

PERSONAL INFORMATION

Giovanni Padovano

CV APPLIED FOR Pubblicazione amministrazione trasparente

BRIEF PRESENTATION

I am a high energy physicist, working in the ATLAS experiment at CERN (Geneva, Switzerland). I am involved in physics and performance analyses in the ATLAS Collaboration, with experience in final states with τ -leptons. I have also experience on trigger system hardware and I am involved in ATLAS operations.

WORKING EXPERIENCE

Employment history:

May 2024 - ongoing - **Post-doctoral researcher**. Sapienza University of Rome, Rome (IT). Title of the research: *Precision physics with tau-leptons and upgrade of the L0 muon trigger of the ATLAS experiment at the LHC*. Responsible: Prof. S. Giagu.

Visiting periods in foreign institutions:

- **University of Oxford** (6 weeks, 11 January 2025 - 22 February 2025). Host academic: Prof. Chris Hays. Motivation: leptoquark interpretation studies for the di-tau High Mass Drell-Yan analysis and Higgs to $\tau\tau$ measurements.

- **University College London** (4 weeks, 10 April 2024 - 8 May 2024). Host academic: Prof. Jon Butterworth. Motivation: unfolding studies for the di-tau High Mass Drell-Yan analysis.

- **CERN** (total of 7 months, along 2023-2025). CERN User. Motivation: operations activities, trigger hardware tests.

EDUCATION

November 2020 - February 2024 - **Ph.D in Physics**. Sapienza University of Rome, Rome (IT).

Supervisors: Prof. S. Giagu and Dr. M. Bauce. Referee: Dr. A. Nisati.

Thesis: *Study of the di-tau Drell-Yan process with the ATLAS experiment: a probe for new physics in the Standard Model flavour sector*.

Thesis defence date: 28/05/2024. Mark: Excellent.

September 2017 - March 2020 - **Master's Degree in Physics**. Sapienza University of Rome, Rome (IT).

Thesis: *Search for invisible Higgs boson decays in the VBF production channel with the ATLAS experiment at the LHC*. Supervisor: Prof. S. Giagu. Average grade of exams: 30.0/30.

Mark: 110/110 cum laude.

September 2015 - November 2017 - **Bachelor's Degree in Physics**. Sapienza University of Rome, Rome (IT).

Thesis: *Direct Dark Matter detection with directional techniques*. Supervisor: Prof. S. Giagu. Average grade of exams: 29.4/30.

Mark: 110/110 cum laude.

September 2012 - July 2015 - **Bachelor's Degree in Aerospace Engineering**. Sapienza University of Rome, Rome (IT).

Thesis: *Zero-dimensional internal ballistics modelling of a hybrid rocket motor*. Supervisor: Prof. D. Bianchi. Average grade of exams: 29.16/30, with "excellent students" program.

Mark: 110/110 cum laude.

RESEARCH ACTIVITIES

I am involved in research activities as a member of the ATLAS Collaboration, spanning across physics and performance analyses, hardware development and detector operations.

Physics analyses:

- **Higgs to $\tau\tau$ (kicked-off on 4/10/24, ongoing).** Study of the Higgs coupling to tau-leptons and cross section measurement with 2022-26 data. Involved in the analysis definition and preliminary studies.
- **Di-Higgs to $bb\ \tau\tau$ (member since 1/10/24, ongoing).** Study of the di-Higgs production using final states with tau-leptons and b -jets with 2015-18+2022-23 data. Responsible for: Monte-Carlo ttH samples validation, systematic uncertainties on the signal.
- **Di-tau High Mass Drell-Yan (Jan. 2021 - Mar. 2025).** Search for leptoquark particles coupling to tau-leptons and b -jets and differential cross section measurement of the di-tau Drell-Yan process, using 2015-18 data. Main analyser. Responsible for: backgrounds estimation, data/MC comparison framework, fake-tau estimate, systematics assessment (experimental and modelling), comparison with leptoquark theory models. Contributed to: statistical fitting framework, unfolding.
- **VBF+MET (during Master's thesis, completed).** Search for Dark-matter particles through invisible decays of Higgs bosons produced in the VBF mode, with 2015-18 data. Main achievements: derived an upper limit for the Higgs-to-invisible branching fraction; tested the impact of a NN algorithm for forward-jets tagging.

