

Andrea Di Luca
Curriculum vitae
(Updated December 17, 2020)

CONTACTS

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EDUCATION

University of Trento Ph.D. Candidate in Physics Advisors: Prof. Roberto Iuppa, Dott. Marco Cristoforetti	<i>Nov. 2018 – present</i>
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University of Pisa Master degree in Physics Thesis: ” <i>Real-time reconstruction of tracks in the Scintillating Fibre Tracker of the LHCb Upgrade</i> ” Advisor: Dott. Michael J. Morello Final mark: 110/110	<i>Sept. 2015 – Oct. 2018</i>
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University of Pisa Bachelor degree in Physics Thesis: ” <i>Statistical behaviour of indistinguishable particles in two-dimensional systems</i> ” Advisor: Prof. Massimo D’Elia Final mark: 108/110	<i>Sept. 2012 – Oct. 2015</i>
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ACTIVITY AT ATLAS EXPERIMENT

Flavor Tagging
Member of Flavor tagging algorithm group.

- Development and performance reproducibility study of the DL1 framework¹.

PAPERS

[15] Georges Aad et al. “Charged-lepton-flavour violation at the LHC: a search for $Z \rightarrow e\tau/\mu\tau$ decays with the ATLAS detector”. In: (Oct. 2020). arXiv: 2010.02566 [hep-ex].

[14] Georges Aad et al. “Measurements of Higgs Bosons Decaying to Bottom Quarks from Vector Boson Fusion Production with the ATLAS Experiment at $\sqrt{s} = 13$ TeV”. In: (Nov. 2020). arXiv: 2011.08280 [hep-ex].

[13] Georges Aad et al. “Medium-induced modification of Z -tagged charged particle yields in Pb+Pb collisions at 5.02 TeV with the ATLAS detector”. In: (Aug. 2020). arXiv: 2008.09811 [nucl-ex].

[12] Georges Aad et al. “Muon reconstruction and identification efficiency in ATLAS using the full Run 2 pp collision data set at $\sqrt{s} = 13$ TeV”. In: (Dec. 2020). arXiv: 2012.00578 [hep-ex].

[11] Georges Aad et al. “Observation and measurement of forward proton scattering in association with lepton pairs produced via the photon fusion mechanism at ATLAS”. In: (Sept. 2020). arXiv: 2009.14537 [hep-ex].

[10] Georges Aad et al. “Observation of photon-induced W^+W^- production in pp collisions at $\sqrt{s} = 13$ TeV using the ATLAS detector”. In: (Oct. 2020). arXiv: 2010.04019 [hep-ex].

[9] Georges Aad et al. “Search for a heavy Higgs boson decaying into a Z boson and another heavy Higgs boson in the $\ell\ell b\bar{b}$ and $\ell\ell WW$ final states in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector”. In: (Nov. 2020). arXiv: 2011.05639 [hep-ex].

[8] Georges Aad et al. “Search for dark matter produced in association with a dark Higgs boson decaying into $W^\pm W^\mp$ or ZZ in fully hadronic final states from $\sqrt{s} = 13$ TeV pp collisions recorded with the ATLAS detector”. In: (Oct. 2020). arXiv: 2010.06548 [hep-ex].

[7] Georges Aad et al. “Search for dark matter produced in association with a single top quark in $\sqrt{s} = 13$ TeV pp collisions with the ATLAS detector”. In: (Nov. 2020). arXiv: 2011.09308 [hep-ex].

[6] Georges Aad et al. “Search for displaced leptons in $\sqrt{s} = 13$ TeV pp collisions with the ATLAS detector”. In: (Nov. 2020). arXiv: 2011.07812 [hep-ex].

[5] Georges Aad et al. “Search for heavy resonances decaying into a pair of Z bosons in the $\ell^+\ell^-\ell'^+\ell'^-$ and $\ell^+\ell^-\nu\bar{\nu}$ final states using 139 fb⁻¹ of proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector”. In: (Sept. 2020). arXiv: 2009.14791 [hep-ex].

