GIULIANO GUSTAVINO

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N° of publications ▷ *Web Of Science*: 791, *Scopus*: 837 *h*-index ▷ *Web Of Science*: 78, *Scopus*: 94

JOB EXPERIENCE

Senior Research Fellow (AdR Senior Fascia 3), INFN, Sapienza Università di Roma 2024 - today

Senior Research Fellow, CERN 2021 - 2023

Post-Doctoral Fellow, University of Oklahoma 2017 - 2021

EDUCATION

PhD in Physics, Sapienza Università di Roma, Italy 2013 - 2017
Thesis: *"Search for New Physics in mono-jet final states in pp collisions at* $\sqrt{s} = 13$ *TeV with the ATLAS experiment at LHC"*
Final mark: Excellent

MSc degree in Physics, Sapienza Università di Roma, Italy 2011 - 2013
Thesis: *"Study of the CP violation in the Higgs sector with the ATLAS experiment"*
Final mark: 110 cum laude

BSc degree in Physics, Università degli studi di L'Aquila, Italy 2008 - 2011
Thesis: *"Geo-neutrinos: a new probe of the Earth"*
Final mark: 110 cum laude

FELLOWSHIPS AND AWARDS

Seal of Excellence, Horizon Europe Marie Skłodowska-Curie Actions 2024
Title: *"Exploiting an Anomalous Jet Tagger to search for New Physics with the ATLAS experiment at LHC"*.
Evaluated as a high-quality project for the MSCA Postdoctoral Fellowships 2023. Total score 90.8/100.

ATLAS Outstanding Achievement Award, 2022
"For outstanding contributions to the integration of large radius tracking into the standard ATLAS reconstruction".
Awarded every two years in the ATLAS collaboration.

Abilitazione Scientifica Nazionale, ASN 2020
II Fascia - Settore concorsuale 02/A1.

Springer Thesis Award, 2017
awarded as the best PhD thesis in Physics in Sapienza Università di Roma in 2016.
Published on Springer: DOI:10.1007/978-3-319-58871-1. Awarded with 500 €.

CERN Cooperation Associate position, 2016
INFN special grant to work at CERN for a specific research activity:
"Search for WIMP dark matter and New Physics in final states containing jet and missing transverse momentum in *pp* collision and $\sqrt{s} = 13$ TeV with the ATLAS detector". Granted with 48k CHF.

"Pietro Blaserna" prize 2015
by Società Italiana di Fisica (SIF) for MSc students graduated after May 2012. Awarded with 1k €.

PhD fellowship "Vito Volterra" in Physics 2013-2016
in Sapienza Università di Roma. First in the final examination ranking.

Summer student in the MEG experiment 2012
in Paul Scherrer Institut (PSI), Villigen, Switzerland. Granted with 3.3k CHF.

"Wanted The Best" prize 2012
by Sapienza Università di Roma. Awarded with a 3255 € prize based on academic merits.

Prize of excellence in Physics. 2010
by SIF. Awarded with a 1.7k € prize based on academic merits.

SCHOOLS AND TRAINING

INFN school of statistics, Ischia (NA), Italy. 2015

European School of High-Energy Physics, CERN-JINR, Garderen, Netherlands. 2014

Hadron collider physics school (HASCO), Göttingen, Germany. 2013

University of Princeton Summer Camp, Princeton, USA. Selected after exam in Physics. 2007

***Extreme Energy Events* project**, CERN, Geneva, Switzerland. Selected for merits. 2005

COORDINATION ACTIVITIES

Analysis coordinator
- Search for emerging jets based on the Run-3 data in ATLAS ($\sim$ 15 people). 2022-today
- Combination of the searches for invisible Higgs decays based in ATLAS ($\sim$ 30 people). 2021-2023
- Search for New Physics in $E_{\mathrm{T}}^{\mathrm{miss}}$+jet final states in ATLAS ($\sim$ 20 people). 2017-2022

Jets and Dark Matter Subgroup convener 2020-2022
Convener of the Jets and Dark Matter (JDM) Exotics Subgroup in ATLAS including $\sim$20 beyond the Standard Model (BSM) searches involving final states with jets and missing transverse momentum ($\sim$ 150 people).