Performance analyses with tau-leptons:

- **Tau Universal Fake Factors Method (Feb. 2023 - Jan. 2025).** Development of a new methodology for the estimate of the background of jets misidentified as fake tau-leptons, with 2015-18 data. Main achievements: validation of the method with di-tau final states; assessment of the method's uncertainties.

Hardware:

- **L0 Muon Barrell trigger Phase-II upgrade (Jan. 2021 - Nov. 2024).** FPGA firmware development for the Phase-II Sector Logic board of the L0 Muon barrel trigger system. Main achievements: developed and tested the firmware implementing the readout functionality of the Sector Logic; integrated the firmware with trigger and I/O functionalities.

Operations:

- **Muon desk shifter in the ATLAS Control Room (2023 - 2025).** Responsible for the Muon system during shifts in Run3 ATLAS detector operations.
- **Trigger and Run Control desks shifter in the ATLAS Control Room (2024 - 2025).** Responsible for the Trigger system during shifts in Run3 ATLAS detector operations, serving also as backup for the Run Control system (both roles at the same time).
- **Trigger signatures expert (2024 - 2025).** Responsible for validation and sign-off of the recorded Run3 data, focusing on Jets, Missing Energy and Calorimeters signatures.

RESPONSIBILITIES WITHIN ATLAS

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|--------------------------------|--|
| 01/10/24 - 30/09/26 (expected) | - Convener of the Fake Tau Task Force subgroup. Responsible for: leading the working group; following 1 PhD student working on Run3 tau Fake Factors calculation. The subgroup is embedded in the ATLAS Tau Combined Performance group. |
| 01/08/24 - to be determined | - Monte Carlo manager for the ATLAS Exotics group. Responsible for processing and approval of Monte Carlo requests for the ATLAS Exotics group. |

TALKS AT CONFERENCES

International conferences or major national conferences:

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|----------------|--|
| September 2024 | Diffraction and low-x 2024 [international, ATLAS + CMS talk] - Trabia (Italy).
Presentation title: Vector boson production in association with jets at ATLAS and CMS (including heavy flavour jets). Conference web page . |
| May 2023 | LHCP 2023: The LHC Physics conference [international, ATLAS talk] - Belgrade (Serbia).
Presentation title: Leptoquarks and other leptonic final states at ATLAS. Conference web page . |
| April 2023 | IFAE 2023: Incontri di Fisica delle Alte Energie [national] - Catania (Italy). |

Presentation title: Measurement of the Drell-Yan process with tau-leptons and searches for leptoquark particles with the ATLAS experiment at the LHC. [Conference web page](#).

Minor conferences:

- September 2023 109° congress of the Italian Physical Society - Salerno.
Presentation title: Measurement of the Drell-Yan process with tau-leptons and search for lepto-quark particles with the ATLAS experiment at the LHC.
- September 2022 108° congress of the Italian Physical Society - Milan.
Presentation title: Cross section measurement for the $Z \rightarrow \tau\tau$ process and forward-backward asymmetry.
- September 2021 107° congress of the Italian Physical Society - Online.
Presentation title: Search for Higgs boson invisible decays in the VBF production channel with the ATLAS experiment at the LHC.

TALKS AT ATLAS SUMMARY MEETINGS AND WORKSHOPS

Talks at subgroup meetings, Editorial Board meetings, Design Review meetings:

- 1 presentation at the Exotics group plenary meeting on behalf of the di-tau High Mass Drell-Yan analysis team (Feb. 2025).
- 1 presentation at the Higgs HLeptons subgroup meeting (May 2024).
- 1 presentation at the ATLAS TauCP workshop (Mar. 2024).
- 1 presentation at the Editorial Board meeting on behalf of the di-tau High Mass Drell-Yan analysis team (Dec. 2023).
- 2 presentations at the Exotics LPX subgroup meeting on behalf of the di-tau High Mass Drell-Yan analysis team (Apr. 2023, May 2022).
- 2 presentations at the Preliminary Design Review meetings for the L0 Muon Barrel trigger Phase-II upgrade (Mar. 2022, Dec. 2021).