[4] Georges Aad et al. “Search for Higgs boson production in association with a high-energy photon via vector-boson fusion with decay into bottom quark pairs at $\sqrt{s}=13$ TeV with the ATLAS detector”. In: (Oct. 2020). arXiv: 2010.13651 [hep-ex].

[3] Georges Aad et al. “Search for pair production of scalar leptoquarks decaying into first- or second-generation leptons and top quarks in proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector”. In: (Oct. 2020). arXiv: 2010.02098 [hep-ex].

[2] Georges Aad et al. “Search for squarks and gluinos in final states with jets and missing transverse momentum using 139 fb⁻¹ of $\sqrt{s}=13$ TeV pp collision data with the ATLAS detector”. In: *PoS EPS-HEP2019* (2020), p. 605. doi: 10.22323/1.364.0605. arXiv: 2010.14293 [hep-ex].

[1] Riccardo Cenci et al. “Real-time reconstruction of long-lived particles at LHCb using FPGAs”. In: *J. Phys. Conf. Ser.* 1525.1 (2020), p. 012101. doi: 10.1088/1742-6596/1525/1/012101. arXiv: 2006.11067 [physics.ins-det].

Works in Progress

- Andrea Di Luca, Francesco Maria Follega, Roberto Iuppa, Marco Cistoforetti, *Automated selection of particle-jet features for data analysis in High Energy Physics experiments, ICHEP 2020 proceeding*, PoS(ICHEP2020)907, submitted

¹A novel higher-level flavour tagging algorithm based on deep neural network.

PRESENTATIONS

Conferences

- 106° Congresso Nazionale Società Italiana di Fisica Title Selezione automatizzata delle osservabili dei jet di particelle per le analisi dati negli esperimenti di fisica delle alte energie.
- 40th International Conference on High Energy Physics (ICHEP 2020) Title: Automated selection of particle-jet features for data analysis in High Energy Physics experiments
- ATLAS physics workshop ”Run 2 Physics, Reaching New Heights”9-13 December 2019, CERNTitle: ”Automated selection of particle-jet features for data analysis in ATLAS experiment”
- 4th ATLAS Machine Learning Workshop 11-15 November 2019, CERN Title: ”Automated selection of particle-jet features for data analysis in ATLAS experiment”
- 19th International Workshop on Advanced Computing and Analysis Techniques in Physics Research 10-15 March 2019, Steinmatte conference centerTitle:”Real-time reconstruction of long-lived particles at LHCb using FPGAs.”

TEACHING EXPERIENCE

University of Trento

- Teaching assistant *A.Y. 2019/2020*
Physics course for Bachelor’s degree in Information Technology
 - Prepared and remotely taught weekly 2-hour lectures.
 - Prepared and graded course exams.
- Teaching assistant *A.Y. 2018/2019*
Physics course for Bachelor’s degree in Information Technology
 - Prepared and graded course exams.

OUTREACH ACTIVITY

International Masterclass 2019

Member of the local organizing committee in Trento

- Introduced machine learning concepts and some high energy physics application to high school students.
- Supervised and assisted students during the afternoon analysis session.

ORGANIZATION EXPERIENCE

Physics PhD Workshop 2020

Member of organizing committee

- Workshop website developer and maintainer

11th Young Researcher meeting 2020

Member of local organizing committee

- Conference website maintainer

SCHOOLS

- INFN School of statistics, 02-07 June 2019, Paestum
- VI International GEANT 4 School, 26-30 November 2018, Trento

JOB RELATED SKILLS

Programming

- Pyhton, C++
- Latex
- Verilog

Physics tools

- Pythia, Madgraph, and Delphes
- GEANT4 toolkit

Data science

- Pytorch, Tensorflow/Keras

Website developer

- Basic HTML and CSS knowledge
- Wordpress