Matthew Citron

PhD student, Imperial College London

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Education

2013–2017 **PhD candidate, Experimental High Energy Physics**, *Imperial College London*

Supervisor: Dr. Oliver Buchmüller

Thesis - Searching for supersymmetry in 13 TeV proton-proton collisions with the CMS detector at the LHC (expected thesis submission March 2017)

2012–2013 **MSc, Quantum Fields and Fundamental Forces**, *Imperial College London*, Distinction

Supervisor: Prof. Arrtu Rajantie

Thesis - Spontaneous and induced false vacuum decay

2009–2012 **BSc, Physics with Theoretical Physics**, *Imperial College London*, First Class Honours

Supervisor: Dr. Oliver Buchmüller

Thesis - The effect of measurement on supersymmetric parameter space

2003–2009 **Secondary school**, *Hyndland Secondary School, Glasgow, UK*

Advanced Higher (equivalent EQF level 5) Physics, Chemistry, Mathematics - all A

Higher (equivalent EQF level 4) Physics, Chemistry, Mathematics, English, History - all A

Academic Experience

2013–2017 **PhD candidate, Experimental High Energy Physics**, *Imperial College London*

Search for supersymmetry in 13TeV proton-proton collisions with the CMS experiment at the LHC

Held a key role in ensuring the results from the α_T search for supersymmetry were among the first to be shown publicly with $2.3fb^{-1}$ of data at CERN in November 2015 and with $12.9fb^{-1}$ of data at ICHEP16

Responsible for developing the statistical analysis of the search as well as looking at new variables and strategies to optimise sensitivity to a wide range of models

Worked on development of python framework for analysis

For the CMS collaboration, worked to develop the jet algorithm for the Stage 2 upgrade of the CMS Level One trigger, particularly focusing on novel methods of pile-up subtraction

Undertook trigger shifts for CMS

Moved to France to work at CERN (2014-2016)

Honorary Research Associate at Bristol University (from 2015)

Additionally, member of a phenomenology collaboration (MasterCode) with which I have worked to determine the impact of direct searches at CMS and ATLAS on the allowed parameter space of GUT scale models

Summer 2012 **Undergraduate research opportunities programme (UROP)**, *Imperial College London*

As part of the MasterCode collaboration, recast searches for supersymmetry at the LHC for use in a scan of GUT scale models to determine the impact of these searches on the SUSY parameter space

Gained experience with event generation (PYTHIA) as well as fast detector simulation (DELPHES)

Additionally, studied the decay times of long-lived supersymmetric taus as part of a proposal for a new search

Both the work within the mastercode collaboration and the study of supersymmetric taus contribute to publications for which I am a co-author

Summer 2011 **DAAD Scholarship**, *Max-Planck-Institut für Kernphysik (MPIK), Heidelberg*

Research placement working with the electron beam ion trap (EBIT) group at MPIK

Assist the EBIT group at MPIK with research into highly charged ions

Experience in experimental techniques and data analysis from work on using an EBIT as a Penning trap

Hardware experience from operating EBIT as well as designing and producing electrical field setup for Penning trap

Summer 2010 **Work placement**, *Scottish Universities Environmental Research Centre (SUERC)*

Research placement working with the luminescence department at SUERC

Gained experience in experimental techniques and data analysis through investigating the luminescent properties of different materials with the aim of using luminescence as an environmental dosimeter

Positions of responsibility

Summer 2016 Contact person for α_T analysis in weeks preceding ICHEP16 conference

from 2014 Experienced member of α_T search for SUSY within the CMS collaboration and responsible for major analysis updates

from 2014 Active roles in several working groups within the SUSY group including the top corridor working group and level one trigger strategy

from 2014 Organise the Imperial College HEP group's monthly coders club in which students and staff present on interesting topics in coding and computing

from 2012 Member of the MasterCode collaboration of theorists and experimentalists

