Gaetano Αθανάσιος Barone

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Professional appointments

Assistant Professor of Physics (Research)	Brown University (USA)	2023 – present
Research Associate	Brookhaven National Laboratory (USA)	2018 – 2023
Postdoctoral Research Fellow	Brandeis University (USA)	2015 – 2018
Research and Teaching Assistant	University of Geneva (Switzerland)	2010 – 2015

Education

- Ph.D. in Physics 2015

  "Enlightened Top Quark: Measurements of the $t\bar{t}\gamma$ Cross Section and of its Spectrum in Transverse Energy of the Photon in the Single Lepton Channel at $\sqrt{s} = 7$ TeV in 4.59 fb $^{-1}$ of pp Collision Data Collected with the ATLAS Detector".
  University of Geneva (Switzerland), Faculty of Sciences.
  Thesis Supervisors: Prof. Xin Wu and Prof. Martin Pohl.

- Master of Science in Physics 2009

  "Measurement of the positive pion lifetime, τ_{π^+}, with the FAST Detector at the Paul Scherrer Institute".
  University of Geneva (Switzerland), Faculty of Sciences.
  Thesis Supervisor: Prof. Martin Pohl.

Funded research

Broadening the Horizons of Pico Second Silicon Devices to Space-Based Operations P.I. Seed Award 2024

Research topics

- **Higgs and electroweak physics and properties**: Precision measurements the electroweak Higgs properties in the ZZ and WW channels. Correlation of effects from new phenomena affecting Vector Boson Fusion, Vector Boson Scattering, and Higgs production simultaneously.
- **Top quark physics and properties**: Precision measurements of the vector boson couplings of the top quark. Measurements of the top–photon vertex and constraints to new physics from its differential spectra.
- **Low and medium energy physics:** Precision extraction of the Fermi constant, G_{F}, by measurement of the muon lifetime. Precision measurement of the pion lifetime, fundamental for lattice QCD and chiral symmetry breaking studies.
- **Detector development**: Silicon R&D on timing detectors. ATLAS Silicon tracker upgrade. ATLAS tracker operations. Track reconstruction and tracking performance. Muon reconstruction and muon reconstruction performance.
- **Leadership within large collaborations**: Executing my research vision by leading large groups of collaborators with my coordination roles: Muon Combined Performance Working Group Convener, Vector Boson Fusion LHC Working Group 1 Sub-Group Convener, H to $ZZ(^*)$ and di-muons Sub-Group Convener, Muon Momentum Scale and Resolution Sub-Group Convener, and coordinator of several smaller analysis teams.
- **Collaboration memberships:** ATLAS (then), CMS (now), FAST, DRD3, Comprehensive Multiboson Experiment-Theory Action (COMETA)