Talks at ATLAS Internal workshops:

- 1 talk at the "Roma - Tokyo trigger" meetings (Dec. 2023).
- 2 talks at the ATLAS Italy collaboration meetings (Sep. 2023, Sep. 2021).
- 1 talk at the ATLAS upgrade week (Nov. 2022).

POSTERS

- April 2025 **IFAE 2025: Incontri di Fisica delle Alte Energie** - Cagliari (Italy).
Title: Estimation of backgrounds from jets misidentified as τ -leptons using the Universal Fake Factor method with the ATLAS detector. [Conference web page](#).
- December 2022 **ESHEP 2022** - Tel Aviv (Israel).
Title: Standard Model precision physics with tau-leptons with the ATLAS experiment at the LHC.

GRANTS AND FUNDING

- **Fondazione della Riccia grant 2024**, Fondazione Angelo della Riccia, Firenze, 2000 EUR.
Obtained as PI. Research project on the ATLAS Higgs to $\tau\tau$ Run3 measurement and the di-Higgs bbtatau Run2+Run3 search.
- **Avvio alla ricerca 2024**, Sapienza University of Rome, 2000 EUR.
Obtained as PI. Research project on preparatory studies for ATLAS Higgs to $\tau\tau$ Run3 measurement. Used for a visiting period at the University of Oxford.
- **Avvio alla ricerca 2023**, Sapienza University of Rome, 2000 EUR.
Obtained as PI. Research project on complementary studies within the ATLAS di-tau High Mass Drell-Yan physics analysis. Used for a visiting period at the University College London.

- **Avvio alla terza missione 2021**, Sapienza University of Rome, 3000 EUR.

Grant to support outreach activities with the “HEPscape!” project. Obtained as team member, together with other two PhD students.

PRIZES AND AWARDS

- **Tito Maiani thesis award 2023 - Accademia Nazionale dei Lincei**

Lincei is the National Academy of Science in Italy. Prize “for master’s degree theses concerning the experimental study of the Universe, also in connection with elementary particle physics, gravitational waves detection from astrophysical and cosmological sources, the experimental study of the gravitational field properties.”

TEACHING AND SUPERVISION

Teaching assistance:

- **Calculus Laboratory (Sep. 2021 - Feb. 2022)**. Course for the Bachelor’s degree in Physics, Sapienza University of Rome, Prof. L. Soffi (resp.) and Prof. S. Rahatlou. Responsible for 40 hours of tutorship during laboratory sessions and exams sessions. Class of $\simeq 80$ students.

Students supervision:

- **C. R. Schmidt (Oct. 2024 - ongoing) [PhD student]**: tutor during qualification task in the ATLAS Collaboration, Technische Universitaet Dresden. Title of the project: Universal Fake Factors measurements using Run2 and Run3 data of the ATLAS experiment.

- **D. Fiacco (Dec. 2021 - Jul. 2022) [MSc student]**: tutor during Master’s thesis in Physics, Sapienza University of Rome. Advisor: Prof. S. Giagu. Thesis title: Graph Neural Network algorithms for the tau-leptons identification in the ATLAS experiment.

Educational training:

- **“Percorso 24CFU” (Mar. 2020 - Jul. 2020)**. Sapienza University of Rome, Rome (IT). I took a series of four exams in the fields of Pedagogy, Anthropology, Didactic methods that provided me training in education.

OUTREACH ACTIVITIES

Recurrent activities and projects:

- **HEPscape! The high energy physics escape room** (Sep. 2021 - Nov. 2024). Escape room on particle physics designed for children and high school students.