MAIN EDITORIAL ACTIVITIES

Peer-reviewer
- *Journal of High Energy Physics (JHEP)*
  Referee of a search for New Physics from the CMS collaboration. 2024
- *Nuovo Cimento C (NCC)*
  Referee of the best communication at the SIF 2021 conference NCC 45 (2022) 5, 107. 2022

Editorial Board member in ATLAS
- Combination of Run-2 searches for Dark photons (arXiv:2405.19862). 2024
- Search for Vector-like quarks in the $TT \to Wq + X$ final states (arXiv:2406.01656). 2023-2024
- Search for New Physics in the $E_{\mathrm{T}}^{\mathrm{miss}} + \gamma$ final states, JHEP 02, 226 (2021). 2018-2021

Editor
- Paper on the performance of the MALTA telescope. 2022-2023
- Paper on the reconstruction algorithm of tracks with large impact parameters in ATLAS. 2022-2023
- Public note on the recast of the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet search in several dark sector scenarios in ATLAS. 2021
- Public note on the sensitivity of the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet search in Run-3 and Run-4 at LHC in ATLAS. 2018

OTHER RESPONSIBILITIES

Expert Reviewer

Invited analysis reviewer appointed before the unblinding approval stage.

- Search for Soft Unclustered Energy Patterns ($\mathscr{L}_{int} = 139$ fb^{-1}). 2023
- Search for New Physics in the $E_{\mathrm{T}}^{\mathrm{miss}} + V$ final states ($\mathscr{L}_{int} = 139$ fb^{-1}). 2023

High Level Trigger Expert on-call

- Data quality monitoring of events selected by the ID and b-jet triggers in ATLAS. 2023-today
- Data quality monitoring of events selected by the Muons and B-physics triggers in ATLAS. 2016-2018

Tracking liaison in the Exotics group 2019-2022

Contact person of the Exotics group in ATLAS for what concern the tracking algorithm and its performance.

Inner detector shifter 2019

Shifter in the ATLAS control room of the inner detector (Pixel, SCT and TRT subsystems).

RESEARCH EXPERIENCE - DATA ANALYSIS IN ATLAS

Anomaly detection search in fully hadronic final states 2024-today

Analyser and student supervision of the anomaly detection search for resonances decaying into hadronic final states. The analysis exploits unsupervised a GNN to develop an anomalous jet tagger trained on jet constituents and track information to target a wide set of BSM scenarios.

Search for dark shower signatures 2021-today

BSM scenarios foreseeing the existence of QCD-like hidden sectors producing dark showers at collider experiments are largely unexplored from both phenomenological and experimental standpoints. My work in this context pioneered the investigation of such distinctive and challenging signatures in ATLAS.

Author of the first search of semi-visible jets in the t-channel based on the Run-2 dataset (PLB 848 (2024) 138324) and recast of the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet analysis providing a sensitivity benchmark for dedicated searches. In this dark QCD scenario, a fraction of dark pions produced in the dark shower process remains stable and undetected whereas the rest decays to SM particles. This results in a distinctive signature known as a semi-visible jet.

Author and Student supervision in the first search of semi-visible jets in the s-channel in ATLAS based on the Run-2 dataset. The analysis is based on an event-level anomaly detection strategy based on auto-encoders to mitigate the model dependence and widen the scope of the search for a resonant decay.

Analysis contact of the first search of emerging jets in ATLAS based on Run-3 data. In this BSM scenario, long-lived dark pions couple and decay to SM particles, resulting in a high multiplicity of displaced tracks and secondary vertices in the inner detector confined in a jet cone. The analysis exploits dedicated triggers and an emerging jet tagger based on a GNN trained on track information to explore a resonant signature never explored so far at LHC.

