

Julien Donini

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Professor Université Clermont Auvergne (UCA)

Laboratoire de Physique de Clermont (LPC), France

Professional career

- 2011 Professor at Université Clermont Auvergne, Clermont-Ferrand.
- 2010 Habilitation to supervise Research, Université Joseph Fourier, Grenoble.
- 2008-2011 Post-Doctorate, Laboratoire Physique Subatomique et de Cosmologie, Grenoble.
- 2003-2008 Post-Doctorate, Institut de Physique Galileo Galilei de Padoue (Italie).
- 2002-2003 ATER, Institut de Physique Nucléaire, Université Claude Bernard (UCB), Lyon.
- 1999-2002 Ph.D Thesis, Institut de Physique Nucléaire de Lyon, UCB Lyon.

Research

Since 2008 : **ATLAS** experiment at LHC (CERN)

- 2016- : Development of AI methods for new physics searches.
- 2011-2019 : Search for new resonances in the quark top sector (W' , H^+)
- 2008-2011: Measurement of the cross-sections of electroweak top-quark production.

2003-2008 : **CDF** collaboration at Tevatron (Fermilab)

- Higgs boson searches
- Measurement of $Z \rightarrow b\bar{b}$ cross-section and b-jets calibration

2002-2003 : **D0** collaboration at Tevatron (Fermilab)

- Electromagnetic calorimeter calibration

1999-2002 : **CMS** experiment at LHC(CERN)

- Performance studies of the electromagnetic calorimeter of CMS
- Demonstrating the feasibility of the search for the Higgs boson

Responsabilités scientifiques

- Supervision of 8 theses (2 ongoing) and 3 post-doctoral fellows
- 2016- : Head of ML axis and new physics research: LPC ATLAS team
- 2020- : MODE (ML Optimized Design of Experiments) Steering Committee
- 2015-2019 : Principal Investigator European project MSCA-ITN - MVA4NewPhysics
- 2011-2019 : Analysis contact for $W' \rightarrow t\bar{b}$ (1 lepton) analysis, ATLAS collaboration
- 2011-2015: Member of the TopLHCWG: Single-Top cross-section combination
- 2010-2011 : ATLAS « Single-top » group convener

Collective interest functions

- 2023- : Scientific Delegate "Artificial Intelligence" at IN2P3
- 2021- : Appointed member of the LPC Unit Council

Teaching responsibilities

- 2021-: Head of the Fundamental Physics and Applications Master's program at UCA
- 2021-: Elected member of the Training and University Life Council (CFVU)
- 2017-: Creation and responsibility for the Data Scientist University Diploma at UCA
- 2017-: Member of the Physics Council: University School of Physics and Engineering

Expertise and outreach

- CNRS-Enterprise Training Manager: Bayesian Inference (2023, 2024)
- Organizing committee for 6 editions of the IN2P3 School of Statistics, since 2012
- Guest lecturer: International School On HEP, Cargèse (2019, 2020, 2023)
- Guest speaker: LPNHE 2022, LLR 2021, Orsay 2020 & 2019
- Presentations IN2P3 prospective days: Computation, algorithms and data (2019)
- Member of the internal editorial board of several ATLAS collaboration publications.
- Referee for international journals (NeurIPS, Review in Physics, Particle Data Group...)
- Participation in 7 thesis committees and 2 HDR committees

Workshop organisation

- Organization of AISSAI workshop on anomaly detection (March 2024)
- Scientific Advisory Board: MODE Workshops (2021, 2022, and 2023)

Projects and grants

- Marie-Curie H2020 action, 2015–2019, budget 233k€ (total of 2,4 M€).
- “New Researcher” funding from the Auvergne region, 2012-2015, budget: 140k€

Publications

Signatory of ATLAS publications (>1.2k articles), h-index 159.

Main articles of which I am the author or a major contributor :

- L. Vaslin, V. Barra, J. Donini, GAN-AE : An anomaly detection algorithm for New Physics search in LHC data, Eur. Phys. J. C 83, 1008 (2023), <https://doi.org/10.1140/epjc/s10052-023-12169-4>
- L. Vaslin, S. Calvet, V. Barra, J. Donini, pyBumpHunter: A model independent bump hunting tool in Python for High Energy Physics analyses, publication dans SciPost Phys. Codebases 15 (2023), <https://scipost.org/SciPostPhysCodeb.15>

- Toward the end-to-end optimization of particle physics instruments with differentiable programming, Reviews in Physics Volume 10, Juin 2023.
<https://doi.org/10.1016/j.revip.2023.100085>
- L. Vaslin, S. Calvet, V. Barra, J. Donini, Fitting the BumpHunter test statistic distribution and global p-value estimation, soumis à la revue Scipost Physics,
<https://arxiv.org/abs/2211.07446>
- Advances in Multi-Variate Analysis Methods for New Physics Searches at the Large Hadron Collider, Reviews in Physics Volume 7, December 2021, 100063,
<https://doi.org/10.1016/j.revip.2021.100063>.
- The LHC Olympics 2020: A Community Challenge for Anomaly Detection in High Energy Physics, Reports on Progress in Physics. Issues. Volume 84, 124201, 2021,
<https://iopscience.iop.org/article/10.1088/1361-6633/ac36b9>
- ATLAS Collaboration, Search for vector-boson resonances decaying to a top quark and bottom quark in the lepton plus jets final state in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector, Physics Letters B 788 (2019) 347-370
<https://doi.org/10.1016/j.physletb.2018.11.032>
- Cid Vidal et al., Beyond the Standard Model Physics at the HL-LHC and HE-LHC, CERN-LPCC-2018-05, 2018, <https://arxiv.org/abs/1812.07831>.
- ATLAS Collaboration, Search for $W' \rightarrow tb$ in the lepton plus jets final state in proton–proton collisions at a centre-of-mass energy of 8 TeV with the ATLAS detector, Physics Letters B 743 (2015) 235-255,
<http://www.sciencedirect.com/science/article/pii/S0370269315001422>
- ATLAS Collaboration, Search for charged Higgs bosons in the $H^\pm \rightarrow tb$ decay channel in pp collisions at $\sqrt{s}=8$ TeV using the ATLAS detector, Journal of High Energy Physics, 2016, JHEP03 (2016) 127. <http://arxiv.org/abs/1512.03704>
- ATLAS Collaboration, Search for invisible particles produced in association with single-top-quarks in proton-proton collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector, Eur. Phys. J. C (2015) 75:79, <http://link.springer.com/article/10.1140/epjc/s10052-014-3233-4>
- ATLAS and CMS Collaborations, Combination of cross-section measurements for associated production of a single top-quark and a W boson at $\sqrt{s} = 8$ TeV with the ATLAS and CMS experiments, ATLAS-CONF-2014-052, 2014,
<https://cds.cern.ch/record/1951032>.
- ATLAS and CMS Collaborations, Combination of single top-quark cross-sections measurements in the t-channel at $\sqrt{s}=8$ TeV with the ATLAS and CMS experiments, ATLAS-CONF-2013-098, 2013, <https://cds.cern.ch/record/1601029>.
- ATLAS Collaboration, Measurement of the t-channel single top-quark production cross section in pp collisions at $\sqrt{s} = 7$ TeV with the ATLAS detector, Phys. Lett. B 717 (2012) 330-350, <http://www.sciencedirect.com/science/article/pii/S0370269312009781>
- J. Donini et al., Energy calibration of b-quark jets with $Z \rightarrow b\bar{b}$ decays at Tevatron collider, Nucl. Instrum. Meth. A596, 354, 2008.
<http://www.sciencedirect.com/science/article/pii/S0168900208013090>