- **INFN Arts and Science project** (2022/23, 2025 editions). INFN outreach project involving high school students, consisting in seminars and production of works of arts on scientific themes.

- **CERN official guide** (during 2023). Trained as guide for the experimental facilities in CERN Meyrin site.

Other events

- International masterclass of particle physics (2021 + 2022 editions). Tutor.

- European Researchers Night (2021 + 2022 editions). Staff member.

- OpenLabs Frascati INFN National Laboratory (2022 edition). Staff member.

- Rome Science Festival (2022 edition). Staff member.

Outreach talks:

May 2025 (TBC) Liceo Scientifico Cavour (High school), as part of the “Arts and Science” project.

Presentation title: Looking at the infinitely small: Particle Physics, CERN and the science without frontiers.

July 2024 Sapienza University of Rome. Report for the university outreach activities.

Presentation title: Outreach at Sapienza - HEPscape: the high energy physics escape room.

May 2023 Liceo Scientifico Taletè (High school), as part of the “Arts and Science” project.
Presentation title: Discovering particle physics: the Istituto Nazionale di Fisica Nucleare and CERN.

PHYSICS SCHOOLS AND POST-GRADUATE COURSES

30 November - 13 December 2022 **CERN European school of High Energy Physics 2022**, University of Tel Aviv, Tel Aviv (Israel). Topic: current topics in particle physics. Organised by CERN.

14 - 23 June 2022 **ISOTDAQ school 2022**, University of Catania and INFN Laboratori Nazionali del Sud, Catania (Italy). Topic: trigger and data-acquisition for high energy physics. Organized by CERN.

15 - 20 May 2022 **INFN school of statistics 2022**, INFN sez. di Napoli, Paestum (Italy). Topic: statistics and data analysis. Organised by Istituto Nazionale di Fisica Nucleare (INFN).

18 – 22 January 2021 **2nd HEP C++ Course and Hands-on Training**, online due to COVID-19 pandemic. Topic: advanced C++ programming techniques. Organised by HEP Software foundation.

COMPUTER AND PROGRAMMING SKILLS

C, C++ Excellent knowledge. Skills in High Energy Physics data analysis packages (ROOT).

Python Excellent knowledge. Skills in deep-learning packages (Keras, Tensorflow).

R, Matlab Good knowledge.

Hardware programming VHDL, Xilinx Vivado toolkit.

Other software Latex, Office, Mathematica.

Operating systems Mac OS, Windows, Linux.

LANGUAGES

Italian Mother tongue.

English Excellent knowledge (C1). Master’s degree and PhD course in Physics attended in English language. Summer language courses at Surrey University (2010) and Staffordshire University (2011).

French Basic knowledge (B2).

OTHER PERSONAL INTERESTS

Sports I currently practice athletics. I practised at amateur level fencing, tennis, swimming.

Music I played the flute for several years. I obtained the “Licenza di teoria, solfeggio e dettato musicale” (June 2011) and the “Compimento of Flute” (October 2011) from Conservatorio di Musica “L. Refice”, Frosinone.

Publications and outputs of the candidate

I am qualified as author in the ATLAS Collaboration and I am therefore inserted in the authors list of each publication issued by the Collaboration since my qualification date. Together with the publications summary I provide below the list of primary publications and internal / technical notes to which I have given my major personal contribution. I also list my conference proceedings, as these can usually assess personal involvement in large extended collaborations.

PUBLICATIONS SUMMARY

Summary information derived from INSPIRE HEP. The complete list of publications can be accessed at: <https://inspirehep.net/authors/2148008>

Qualified as ATLAS author on: 25/01/2022

Published papers: 265

Number of citations: 7686

H-index: 40

Last update: 13/04/2025.

PRIMARY PUBLICATIONS

- ATLAS Collaboration, ***A measurement of the high-mass $\tau\tau$ production cross-section and constraints on leptoquarks and effective couplings with the ATLAS detector at $\sqrt{s} = 13$ TeV***, doi:10.48550/arXiv.2503.19836, submitted to JHEP.