Search for long-lived particles in the $H \to aa \to 4q$ channel ($\mathscr{L}_{int} = 36, 139$ fb^{-1}) 2017-2024

The search for long-lived particles (LLPs) decaying from the Higgs boson is a standard benchmark for BSM particles with a non-null proper lifetime and relatively light masses (i.e. $m_a < \frac{m_H}{2}$). The phase-space with proper decay lengths up to $\mathcal{O}$(dm) was still uncovered in ATLAS before my contribution.

Main Analyser of the search for Higgs boson decays into two LLPs in the $H \to aa \to 4b$ channel. Exploiting the b-tagging algorithm performance to reconstruct secondary vertices, the analysis allowed to probe a range of proper decay length up to a few mm, never explored before (JHEP 10 (2018) 031).

STUDENTS SUPERVISION AND ANALYSER in the search for exotic decays of the Higgs boson to LLPs in the $ZH(\rightarrow 4b)$ channel based on the full Run-2 dataset in ATLAS. The analysis exploits the large radius tracks (LRT) algorithm to detect and reconstruct secondary vertices in the silicon detector. This novel search bridged the gap between the proper lifetime regimes probed by the existing prompt and dedicated searches for LLPs looking for displaced physics objects in the outer ATLAS subdetectors (JHEP 11 (2021) 229).

STUDENT SUPERVISION AND AUTHOR of the second-wave full Run-2 analysis that leverages the recent integration of the improved LRT algorithm, that I developed, in the ATLAS reconstruction chain. This allowed to double the signal efficiency and reduced by more than a factor of 10 the background vertices outside of the pixel detector. It also enabled to broadening of the search scope by exploiting the VBF, WH, and ZH production modes, to extend the LLP mass range and exploit new analysis techniques. The constraints obtained on the Higgs branching fractions to LLPs, $\mathcal{B}_{H\rightarrow aa} \sim \mathcal{O}(\%)$, are more stringent by an order of magnitude compared to the previous results, even by utilising the same statistical dataset (arXiv:2403.15332, submitted to PRL).

Legacy $H \rightarrow inv$ combination (Run-1 + Run-2) 2021-2023

ANALYSIS CONTACT of the legacy Higgs to invisible combination including the analyses targeting the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet, VBF+$E_{\mathrm{T}}^{\mathrm{miss}}$, VBF+$E_{\mathrm{T}}^{\mathrm{miss}}+\gamma$, $E_{\mathrm{T}}^{\mathrm{miss}}+Z(\ell\ell)$, $t\bar{t}+E_{\mathrm{T}}^{\mathrm{miss}}$ final states based on the Run-2 dataset together with the Run-1 combination (PLB 842 (2023) 137963). It provides the most stringent exclusion limit to date on the branching ratio of the Higgs decaying into invisible particles: $\mathcal{B}_{H\rightarrow inv} < 10.7(7.7)\%$ at 95% CL.

Dark Matter combinations ($\mathscr{L}_{int} = 36, 139$ fb^{-1}) 2017-2023

STUDENTS SUPERVISION AND ANALYSER of the sensitivity studies and interpretations of dark energy and several dark matter (DM) scenarios (including simplified models with different spin mediator hypotheses and coupling values as well as in the context of the 2HDM+a model) in the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet final state in ATLAS. This work culminated with the publication of papers based on 36 and 139 fb^{-1} of data collected at $\sqrt{s}$ =13 TeV (JHEP 05 (2019), 142, arXiv:2306.00641, submitted to Science Bulletin). These underscored the complementarity of the DM search program in ATLAS and included comparisons with the results of direct detection experiments. Additionally, they presented the first exclusion constraints on dark energy models from collider experiments (ATL-PHYS-PUB-2018-008).

Search for New Physics in $E_{\mathrm{T}}^{\mathrm{miss}}$+jet final states ($\mathscr{L}_{int} = 3, 36, 139$ fb^{-1}) 2017-2022

This channel is considered as a standard candle of the research program for DM, and more generally for undetectable particles, at collider experiments, and serves as a reference for other $E_{\mathrm{T}}^{\mathrm{miss}} + X$ analyses.