Scientific leadership

Selected coordination roles

- **CMS Convener of the Vector Boson Fusion LHC Working Group 1 sub-group (L3)** 2023 – present
  Coordination among LHC experiments and theorists.
  Theoretical predictions and phase-space definitions impacting Higgs measurements via the Vector Boson Fusion process.
- **ALTAS Convener of the Vector Boson Fusion LHC Working Group 1 sub-group (L3)** 2022 – 2023
  Coordination among LHC experiments and theorists.
  Theoretical predictions and phase-space definitions impacting Higgs measurements via the Vector Boson Fusion process.
- **Convener of the Muon Combined Performance Working Group (L2)** 2021 – 2023
  Higher level manager of all physics analysis teams for their activities involving muons.
  Organized in 4 sub-groups, 11 ATLAS authorship
  qualification projects, member of the ATLAS Physics Coordination Board.
- **Convener of the H to $ZZ(^*)$ and di-muons sub-group (L3).** 2018 – 2020
  Leader of all analyses involving this decay process in the ATLAS Higgs Working Group.
  $\sim$120 physicists, 9 physics results, 2 CERN press releases, 4 ATLAS briefings.
- Convener of the Muon Momentum Scale and Resolution sub-group (L3). 2016 – 2018
  $\sim$10 people, 5 qualification projects.
  Responsible for the calibration of the muon momentum object response, appointed twice.
- **Analysis Contact / Coordinator:** 2016 – 2023
  Leader of a dedicated team of scientists for the measurement of a specific quantity or process.
  Early Run-2 $H \to ZZ^* \to 4\ell$ analysis; Higgs mass measurement in the $H \to ZZ^* \to 4\ell$ channel; Coordinator of the Isolation Task Force in the $H \to ZZ^* \to 4\ell$ channel; and $H \to WW(^*)$ VBF fiducial and differential measurement.
- **Contact Editor and other editorial roles:** 2014 – 2023
  Coordination of the editing process of the collaboration papers.
  For the $t\bar{t}\gamma$ first observation, the Higgs mass measurement at Run-2, for the Higgs H to WW Vector Boson Fusion fiducial and differential measurement, and the high precision muon momentum performance corrections.
- Cross-activity coordination: 2017 – 2023
  Higgs Contact to the Muon Combined Performance group: *responsible for advising the Higgs Group on the use of muons*; Contact of the H to $WW(^*)$ sub-group to the Higgs Combination sub-group: *responsible for advising the H to $WW(^*)$ analyses on common ATLAS strategies on theory and experimental uncertainties object definition, and phase-space definitions*.
- Detector operation: 2011 – present
  Semiconductor Tracker Online Monitor Super Expert on Call: *responsible for overseeing the work of sub-detector experts on call during data-taking periods*; Inner Detector Data Quality Online Expert on Call: *expert on data quality in ensuring high data-taking efficiency*.

Organization of conferences and workshops

- Organization and Co-Organisation of 6 Conferences and Workshops.

Review committees

- Reviewer for (ATLAS) Higgs Working Group, Member of ATLAS (then) & CMS (now) collaboration review boards, Ex-officio reviewer of (ATLAS) results using muons, Final Sign-Off Reader/Reviewer, Journal Referee

Research output

Physics analysis at the LHC

Then member of the ATLAS Collaboration and now member of the CMS Collaboration, my current research activities focus on the **electroweak sector**, in particular on the **Higgs** physics or in the **top quark** sector. Finding novel ways to constrain the presence of unexplained phenomena via **precision measurements** has been my main focus.

Higgs physics and properties:

- *Charm Yukawa couplings of the Higgs* 2023 – present
- *Differential and fiducial cross sections measurements of the VBF Higgs production to WW^** 2018 – present
- *Couplings measurements of Higgs production to WW^** 2020 – present
- *Differential and fiducial cross sections measurements of the ggf Higgs production to WW^** 2018 – present
- *Exploration of vector boson polarisation to measure the Higgs boson properties in di-boson channels* 2020 – present
- *Measurement of the VBF Higgs fiducial cross section in the $ZZ^* \to 4\ell$ channel* 2020 – present
- **Coordination of the Higgs to $ZZ(^*)$ and di-muons sub-group of ATLAS** 2018 – 2020
  With 9 released results and an additional 4 brought to close completion, the group achieves the goal of f a comprehensive and precise study of the properties of the Higgs boson, both in its interactions to **heavy bosons** as well as in its **Yukawa couplings** probes in the second and first generation of fermions.
  - $H \to \mu\mu$ search with final Run 2 observed significance of 2.0σ.
  - First ATLAS and most precise measurements of the Higgs production and decay fiducial and differential cross sections with full Run 2 data.
  - Measurements of the Higgs production mode couplings, Simplified Template Cross Sections (STXS) measurements with full Run 2 data and Effective Field Theory interpretations.
  - Combination of the STXS Higgs ATLAS measurements with full Run 2.
  - Combination of the Higgs production differential cross section measurements with the $H \to \gamma\gamma$ group.
  - Most precise measurement of the Higgs boson mass to date by ATLAS, using the full Run 2 data.
  - Searches for heavy resonances decaying into pairs of Z bosons in the $\ell^+\ell^-\ell'^+\ell'^-$ and $\ell^+\ell^-\nu\bar{\nu}$ final state.
  - Search for the Higgs boson decays $H \to ee$ and $H \to e\mu$.
  - Measurement of the four-lepton invariant mass differential cross section spectrum, ranging from below Higgs threshold to the off-shell production region on the 2015-2016 dataset.