Awards and grants

2013–2017 PhD funded by the UK Science and Technologies Funding Council

2015 The CMS team within the High Energy Physics group of Imperial College London was awarded *The Imperial College President's Award for Excellence in Research*

2012 & 2013 UROP funding to carry out research at Imperial College London

2011 DAAD RISE Scholarship to carry out research in Germany for 10 weeks

2009 School prizes for physics, maths and chemistry

Teaching and outreach

2014 Demonstrator for computing lab for 2nd year undergraduates in physics at Imperial College (2014)

Summer 2014 and 2015 On two occasions supervised school pupil at CERN for a week long research placement

Spring 2016 Joined my local MP on a tour of CERN to explain my work and the general activities at CERN

Computing

Large dataset analysis

Bash, Unix OS, git, SVN, C++, python, CMSSW, ROOT, LaTeX

Scientific communication

Presentations and conferences

2014 & 2016 Presented results of all-hadronic SUSY search and trigger work at meeting of all UK institutes working on CMS (CMS UK) on two occasions

2016 Presented results of all-hadronic SUSY search at the joint annual HEPP and APP conference in Brighton

from 2014 I have presented work carried out by myself and colleagues on many occasions to the supersymmetry (SUSY) group at CERN

Summer schools

2016 Attended the CERN-Fermilab Summer School in Fermilab, Chicago

Publications

As a member of the CMS Collaboration for several years, I am a co-author of more than 150 publications, which can be found at `inSPIRE`. I have provided significant contributions to the following publications, conference proceedings, preliminary results, and other public notes. In addition, I have been a co-author of five papers as a member of the MasterCode collaboration as well as two phenomenology papers with other collaborators.

Publications

- E. Bagnaschi et al. Supersymmetric Dark Matter after LHC Run 1. *Eur. Phys. J.*, C75:500, 2015.
- E. Bagnaschi et al. Likelihood Analysis of Supersymmetric SU(5) GUTs. 2016.
- O. Buchmueller et al. The CMSSM and NUHM1 in Light of 7 TeV LHC, $B_s \to \mu^+\mu^-$ and XENON100 Data. *Eur. Phys. J.*, C72:2243, 2012.
- O. Buchmueller et al. The NUHM2 after LHC Run 1. *Eur. Phys. J.*, C74(12):3212, 2014.
- O. Buchmueller et al. Collider Interplay for Supersymmetry, Higgs and Dark Matter. *Eur. Phys. J.*, C75(10):469, 2015. [Erratum: Eur. Phys. J.C76,no.4,190(2016)].
- M. Citron et al. End of the CMSSM coannihilation strip is nigh. *Phys. Rev.*, D87(3):036012, 2013.

- M. Citron and N. Wardle. Simplified likelihood for the re-interpretation of public CMS results. 2016. In preparation.
- CMS Collaboration. Search for new physics in final states with jets and missing transverse momentum in $\sqrt{s} = 13$ TeV pp collisions with the α_T variable. 2015. Submitted to EPJC.
- CMS Collaboration. An inclusive search for new phenomena in final states with one or more jets and missing transverse momentum at 13 TeV with the AlphaT variable. 2016. In preparation for submission to journal.
- K. J. de Vries et al. The pMSSM10 after LHC Run 1. *Eur. Phys. J.*, C75(9):422, 2015.
- Kreis, B. and others. Run 2 Upgrades to the CMS Level-1 Calorimeter Trigger. In *Proceedings, Topical Workshop on Electronics for Particle Physics (TWEPP15): Lisbon, Portugal, September 28 - October 02, 2015*, volume 11, page C01051, 2016.
- Zabi, A. and others. Triggering on electrons, jets and tau leptons with the CMS upgraded calorimeter trigger for the LHC RUN II. In *Proceedings, Topical Workshop on Electronics for Particle Physics (TWEPP14): Aix en Provence, France, September 22-26, 2014*, volume 11, page C02008, 2016.

Other activities

I am an enthusiastic rock climber, runner and skier

Referees

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