MAIN ANALYSER of the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet searches based on the $\sqrt{s} = 13$ TeV data with the ATLAS experiment. Author of the sensitivity studies, framework developer, definition of the analysis strategy and introduction of the major improvements with respect to the previous iterations as well as of the production of the results' interpretation in several DM scenarios. Among the most relevant novel background estimation strategies implemented are the definition of new control regions, which helped reducing the large theoretical uncertainties of the top processes, and the introduction of a shape-fit to exploit the signal-to-background discrimination power provided by the $E_{\mathrm{T}}^{\mathrm{miss}}$ distribution. The work culminated with the publication of the papers based on the first 3 and 36 fb^{-1} of data collected in Run-2 (PRD 94 (2016) 3, 032005, JHEP 1801 (2018) 126).

MAIN ANALYSER AND EDITOR of the public note (ATL-PHYS-PUB-2018-043) including the Run-3 and HL-LHC DM limit projections in the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet channel. This study highlights the main limitations in terms of experimental and theoretical systematic uncertainties of future searches and how the analysis sensitivity evolves in different systematics scenarios. This work was included in the HL/HE-LHC Yellow Report (CERN Yellow

Rep. Monogr. 7 (2019), 585-865) and in the context of the proposal for the European Strategy.

ANALYSIS CONTACT AND MAIN ANALYSER of the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet search based on the full Run-2 dataset. Supervisor and coordinator of the work of PhD students and postdocs. Leader of the main analysis improvements aimed to reject the signal region background, to reduce the main uncertainties by incorporating state-of-the-art theoretical predictions of V+jets processes and to lower the $E_{\mathrm{T}}^{\mathrm{miss}}$ and leading jet p_{T} thresholds. The latter were the main limiting factors in the previous analysis versions to probe 'soft' signals such as the Higgs to invisible decays. The unprecedented accuracy of the SM predictions achieved in the signal region, of the order of $\mathcal{O}(\%)$ between $E_{\mathrm{T}}^{\mathrm{miss}}\epsilon\,[0.2, 1.2]$ TeV, enabled to set the most stringent constraints to date across a broad spectrum of BSM theories predicting final states with invisible particles at collider experiments (PRD 103 (2021) 11, 112006).

ANALYSIS CONTACT of the reinterpretation of the search for New Physics in the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet in a dark photons model (FRVZ) and in the signature predicting LLPs decaying from the Higgs.
EDITOR of the public note describing the results that allowed to extend at longer lifetimes the existing esclusion contours set by dedicated searches (ATL-PHYS-PUB-2021-020).

Measurement of the spin-CP properties of the Higgs boson 2013-2014

MAIN ANALYSER of the study of the tensorial structure of the HZZ vertex to estimate the matrix element couplings sensitive to New Physics and the CP violation in the Higgs sector in ATLAS. Author and developer of the multivariate analysis based on a nine-dimensional matrix-element method based on a multi-variate likelihood. The results based on the full Run-1 dataset provided the most stringent results of the spin-CP Higgs properties, confirming the SM predictions of the newly discovered particle (EPJC 75 (2015) no.10, 476).
MAIN ANALYSER of the sensitivity studies and projections to an integrated luminosity of 300 and 3000 fb^{-1} at $\sqrt{s} = 14$ TeV, that will provide precision measurements of the CP-odd and BSM couplings of the HZZ decay amplitude (ATL-PHYS-PUB-2013-013). This work was included in the report of the European Committee for Future Accelerators (ECFA report).

RESEARCH EXPERIENCE - ALGORITHMS DEVELOPMENT

Anomaly detection trigger 2024-today

DEVELOPER of the R&D project aimed at implementing an anomalous jet and LLP signature taggers at the trigger level based on an auto-encoder trained on track information. The goal is to compare the performance of such algorithms on CPU and FPGA and integrate it in the ATLAS High-level trigger (HLT) during Run-3.

Level-0 muon trigger for HL-LHC 2024-today

DEVELOPER of the tracking reconstruction algorithm within the ATLAS muon spectrometer, employing a GNN integrated on FPGAa, to include and adopt it as the upgraded Muon trigger system at Level-0 for the HL-LHC.