  With the imminent finalization and publication of the following analyses:
  - final and improved Run-2 m_H measurement targeting $< 0.1\%$ uncertainty,
  - study of the CP structure with fiducial cross-section measurements of angular and optimal observables,
  - competitive limits in the $H \to$invisible search in the $\ell\ell\nu\nu$ channel, and the
  - constraint of the Higgs width with even more reduced model dependency,
- *Searches for Higgs decays to light leptons, $H \to \mu\mu$* 2018 – 2020
- *Off-shell and on-shell study of the Higgs in $ZZ^* \to 4\ell$ channel* 2020 – present
- *Higgs mass measurement in the $ZZ^* \to 4\ell$ channel* 2016 – present
- *$H \to ZZ^* \to 4\ell$ fiducial and differential cross section measurement at $\sqrt{s} = 13$ TeV* 2015 – 2020
- *$H \to ZZ^* \to 4\ell$ couplings and simplified template cross sections (STXS) measurements at $\sqrt{s} = 13$ TeV* 2016 – 2020
- *Searches for additional heavy scalars in the $ZZ \to 4\ell$ channel* 2016 – 2020
- *$H \to ZZ^* \to 4\ell$ and $H \to \gamma\gamma$ cross-section combination at $\sqrt{s} = 7$ TeV, 8 TeV, and 13 TeV* 2015 – 2016

- *$H \to ZZ^* \to 4\ell$ fiducial and differential cross section measurement at $\sqrt{s} = 7$ TeV* 2015

Top quark physics and properties:

- *Measurement of the $t\bar{t}\gamma$ fiducial and differential cross section at 8 TeV* 2015 – 2016
- *Observation and measurement of the fiducial cross-section of the top quark pair production in association with a photon in the single lepton (e, μ) plus jets channel at $\sqrt{s} = 7$ TeV.* 2011 – 2015

Physics Objects Reconstruction, Calibration, and, Performance:

- *(CMS) Flavor Tagging Calibration, and, Performance* 2023 – present
  Tying jet definition/clustering algorithms to flavor identification.
  Tagger identificaiton & calibration
- *(ATLAS) Muon Reconstruction, Calibration, and, Performance* 2015 – 2023

  Combined Muon Performance Working Group Convener 2021 – 2022

  Member of the ATLAS Physics Coordination board that sets the goals of the physics program of the Collaboration. **Coordination of group comprised of 4 sub-groups and liaisons to analysis groups**. For my mandate, I have achieved the successful physics commissioning of the improved New Small Wheel (NSW) detector and pushed the physics performance of the muon reconstruction to the highest precision possible in the challenging environments of Run-2 and Run-3. To achieve this, I restructured the group for longer-term growth, focusing on building a self-maintained expertise in the mission-critical areas. These areas involve:
  - Re-structured the group by introducing two sub-group conveners per sub-group on staggered terms.
  - Attracted new talent to the group by pooling resources from analyses teams within ATLAS.
  - Successfully calibrated the detector response for muons for Run-2 data with 0.5×10^{-4} precision.
  - First & early calibration of the muon objects with the first Run-3 data with a good precision comparable to the Run-2 final calibration.
  - The group finalized the release of 3 precision-level publications for Run-2, and it has released public results on the first performance of the first Run-3 data.
- *Muon Momentum Reconstruction Performance* (2015 – 2023)

  Muon Momentum Reconstruction Performance Convener of the Scale and Resolution sub-group (2016 – 2019). Reappointed in 2017 after the conclusion of the first tenure.