Personal contribution: directly produced or contributed to all physics results included in the paper; produced most of the figures that are in the paper and in the auxiliary material.

- ATLAS Collaboration, ***Estimation of the backgrounds from jets misidentified as tau-leptons using the Universal Fake Factor method with the ATLAS detector***, doi:10.48550/arXiv.2502.04156, submitted to Eur. Phys. J. C.

Personal contribution: provided validation of the method with di-tau final states; contributed to the method's uncertainties determination.

Note: for deeper details on my contribution to the above publications see the description of the corresponding activity in the "Research Activities" section of the CV.

INTERNAL NOTES AND TECHNICAL NOTES

- ***Measurements and searches in high-mass $\tau\tau$ production with the ATLAS detector***. Personal contribution: authored Chapters on Data and MC samples, Background estimate, Uncertainties, Expected results; wrote 5 appendices; directly produced the large majority of plots. Link to the Note (ATLAS Internal): [ATL-COM-PHYS-2022-444](#).

- ***Universal Fake Factor Method***. Personal contribution: authored Chapters on the general method (implementation with di-tau final states), and uncertainties assessment. Link to the Note (ATLAS Internal): [ATL-COM-PHYS-2023-610](#).

- ***TDAQ L0 Muon Barrel Sector Logic Specifications***. Personal contribution: authored Chapters on Barrel Sector Logic firmware (Readout), and Specifications; produced corresponding schemes and tables. Document in internal GitLab repository: [ATLAS Doc. AT2-DA-ES-0001](#).

CONFERENCE PROCEEDINGS

As single author:

- G. Padovano, ***Vector boson production in association with jets at ATLAS and CMS (including Heavy Flavour jets)***, Acta Phys. Polon. Supp., 18 (2025) no.1, 1-A40, doi:10.5506/APhysPolBSupp.18.1-A40. Conference: Diffraction and low-x 2024.

- G. Padovano, ***Leptoquarks and other leptonic final states - ATLAS***, Proceedings of Science (PoS), LHCP2023 (2024), 155, doi:10.22323/1.450.0155. Conference: LHCP 2023.

- G. Padovano, ***Measurement of the High Mass Drell-Yan process in di-tau final states and leptoquark searches with the ATLAS experiment at the LHC***, Nuovo Cim. C 47 (2024) no.3, 79, doi:10.1393/ncc/i2024-24079-x. Conference: IFAE 2023.

As co-author:

- M. Bauce et al. [G. Padovano as co-author], **Low-latency hardware trigger for muons in the barrel region of the ATLAS experiment for the High-Luminosity LHC**. Submitted to JINST, preprint: [ATL-DAQ-PROC-2024-017](#). Conference: TWEPP 2024.
- S. Perrella et al. [G. Padovano as co-author], **ATLAS Level-0 Muon Barrel Trigger system status and integration tests for Phase-II**, Nucl. Instrum. Meth. A 1069 (2024), 169843, [doi:10.1016/j.nima.2024.169843](#). Conference: 16th Pisa Meeting on Advanced Detectors - Pisameet 2024.

OUTREACH PROCEEDINGS

- F. Cavallari et al. [G. Padovano as co-author], **Escape Rooms as a tool for science outreach: the HEPscape! experience**, Proceedings of Science (PoS), LHCP2024 (2025), 143, [doi:10.22323/1.478.0143](#). Conference: LHCP 2024.
- C. I. Rovelli et al. [G. Padovano as co-author], **HEPscape! The High Energy Physics Escape Room**, Proceedings of Science (PoS), ICHEP2022, 370, [doi: 10.22323/1.414.0370](#). Conference: ICHEP 2022.
- F. Cavallari et al. [G. Padovano as co-author], **HEPscape: an escape room about high energy physics**, proceedings of the 30th International Symposium on Lepton Photon Interactions at High Energies, published online: [link](#). Conference: Lepton Photon 2021.