Reconstruction of tracks with large impact parameters 2019-2023

DEVELOPER of the algorithm that reconstructs tracks with large impact parameters originating from secondary vertices in the ATLAS silicon detector, referred to as the LRT algorithm. The current algorithm overhaul reduced the fake tracks (B), due to combinatorics and pile-up, maintaining high signal efficiencies (S) to a wide range of BSM scenarios, enhancing $S/\sqrt{B}$ by more than a factor 4. Thanks to the unprecedented reduction of CPU-time (disk) consumption by more than a factor $\sim$ 10 (40), it is now integrated into the ATLAS reconstruction chain. This achievement hugely benefits the next generation of searches for LLPs based so far on a small fraction of data undergoing special reprocessing. My contribution to this project was recognised with the *ATLAS Outstanding Achievement Award*.
EDITOR of the paper describing the algorithm and its performance (EPJC 83 (2023) 1081).

AUTHOR of the implementation of the LRT algorithm to reconstruct electrons with large impact parameters. This new set of electrons was never considered in ATLAS before and will be fundamental for BSM searches looking for displaced leptonic decays. The algorithm is now integrated into the ATLAS reconstruction chain.

Reconstruction of secondary vertices 2018-2019

AUTHOR of the characterisation studies of the vertex reconstruction algorithm for the detection of LLP decays within the ATLAS silicon detector. It is fundamental for searches looking for BSM particles with decay lengths in the lab-frame ranging between $10^{-3} \div 3 \cdot 10^{-1}$m (ATL-PHYS-PUB-2019-013).

τ-lepton performance studies 2014-2015

AUTHOR of the first *tag-and-probe* studies in $Z \to \tau\tau$ events based on Run-2 data. Developer of the τ-CP reconstruction algorithm in the release used in Run-2 and estimation of efficiency and background rejection at $\sqrt{s} = 8, 13, 14$ TeV. This work was acknowledged as the *service task* to get the ATLAS authorship in March 2015.

Fast signal reconstruction algorithm in the MEG experiment 2012

DEVELOPER of a reconstruction algorithm of fast signals (1 ns rise time and 5 ns fall time) of a drift chamber prototype built in Sapienza Università di Roma for the MEG-2 experiment upgrade. The algorithm exploited the optimal Wiener filter and was optimised for high pileup conditions to exploit the cluster timing information (JINST 10 (2015) n. 03, P03012).

RESEARCH EXPERIENCE - HARDWARE & DETECTORS

R&D of radiation-hard CMOS pixel sensors in the MALTA project 2021-2023

AUTHOR of characterisation studies, noise occupancy measurements and definition of the operating window of the MALTA pixel sensors, radiation-hard DMAPs (Depleted Monolithic Active Pixel Sensors) initially designed for the ATLAS ITk upgrade and for future collider applications (EPJC 84 (2024) 3, 251).
EDITOR of the paper describing the performance of the MALTA telescope based on six samples permanently installed and used at SPS at CERN and estimation of its spatial resolution (EPJC 83 (2023) 7, 581).

R&D for the proposed MATHUSLA detector 2020-2021

AUTHOR of R&D studies for the MATHUSLA experiment project, a detector proposal to broaden the physics reach for LLP searches at HL-LHC. Installation of the experimental setup, data acquisition and characterisation of SiPMs used to read out signals from extruded scintillators with embedded wavelength-shifting fibres. Estimation of the dark current of different types of SiPMs as a function of the temperature.

MRPCs construction in the *Extreme Energy Events* project 2005

CONSTRUCTION of two MRPCs (Multigap Resistive Plate Chambers) detectors at CERN as a winter student in the *Extreme Energy Events* (EEE) project. The detectors are now located in the high school A. Bafile of L'Aquila and act as telescopes used to study the origin of cosmic rays with the coincidence of muon signals observed in these and other MRPCs located in several schools (NCB 125 (2010) 243).