Low and medium energy physics

FAST physics analysis:

- *High precision positive pion lifetime measurement and associated pion's constant* 2008 – 2012
- *High precision G_{F} measurement* 2008 – 2010

Detector activities and R&D

Silicon R&D

- *Integration of BNL-produced AC-LGAD on pico timing ASICS.* 2022 – present
- *AI/ML-based processing architecture of AC-LGADs and development of data readout chain.* 2022 – present
- *Environmental stress-tests and space applications* 2021 – present
- *Test stand setup for sensor characterisation at CERN.* 2021 – 2022
- *Test-beam characterisation of AC-LGADs.* 2021 – present

- *Organisation and realization of (AC-) LGADs testing and characterization setup at CERN.* 2020 – present
- *Characterisation of BNL–designed and –produced (AC-) Low Gain Avalanche Diodes (LGAD).* 2018 – present
- *Assembly of telescope for timing measurements and test-beam operations in the north area at CERN.* 2018
- *Analysis of test-beam data in the context of LGAD R&D.* 2018 – 2019

ATLAS Inner Tracker Strip Detector Upgrade Phase-2 Upgrade

- *Preparations for, and participation to, system tests at CERN of BNL-assembled staves.* 2021 – 2023

CMS Outer Tracker, tracking, operations and performance

- *DAQ Strips operations* 2023 – present
- *Cosmic Ray Rack detector DAQ operations and mantaince* 2023 – present

CMS Outer Tracker Phase-2 Upgrade

- *DAQ system tests* 2023 – present

ATLAS Inner Detector (ID), tracking, operations and performance

- *Study of Inner Detector radial distortions.* 2018 – 2019
- *ATLAS Upgrade tracking and performance.* 2016 – 2017
- *Offline tracking performance monitoring.* 2010 – 2014
- *Online detector reconstruction monitoring.* 2010 – 2014

FAST detector and operations

- *Design, performance and commissioning.* 2008 – 2009

Conferences, seminars, workshops, and schools

Invited physics colloquia & and seminars

- *"Cracking the mass problem at the LHC with ATLAS".*
  - Institute of Nuclear and Particle Physics, NCSR Demokritos (Greece), March 2022
- *"Characterising experimentally the Higgs Boson and the electroweak processes as a portal to new phenomena".*
  - HEP Theory Group, Brookhaven National Laboratory (USA), July 2022
- *"Enlightening the properties of the Higgs boson with the ATLAS experiment using full Run-2 LHC data".*
  - Stony Brook University (USA), March 2021
  - Experimental Particle Physics, Brookhaven National Laboratory (USA), January 2021
- *"Study of the Higgs boson properties with the ATLAS detector at the LHC Run 2".*
  - University of Geneva (Switzerland), April 2018
- *"Study of the Higgs (H) properties in the $H \to ZZ^* \to 4\ell$ channel with the ATLAS detector".*
  - Brookhaven National Laboratory (USA), October 2017
  - Harvard University (USA), October 2017
  - Brandeis University (USA), October 2017
  - Stony Brook University (USA), October 2017

Invited talks at conferences and symposia

- *"Measurements of the Higgs boson mass".*
  HiggsDiscovery@10: Symposium for the 10 years from the Higgs boson observation,
  University of Birmingham (United Kindom). **Plenary talk**, June 2022 HEP Conference 2020, Thessaloniki (Greece),
  postponed due to the pandemic, April 2020
- *"Standard Model Higgs and Beyond the Standard Model Higgs physics with ATLAS detector at Run 2".*
  Interpreting the LHC Run 2 Data and Beyond School / Conference, ICTP Trieste (Italy). **Plenary talk,** May 2019
- *"Latest Results on the Beyond the Standard Model Higgs Searches from ATLAS and CMS".*
  Brookhaven Forum 2017: In Search of New Paradigms, BNL (USA), September 2017

