

Konstantinos Bachas | CV

E-mail: kbachas@uth.gr, dinos.bachas@cern.ch

Employment History

- Associate Professor** **University of Thessaly, Physics Department, Lamia, Greece**
June 2021 - present

Subject: Experimental High Energy Physics
- Fellow Research grant** **Aristotle University of Thessaloniki**
Jan 2020 - Apr 2021

Searches for new physics with the ATLAS experiment at the LHC using indirect methods and novel statistical analysis techniques in the context of Effective Field Theories
- Teaching grant** **Aristotle University of Thessaloniki**
Feb 2020 - Sep 2020

Acquisition of Academic Teaching Experience for Young Doctoral Scientists. Courses "Accelerators and Detectors in Nuclear and Particle Physics" and "Experimental Foundation of Elementary Particle Physics"
- Fellow in Scientific Computing, International Competition (Bando-18827)** **INFN Lecce**
Oct. 2017 - Dec. 2019

Development of Machine Learning techniques for physics analyses. Searches for diboson production at the LHC in the Exotics domain, with the ATLAS Detector using Deep/Recurrent Neural Networks.
- Research Fellow, International Competition (Bando-16725)** **INFN Lecce**
Oct. 2015 - Oct. 2017

Searches for diboson production at the LHC with the ATLAS Detector. Performance studies of muon reconstruction at high pseudorapidity.
- Post-Doctoral researcher, Research programme 'Thalis', 'Diboson' Network** **Aristotle University of Thessaloniki**
Sep. 2012 - Sep. 2015

Analysis of diboson WZ production at the LHC with the ATLAS Detector. Convener of the ATLAS diboson WZ group. Z,W boson inclusive cross-section measurement with 2011 data focusing on $Z \rightarrow \mu\mu$ decay. Performance studies of muon reconstruction at high pseudorapidity.

- **Applied Fellow**

**CERN PH Division
Sep. 2009 - Sep. 2012**

ATLAS Muon simulation/digitization/detector description task leader. Validation of muon simulation code, muon spectrometer geometry and magnetic field descriptions. Development and maintenance of simulation software for the Monitor Drift Tube (MDT) muon tracking chambers. Responsible for Monte Carlo simulation sample productions used for validation and physics analyses. Observation, performance and physics analysis of $J/\psi \rightarrow \mu\mu$ decays with early LHC data. Participation in development of the new muon reconstruction algorithm replacing the ones used until 2012. Z,W inclusive cross-section measurement with 2011 data focusing on $Z \rightarrow \mu\mu$ decay.

- **Research Associate**

**Aristotle University of Thessaloniki
Dec. 2003 - Jul. 2004**

Construction, quality assurance and control tests of the ATLAS Barrel Inner Small (BIS) muon tracking chambers.

Education

- **PhD in Physics**

**Aristotle University of Thessaloniki
2004 - 2008**

Thesis Title: 'Studies of the ATLAS Muon Spectrometer with testbeam and simulated physics data'

- **MSc in Experimental Particle Physics**

**The University of Manchester
2002 - 2003**

Thesis Title: 'Studies of interstrip capacitance in a silicon detector'

- **Bachelor in Physics (BSc)**

**Aristotle University of Thessaloniki
1996 - 2002**

Awards

- **ATLAS Experiment 'Marc Virchaux' Prize**

CERN, 12/2009

For outstanding PhD theses related to the ATLAS Muon Spectrometer

Coordination and convener positions

- **ATLAS Exotics Group MC Contact** **ATLAS Experiment**
Contact to Physics Modeling Group, responsible for MC simulated sample production coordination *Jun 2017 to Sep 2018*
- **Convener** **ATLAS Experiment**
Standard Model Diboson WZ group *2012-2016*
- **Work package manager** **Aristotle University of Thessaloniki**
"Thalis" research project under the "Diboson" network *2012-2015*
- **Liaison** **Aristotle University of Thessaloniki**
Contact between ATLAS and Grid Tier-3 at AUTH *2012-2015*
- **Task leader** **ATLAS Experiment**
Muon Spectrometer Simulation/Digitization/ Detector Description *2009-2012*

Editorial Boards

Member of 3 Editorial Boards for a publication to a journal(2 published, 1 under approval) and 1 Editorial Board for a publication in a Conference(published)

- **"Observation of the B_{c}^{\pm} meson in the decay $B_{c}^{\pm} \rightarrow J/\psi \mu^{+}\mu^{-} \pi^{\pm}$ with the ATLAS detector at the LHC"**, The ATLAS Collaboration, ATLAS CONF-2012-028
- **"Charged-particle distributions in pp interactions at $\sqrt{s}=8\text{TeV}$ measured with the ATLAS detector"**, Aad, G., Abbott, B., Abdallah, J. et al. Eur. Phys. J. C (2016) 76: 403
- **"Search for resonant WZ production in the fully leptonic final state in proton-proton collisions at $\sqrt{s} = 13 \text{ TeV}$ with the ATLAS detector"**, Aad, G., Abbott, B., Abdallah, J. et al. Phys. Lett. B 787 (2018)68

Teaching Experience

- **Teaching courses to 4th year students** **Aristotle University of Thessaloniki**

1. "Accelerators and Detectors in Nuclear and Particle Physics" and
2. "Experimental Foundation of Elementary Particle Physics"

**Spring semester of the academic year
2019-2020**

- **Hands-on Machine Learning**

Dipartimento di Matematica e Fisica "Ennio de Giorgi", Università del Salento

May 2019 to June 2019

Series of lectures on Machine Learning to post-graduate and Ph.D. students.
<https://dinosbachasblog.netlify.com/>

- **Nuclear and atomic physics**

Aristotle University of Thessaloniki

2011-2015

Lab courses to undergraduates

- **PhD tutor**

Dipartimento di Matematica e Fisica "Ennio de Giorgi", Università del Salento

PhD tutor of candidate Isabella Oceano. Thesis title: "Studio della strategia di analisi dei dati dell'esperimento PADME per la ricerca del fotone oscuro".