RESEARCH EXPERIENCE - COLLABORATIONS OUTSIDE ATLAS

Measurement of the cosmic rays flux in Monte Soratte 2021-2022

MAIN ANALYSER of the measurement of the differential muon flux with the COSMIC RAY CUBE detector, a hodoscope consisting of 48 scintillating bars with embedded wavelength-shifting fibers read out with SiPMs. This study provided a mountain tomography and estimated the background induced by cosmic rays at the underground bunker in Monte Soratte, Italy, a potential location for the Ptolemy experiment. The project also included outreach activities for high school students (NIM-A 1031 (2022) 166514).

Snowmass Energy Frontier collaborations 2020-2022

MEMBER of the task force, composed of theoretical and experimental physicists, for the scientific vision of the future of particle physics in the context of DM and dark sector searches at collider experiments.
AUTHOR of the white paper describing the state-of-the-art of the recent experimental constraints on a set of different DM benchmark models (arXiv:2206.03456).
AUTHOR of the white paper providing a set of benchmarks for dark showers models in order to define and harmonise the future experimental searches (EPJC 82 (2022) 12, 1132).

Long-lived particles community collaboration 2017-today

MEMBER of the LLPs community, composed of theoretical and experimental physicists, to establish guidelines and benchmark signals for searches performed at collider experiments, highlighting the role and the potential of the current and future detector technologies (J. Phys. G 47 (2020) 9, 090501).

Dark matter working group collaboration 2016-today

MEMBER of the DM working group, a collaboration including both experimental and theoretical physicists, with the role of defining the guidelines and benchmark signals for DM searches at collider experiments (Phys. Dark Univ. 26 (2019) 100377, Phys. Dark Univ. 27 (2020) 100351).

CONFERENCE & WORKSHOP CONTRIBUTIONS

Talk, 9^{th} Workshop on Theory, Phenomenology and Experiments in Flavour Physics, *Capri, Italy* Jun 2024
Title: *"Latest results and prospects on the dark sector from ATLAS and CMS"*

Talk, Incontri di Fisica di Alte Energie (IFAE), *Firenze, Italy* Apr 2024
Title: *"Unconventional search and long-lived particles at LHC: signature and experimental challenges"*

Talk, 32^{nd} International Workshop on Vertex Detectors, *Sestri Levante, Italy* Oct 2023
Title: *"Development of the radiation-hard MALTA CMOS sensor for tracking applications"*
Proceedings: PoS VERTEX (2023) 048

Talk, 23^{rd} Int. Workshop on Radiation Imaging Detectors, *Riva del Garda, Italy* Jun 2022
Title: *"Timing performance of radiation hard MALTA monolithic Pixel sensors"*
Proceedings: JINST 18 (2022) C03011

Poster, 15^{th} Pisa Meeting on Advanced Detectors, *Elba island, Italy* May 2022
Title: *"Measurement of the muon flux in the bunker of Monte Soratte with the CRC detector"*
Proceedings: NIM-A 1046 (2023) 167715

Talk, 30^{th} Int. Symposium on Lepton Photon Interactions at High Energies, *Virtual* Jun 2022
Title: *"Searches for BSM physics using challenging and long-lived signatures with the ATLAS detector"*

Talk, The 7th Annual Large Hadron Collider Physics Conference, *Puebla, Mexico* May 2019
Title: *"Beyond the Standard Model physics at High Luminosity LHC"*
Proceedings: PoS LHCP2019 (2019) 244

Talk, DM@LHC 2018, *Heidelberg, Germany* Apr 2018
Title: *"Searching for New Physics in events with an energetic jet and large missing transverse momentum"*

Talk, 28^{th} Rencontres de Blois, *Blois, France* May 2016
Title: *"Dark matter searches at ATLAS"*

Talk, 101st National Conference of 'Società Italiana di Fisica', *Rome, Italy* Sep 2015
Title: *"New Physics search in final states with jet plus missing transverse energy at $\sqrt{s} = 13$ TeV in ATLAS"*