Contributed talks at conferences and invited talks at workshops

- *"Environmental conditions stress tests on Low Gain Avalanche Diodes",*
  G. Barone *et. al*, PSD13 2023, Oxford (United Kingdom) **Plenary talk,** September 2023
- *"Precision measurements of the Higgs boson mass and width using four-lepton and diphoton final states".*
  ICHEP 2022, Bologna (Italy), July 2022
- *"Future differential measurements".* ATLAS HWW Workshop, CERN (Switzerland). **Invited talk**, June 2022
- *"Searches for Higgs bosons in resonance decays at ATLAS and CMS".*
  Higgs Couplings Conference, Oxford (United Kingdom). **Plenary talk,** September 2019
- *"Analysis of Vector Boson Fusion in Higgs to WW and W+jets production".*
  ATLAS HWW Workshop, Chamonix (France), June 2018
- *"Search of a high mass neutral Higgs boson in final states with the ATLAS detector".*
  EPS Conference of High Energy Physics, Venice (Italy), July 2017
- *"Higgs mass: $H \to ZZ^* \to 4\ell$ and muon and electron performance".*
  ATLAS Higgs-Combination Workshop, CERN (Switzerland). **Invited talk**, October 2017
- *"Differential and fiducial cross sections".*
  ATLAS Higgs-ZZ Workshop, Munich (Germany). **Invited talk**, March 2016
- *"Top quark pair properties using the ATLAS detector at the LHC".*
  International Frontiers of New Physics Conference, Kolymbari (Greece), August 2015
- *"Measurement of the $t\bar{t}\gamma$ cross section at $\sqrt{s} = 7$ TeV in 4.59 fb^{-1} of pp collision data collected with the ATLAS detector".*
  Swiss Physical Society Meeting, University of Fribourg (Switzerland), June 2014
- *"Recent Results On Top Physics in ATLAS".*
  ECFA Linear Collider Workshop, DESY Hambourg (Germany), May 2013
- *"Measurement of the positive pion lifetime, τ_{π^+}, with the FAST Detector at PSI".*
  Swiss Physical Society Meeting, ETH Zurich (Switzerland), June 2012

Posters

- *"Characterisation and Stress Tests of DC- and AC-LGAD sensors".*
  P. Azzarello, G. Barone, D. Boye , W. Chen, G. D'Amen, J. Roloff , G. Giacomini , A. Tricoli,
  X. Wu, and P. Xi.
  2022 IEEE Nuclear Science Symposium and Medical Imaging Conference, Milan (Italy), November 2022
- *"Muon identification and performance in the ATLAS experiment".*
  EPS Conference of High Energy Physics, Venice (Italy), July 2017
- *"Muon reconstruction performance in ATLAS at Run-II".*
  International Frontiers of New Physics Conference, Kolymbari (Greece). August 2015

- *"Operations and performance of the ATLAS Silicon Micro-strip Detector".*
  Vienna Conference of Instrumentation, Vienna (Austria), February 2013

Teaching, student supervision, and outreach

Student research and younger researchers supervision

Supervision of 9 Ph.D. candidates on their doctoral data analysis and 8 Ph.D. candidates on their work on detector performance. The detailed topics are summarised below.

Student research supervision at Brown University **2023 – present**

- *Higgs Vector Boson Couplings*, *Silicon R&D on resistive silicon devices*, and *Outer Tracker operations and upgrade.*
- *Charm Yukawa couplings*, *Silicon R&D on resistive silicon devices*, and *Outer Tracker operations and upgrade.*
- *Stress tests on Resistive Silicon Devices and AC-LGADs*
- *AI/ML wavefom processing on Silicon Devices and AC-LGADs*

