact with CERN-based experts over an extended period of time, with the possibility of spending up to 18 months at CERN in the second year of the PhD, as well as regular attendance in person and videoconference to physics and trigger meetings are expected. (Supervisor: Dr. Lily Asquith, l.asquith@sussex.ac.uk)

NOvA and DUNE Neutrino Oscillations

The recent discovery of the last neutrino mixing angle (theta13) has opened a door to discovering the pattern of the neutrino masses and whether neutrinos violate CP symmetry: two of the very last missing pieces of the standard model of particle physics extended to include neutrino masses. Neutrinos may provide the answer to the big question of why the universe is dominated by matter and not antimatter. With the NOvA experiment you will have the opportunity to compare data taken with a beam of neutrinos to those from a beam of antineutrinos, looking for differences. The physics reach of NOvA is unique due to its long 810 km baseline combined with the high power and well understood beam of (anti)neutrinos. The DUNE experiment is the successor to NOvA and will use huge liquid argon TPC detectors. With DUNE you will have the opportunity to help design and build the experiment for the future. (Supervisor: Prof. Jeff Hartnell, j.j.hartnell@sussex.ac.uk)

SNO+ Neutrino Experiment

SNO+ offers a rich programme of neutrino physics, which includes neutrinoless double beta decay, antineutrinos from reactors and geothermal activity, solar neutrinos and a supernova watch. It is located at SNOLAB, 2 km underground in the Creighton mine in Canada. Data-taking commenced in 2017, with scintillator fill currently underway. The successful candidate is expected to work on the analysis of antineutrinos, focusing on an oscillation measurement using nearby reactor sources. The student will also spend some fraction of their time developing software for the calibration of the experiment and for data quality assurance, as well as participating in SNO+ experimental operations. The project is likely to involve spending an extended period of time at SNOLAB. (Supervisor: Dr. Lisa Falk, e.falk@sussex.ac.uk)