Poster, The 3rd Annual Large Hadron Collider Physics Conference, *St. Petersburg, Russia* Sep 2015
Title: *"New Physics search in mono-jet final states in ATLAS"*
Proceedings: LHCP 2015, 648-654

Talk, 100th National Conference of 'Società Italiana di Fisica', *Pisa, Italy* Sep 2014
Title: *"Study of the spin-CP properties of the Higgs boson in the $H \to ZZ^* \to 4\ell$ channel in ATLAS"*

Poster, Incontri di Fisica di Alte Energie (IFAE), *LNGS, L'Aquila, Italy* Apr 2014
Title: *"CP-mixing in the $H \to ZZ^* \to 4\ell$ channel in ATLAS"*

Poster, 117th LHCC Meeting, *CERN, Geneva, Switzerland* Mar 2014
Title: *"CP-mixing in the $H \to ZZ^* \to 4\ell$ channel in ATLAS"*

Talk, 99th National Conference of 'Società Italiana di Fisica', *Trieste, Italy* Sep 2013
Title: *"Study of the tensorial structure and of the CP violation in $H \to ZZ^* \to 4\ell$ in ATLAS"*
Proceedings: NCC 38 (2015) 1, 49

CONFERENCE & WORKSHOP CONTRIBUTIONS - ATLAS INTERNAL

Session Chair, ATLAS Exotics workshop, *Bologna, Italy* Oct 2024
Title: *"Run-3 expectations"*

Talk, ATLAS Physics workshop on Run-3 milestones and final goals, *CERN* Dec 2022
Title: *"The big picture for run-3 - Exotics working group"*

Talk & Session Chair, ATLAS Exotics workshop, *Nikhef, Amsterdam, Netherlands* Sep 2022
Title: *"Lessons from Run-2"*

Talk, ATLAS HDBS workshop, *Uppsala, Sweden* Sep 2022
Title: *"Searches for lepton-flavour violation, invisible Higgs decays, long-lived particles"*

Talk, ATLAS Exotics workshop, *Virtual* Sep 2021
Titolo: *"Plans for reinterpretation of different searches on dark sectors"*

Talk, ATLAS Collaboration week, *Virtual* Jun 2020
Title: *"ATLAS Exotics WG report"*

Talk, ATLAS Collaboration week, *Virtual* Jun 2020
Title: *"Overhaul of Tracking for Long-Lived Particle Searches"*

Talk, Exotics + HDBS workshop 2019, *Naples, Italy* Jun 2019
Title: *"Bridging the Gaps Between Prompt, Long-Lived, and Invisible Searches"*

CONFERENCES & EVENTS ORGANISATION

Chair and Organisation of Young@INFN seminars Mar - Jun 2024
A set of topical sessions of seminars held by young researchers *Sapienza Università di Roma*
to introduce early career scientists, PhD and MSc students to various research fields in particle physics.

Chair and Organisation of the session of the LHC DM Working Group Apr 2024
"Roadmap of Dark Matter Models for Run 3: Unexplored signatures" *CERN*

Organisation of the ATLAS internal workshop: Jul 2020
"Uncovered signatures + Run 3 opportunities" *Virtual*

SEMINARS

Title: *"Status and perspective of long-lived particle searches"*, Sapienza Università di Roma. Nov 2023

Title: *"Large-radius tracking and Long-lived particles searches in ATLAS"*, CERN ATLAS team. Feb 2023

Title: *"Search for Higgs to invisible decays"*, CERN ATLAS team. Nov 2022

TEACHING & REFEREEING ACTIVITIES

PhD thesis Referee, *Sergio Gonzalez Fernandez*, Institut de Física d'Altes Energies (IFAE) 2022
Title: *"Search for new phenomena in events with jets/photons/V-bosons and large missing transverse momentum at the high-energy LHC Run II using the ATLAS detector"*.

MSc thesis Supervisor, *Alice Ugoccioni*, Sapienza Università di Roma 2021-2022
Title: *"Searching for dark matter with the ATLAS detector: monojet analysis sensitivity to the 2HDM+a model"*.