Student research supervision at Brookhaven National Laboratory **2018 – 2023**

- *Extraction of in-situ corrections of the muon track uncertainties for the precision measurement of* m_H.
- *Measurement of the Vector Boson Fusion (VBF) fiducial and differential cross section and CP study in the* H *to* $ZZ^* \to 4\ell$ *channel.* Appointed as **Support Note Editor**.
  Ph.D. analysis on the optimization of the VBF signal extraction and background determination in the $H \to WW^*$ *channel.*
- *Ph.D. analysis on the unfolding of the fiducial and differential cross section of the VBF production in the* $H \to WW^*$ *channel.*
- *Ph.D. analysis on the interpretations of new physics from fiducial and differential distributions in VBF production in the* $H \to WW^*$ *channel.*
  Appointed as $H \to WW^*$ **EFT Task Force Coordinator** and Awarded the **2022 Gertrude Scharff-Goldhaber Prize**,
- *Ph.D. analysis on the observation of the Higgs VBF production in the* $H \to WW^*$ *channel and the measurement of the production fiducial cross-section.*
- *Ph.D. analysis on the measurement of the Higgs mass in the* 4ℓ *channel.*
  Appointed as **Analysis Coordinator** and **Support Note Editor**, while being supervised by me.
- *Muon reconstruction and identification performance, calibration of muon momenta.*
- *Corrections for sagitta bias muon tracking charge-dependant uncertainties.*
  Appointed as **Higgs Contact to the Muon Combined Performance Group**.

Student research supervision at Brandeis University **2016 – 2018**

- *Fiducial and differential cross section measurement in the* $H \to ZZ^* \to 4\ell$ *channel.*
- *Higgs mass measurement and Higgs couplings measurement.*
- *Validation of the muon momentum reconstruction performance using* $\Upsilon \to \mu\mu$ *events.*
- *Corrections for sagitta bias muon tracking charge-dependant uncertainties.*
- *Validation of the muon momentum reconstruction performance.*
- *Muon reconstruction and identification performance, calibration of muon momenta.*
- *Muon momentum corrections validation in early Run 2 data taking.*
- *Precision studies on muon momentum scale and resolutions.*

- *Muon momentum corrections derivation.*

Formal teaching

- Course Assistant *General physics for Medicine*, University of Geneva (Switzerland). 2012 – 2014
- Course Assistant *General physics laboratory for Geology curricula*, University of Geneva (Switzerland). 2010 – 2012
- Course Assistant *General physics laboratory for Physics curricula*, University of Geneva (Switzerland). 2010 – 2012
- Course Assistant *Astro-particle physics*, University of Geneva (Switzerland). 2010.

Outreach & mentorship

- *Official Mentor for the University of Geneva Alumni Mentoring Programme.* 2022 – present
  Membership is accepted twice into the program through application and selection (2022 and 2023).
- *Study of the Higgs decay to four lepton final state: an example from start to finish.*,
  ATLAS Induction Day July 2020
- Coordinator of University of Geneva's ATLAS Group activities
  at *"Nuit de la science".* July 2012
  Public exhibition of scientific outreach in Geneva (Switzerland).

Publications

Selected ATLAS publications

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Inspire record identifier: Barone.G.1

Qualified as ATLAS author as of April 2011, author of 1004 ATLAS publications and with direct contribution to 27 papers and 27 non peer-reviewed or preliminary results. A selection of peer-reviewed publications and public results with most impactful contribution from me are listed below.

Peer-reviewed publications

1. *"Measurement of the $H \to \gamma\gamma$ and $H \to ZZ^* \to 4\ell$ cross-sections in pp collisions at $\sqrt{s}$ =13.6 TeV with the ATLAS detector"*,
   ATLAS Collaboration, accepted by Eur. Phys. Jour. C (2023) arXiv:2306.11379, EPJC-23-06-152.
2. *"Test of CP-invariance of the Higgs boson in vector-boson fusion production and its decay into four leptons"*,
   ATLAS Collaboration, submitted to Jour. High. Ener. Phys. arXiv:2304.09612 (2023).
3. *" Combined measurement of the Higgs boson mass from the $H \to \gamma\gamma$ and $H \to ZZ^* \to 4\ell$ decay channels with the ATLAS detector using $\sqrt{s}$ =7, 8 and 13 TeV pp collision data"*,
   ATLAS Collaboration, arXiv:2308.04775 (2023), accepted by Phys. Rev. Lett.
4. *"Evidence of off-shell Higgs production and constraints on total width of the Higgs boson in $ZZ \to 4\ell$ and $ZZ \to 2\ell 2\nu$ decay channels with the ATLAS detector"* ,
   ATLAS Collaboration, Phys. Lett. B 846 (2023) 138223 16 citations.
5. *"Studies of the muon momentum calibration and performance of the ATLAS detector with pp collisions at $\sqrt{s}$=13 TeV"*,
   ATLAS Collaboration,
   ATLAS Collaboration, Eur. Phys. J. C 83 (2023) 686 25 citations.
6. *"A detailed map of Higgs boson interactions by the ATLAS experiment ten years after the discovery"*,
   ATLAS Collaboration, Nature 607, 52–59 (2022), 32 citations.
7. *"Fiducial and differential cross-section measurements for the vector-boson-fusion production of the Higgs boson in the $H \to WW \to e\nu\mu\nu$ decay channel in pp collisions at ATLAS*",
   ATLAS Collaboration, Phys. Rev. D 108, 072003.