Lecture on the search for DM in ATLAS in the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet final state 2021
for graduate and undergraduate students of University of Oklahoma

Lecture and Tutorial on the missing transverse momentum reconstruction in ATLAS, 2016
for MSc and PhD students of Sapienza Università di Roma and Università di Napoli Federico II.

STUDENTS SUPERVISION

CERN Summer Student, *Zhiyuan Huang*, CERN 2023
Project: *"Bump-Hunter sensitivity in the search for semi-visible jets in ATLAS"*.

CERN Summer Student, *Michalis Panagyiotou*, CERN 2022
Project: *"Search for LLPs in the ATLAS inner detector with large-R jets"*.

CERN Summer Student, *Joel Davidson*, CERN 2022
Project: *"Optimisation of the jet collection in the search for semi-visible jets in ATLAS"*.

MSc student, *Alice Ugoccioni*, Sapienza Università di Roma 2022
DM interpretation of the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet analysis in the 2HDM+a model.

PhD student, *Amber Roepe*, University of Oklahoma 2018-2021
Development of the LRT algorithm for Run-4; search for exotic Higgs decays to LLPs in the $ZH(\rightarrow 4b)$ channel.

PhD student, *Guglielmo Frattari*, Sapienza Università di Roma 2018-2021
Main analyser of the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet search based on the full Run-2 dataset in ATLAS.

MSc student, *Cristiano Sebastiani*, Sapienza Università di Roma 2016
Multivariate analysis based on a BDT discriminant to exploit the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet final state discriminating variables.

MSc student, *Mariaelena D'Errico*, Università di Napoli Federico II 2016
Control region definition to constrain the top processes in the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet analysis.

MSc student, *Veronica Fabiani*, Sapienza Università di Roma 2015
Statistical fit strategy which exploits the kinematic information of the $E_{\mathrm{T}}^{\mathrm{miss}}$ spectrum in the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet analysis.

OUTREACH

"Stage d'observation" with a CERN scientist 2021

Tutor of the secondary school student Syrah Clasen for a week at CERN introducing her to the world of high-energy physics research with lectures, guided tours and the completion of a *masterclass*.

Cosmic Ray Cube 2021-2022

Analysis of the measurement of the differential muon flux with the Cosmic Ray Cube inside the bunker of Monte Soratte, Italy, a tracking detector conceived for outreach activities allowing a direct scientific experience for secondary school students.

Physics Briefing for the ICHEP 2020 conference. 2020

Title: *"Jetting into the dark side: a precision search for dark matter".*

Editor of the physics briefing on behalf of the ATLAS collaboration on the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet search based on the data collected in 2015-2018 at the $\sqrt{s} = 13$ TeV: webpage.

Physics Briefing for the EPS 2017 conference. 2017

Title: *"Chasing the invisible".*

Editor of the physics briefing on behalf of the ATLAS collaboration on the $E_{\mathrm{T}}^{\mathrm{miss}}$+jet search based on the first 36 fb^{-1} of data collected at the $\sqrt{s} = 13$ TeV: webpage.

ASSOCIATIONS MEMBERSHIP

Società Italiana di Fisica (SIF) 2012/13/15/24

Science is Cool (SCOOL) 2023

Non-profit Cultural Association promoting educational activities aimed at engaging people with science.

JET AND DARK MATTER PUBLIC RESULTS

List of public results which I co-reviewed and approved as a JDM subgroup convener.

JHEP 07 (2023) 202	PLB 848 (2024) 138324
JHEP 07 (2023) 116	JHEP 08 (2022) 104
JHEP 11 (2021), 209	EPJC 82 (2022) no.2, 105
PRD 105 (2022) no.1, 012001	PRD 103, 112006
PRL 126, no.12, 121802 (2021)	JHEP 02, 226 (2021)

LANGUAGES

Italian Native **English** C1 **French** A2 **Spanish** A2

Autorizzo il trattamento dei miei dati personali ai sensi dell'art. 13 del D.Lgs. 30/06/2003 n° 196 e dell'art. 13 del GDPR 679/16.

Rome, July 16, 2024

Giuliano Gustavino