8. *"Measurements at $\sqrt{s}$ =13 TeV of differential cross sections of Higgs boson production through gluon fusion in the $H \to WW \to e\nu\mu\nu$ finals state at $\sqrt{s} = 13$ TeV with the ATLAS detector"*.
ATLAS Collaboration, Eur. Phys. J. C 83 (2023) 774

9. *"Measurement of the Higgs boson mass in the $H \to ZZ^* \to 4\ell$ decay channel using 139 fb^{-1} of $\sqrt{s}$ = 13 TeV pp collisions recorded by the ATLAS detector at the LHC"*,
ATLAS Collaboration, Phys. Lett. B 843 (2023) 137880 28 citations.

10. *"Measurements of gluon fusion and vector-boson-fusion production of the Higgs boson in $H \to WW^* \to e\nu\mu\nu$ decays using pp collisions at $\sqrt{s}$ = 13 TeV with the ATLAS detector"*,
ATLAS Collaboration, Phys. Rev. D 108 (2023) 032005 38 citations.

11. *"Search for associated production of a Z boson with an invisibly decaying Higgs boson or dark matter candidates at $\sqrt{s}$ = 13 TeV with the ATLAS detector"*,
ATLAS Collaboration, Phys. Lett. B Phys. Lett. B 829 (2022) 137066 18 citations.

12. *"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"*,
ATLAS Collaboration, Eur. Phys. J. C 81 (2021) 4, 332, 67 citations.

13. *"A search for the dimuon decay of the Standard Model Higgs boson with the ATLAS detector"*,
ATLAS Collaboration, Phys. Lett. B 812 (2021) 135980, 154 citations.

14. *"Measurements of the Higgs boson inclusive and differential fiducial cross sections in the 4ℓ decay channel at $\sqrt{s}$ = 13 TeV"*,
ATLAS Collaboration, Eur. Phys. J. C 80 (2020) 10 942, 78 citations.

15. *"Higgs boson production cross-section measurements and their EFT interpretation in the 4ℓ decay channel at $\sqrt{s}$ = 13 TeV with the ATLAS detector"*,
ATLAS Collaboration, Eur. Phys. J. C 81 (2021) 5 398, 109 citations.

16. *"Measurement of the transverse momentum distribution of Drell–Yan lepton pairs in proton–proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector"*,
ATLAS Collaboration, Eur. Phys. J. C 80 (2020) 7 616, 60 citations.

17. *"Search for the Higgs boson decays $H \to ee$ and $H \to e\mu$ in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector"*,
ATLAS Collaboration, Phys. Lett. B 801 (2020) 135148, 64 citations.

18. *"Measurement of the four-lepton invariant mass spectrum in 13 TeV proton-proton collisions with the ATLAS detector"*,
ATLAS Collaboration, JHEP 04 (2019) 048, 39 citations.

19. *"Constraints on off-shell Higgs boson production and the Higgs boson total width in $ZZ \to 4\ell$ and $ZZ \to 2\ell 2\nu$ final states with the ATLAS detector"*,
ATLAS Collaboration, Phys. Lett. B 786 (2018) 223-244, 111 citations.

20. *"Measurement of the Higgs boson mass in the $H \to ZZ^* \to 4\ell$ and $H \to \gamma\gamma$ channels with $\sqrt{s}$=13 TeV pp collisions using the ATLAS detector"*,
ATLAS Collaboration, Phys. Lett. B 784 (2018) 345-366, 200 citations.

21. *"Measurement of the $t\bar{t}\gamma$ production cross section in proton-proton collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector"*,
ATLAS Collaboration, JHEP 11 (2017) 086, 57 citations.

22. *"$ZZ \to \ell^+\ell^-\ell'^+\ell'^-$ cross-section measurements and search for anomalous triple gauge couplings in 13 TeV pp collisions with the ATLAS detector"*,
ATLAS Collaboration, Phys. Rev. D 97 (2018) 3, 032005, 88 citations.

23. *"Search for heavy ZZ resonances in the $\ell^+\ell^-\ell^+\ell^-$ and $\ell^+\ell^-\nu\bar{\nu}$ final states using proton proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector"*,
ATLAS Collaboration, Eur. Phys. J. C 78 (2018) 4 293, 139 citations.

24. *"Measurement of the inclusive and differential cross sections in the $H \to ZZ^* \to 4\ell$ decay channel in in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector."*,
ATLAS Collaboration, JHEP 10 (2017) 132, 120 citations.

25. *"Measurement of the Higgs boson coupling properties in the $H \to ZZ^* \to 4\ell$ decay channel at $\sqrt{s} = 13$ TeV with the ATLAS detector"*,
ATLAS Collaboration, JHEP 03 (2018) 095, 193 citations.

26. *"Muon reconstruction performance of the ATLAS detector in proton–proton collision data at $\sqrt{s}$ =13 TeV"*,
ATLAS Collaboration, Eur. Phys. J. C 76 (2016) 5, 292, 1201 citations.

27. *"Observation of top-quark pair production in association with a photon and measurement of the $t\bar{t}\gamma$ production cross section in pp collisions at $\sqrt{s} = 7$ TeV using the ATLAS detector"*,
ATLAS Collaboration, Phys. Rev. D91 (2015) 7, 072007, 81 citations.

Conference and publication notes

1. *"Search for off-shell Higgs boson production and constraints on the total width of the Higgs boson in the $ZZ \to 4l$ and $ZZ \to 2l2\nu$ decay channels with the ATLAS detector"*,
ATLAS Collaboration, ATLAS-CONF-2022-068 (2022).

2. *"Search for associated production of a Z boson with an invisibly decaying Higgs boson or dark matter candidates $\sqrt{s} = 13$ TeV with the ATLAS detector"*,
ATLAS Collaboration, ATLAS-CONF-2021-029 (2021).

3. *"Measurements of gluon fusion and vector-boson-fusion production of the Higgs boson in $H\to WW^*\to e\nu\mu\nu$ decays using pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector"*,
ATLAS Collaboration, ATLAS-CONF-2021-014 (2021).

4. *"Observation of vector-boson-fusion production of Higgs bosons in the $H\to WW^*\to e\nu\mu\nu$ decay channel in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector"*,
ATLAS Collaboration, ATLAS-CONF-2020-045 (2020).

5. *"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"* ,
ATLAS Collaboration, ATLAS-CONF-2020-032 (2020).

6. *"Measurement of the Higgs boson mass in the $H \to ZZ^* \to 4\ell$ decay channel with $\sqrt{s} = 13$ TeV pp collisions using the ATLAS detector at the LHC''* ,
ATLAS Collaboration, ATLAS-CONF-2020-005 (2020).

7. *"Combined measurement of the total and differential cross sections in the $H \to \gamma\gamma$ and the $H \to ZZ^* \to 4\ell$ decay channels at $\sqrt{s}$ =13 TeV with the ATLAS detector"* ,
ATLAS Collaboration, ATLAS-CONF-2019-032 (2019), 10 citations.

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