- **Supervisor of Master's student**

Aristotle University of Thessaloniki

01-09-2012 to 30-09-2013

Supervisor of Master's student (Dimitris Kyriazopoulos) in the field of the ATLAS Muon Spectrometer reconstruction performance at high pseudorapidity regions.

- **Supervisor of Diploma student**

Aristotle University of Thessaloniki

01-09-2014 to 01-09-2015

Supervisor of Diploma student (Evangelos Kourlitis) on background estimation, unfolding and aTGC limits for the ATLAS measurement of WZ production cross section and limits on anomalous gauge couplings.

Outreach activities

- **Settimana della Cultura Scientifica 2018**

Universita del Salento

Cloud chamber demonstration to high-school students

Apr 2018

- **International Master Classes**

Aristotle University of Thessaloniki

Apr 2014

- **"Physics enchants..."** **Kozani, Greece**
Public seminar on physics at the LHC and the Higgs boson *Feb 2014*
- **CERN Open Days** **CERN**
Sep 2013

Technical and Personal skills

- **Programming Languages** Proficient in C++, Python, TeX, Unix
- **Machine Learning Software** Keras, Scikit-Learn
- **Data Analysis/Visualization Software** ROOT Framework, Matplotlib, NumPy, Pandas
- **Other software** Most MS Office programs
- **Languages** Greek(Mothertongue), English(C2 - Proficiency in English), Italian (A1)

Other memberships

- **Board secretary** **Aristotle University of Thessaloniki**
Postgraduate and doctoral student's association *2007-2009*
- **Board member** **Aristotle University of Thessaloniki**
Postgraduate and doctoral student's association *2006 - 2007*

Training

- **European School of High Energy Physics (formerly the CERN-JINR School of Physics)** **Aronsborg, Sweden**
2006

Conferences/Workshops

Invited talks

-
- **VBScanLis2019 International Workshop on BSM models in Vector Boson Scattering processes** **LIP Lisbon**

Experimental results on BSM constraints in EW sector and future prospects 4-5 Dec 2019
https://indico.cern.ch/event/846927/contributions/3628410/attachments/1956507/3250123/LisbonTalk_BachasFinal.pdf
 - **Transversity 2017** **Frascati National Lab**

Drell-Yan lepton angular dependencies at the LHC 11-15 Dec 2017
<http://www.roma1.infn.it/conference/Transversity2017/>
 - **"Les Rencontres de Physique de la Vallée d'Aoste"** **La Thuile**

Electroweak Physics (di-boson production) measurements with ATLAS 1-7 May 2015
https://www.pi.infn.it/lathuile/lathuile_2015.html
 - **"Les Rencontres de Physique de la Vallée d'Aoste"** **La Thuile**

Diboson physics at ATLAS 24 Feb - 2 Mar 2013
https://www.pi.infn.it/lathuile/lathuile_2013.html
 - **HEP 2013** **Chios**

Diboson physics at ATLAS 25-28 Apr 2013
 - **LHC days 2010** **Split**

B-physics in ATLAS 4-9 Oct 2010
<https://indico.cern.ch/event/89312/overview>
 - **HEP 2006** **Ioannina, Greece**

ATLAS Combined Testbeam 2004 Muon Detector-Calorimeter combined reconstruction 13-16 Apr 2006
<http://hep2006.physics.uoi.gr/>
 - **HEP 2004** **Thessaloniki, Greece**

First look for catastrophic energy losses of muons with ATLAS Testbeam data 2004

Poster Presentations

- **XVI Incontri di Fisica delle Alte Energie - IFAE 2017** **Trieste, Italy**

Track based software package for measurement of the energy deposited by muons in the calorimeters of the ATLAS detector at $\sqrt{s} = 13$ TeV 19-21 Apr 2017
<https://agenda.infn.it/event/12289/contributions/13505/>

- **QCD@Work - International Workshop on QCD, Theory and Experiment** **Martina Franca, Italy**

Search for heavy resonances in the $\ell\ell q\bar{q}$ final state in pp collisions at $\sqrt{s} = 13\text{TeV}$ with ATLAS 27 - 30 Jun 2016
<https://agenda.infn.it/event/9699/>
- **CHEP 2007** **Victoria, Canada**

Track based software package for measurement of the energy deposited by muons in the calorimeters of the ATLAS detector 2007
- **Hadron Collider Physics Symposium** **La Biodola, Isola d'Elba, Italy**

Diboson physics studies with the ATLAS detector 2007
- **X Pisa Meeting on Advanced Detectors** **La Biodola, Isola d'Elba, Italy**

Studies of catastrophic muon energy losses in ATLAS H8 combined testbeam data 2006
- **X Pisa Meeting on Advanced Detectors** **La Biodola, Isola d'Elba, Italy**

Testbeam BIS Muon Tracking Chamber - Liquid Argon Calorimeter Combined Reconstruction 2006

Workshops

- **ATLAS Exotics Workshop** **Rome**

Hand-on Session on Machine Learning 29 May - 1 Jun 2018
<https://indico.cern.ch/event/710748/>
- **Workshop on ATLAS Simulation** **CERN**

Update on data/mc comparisons: overview of MDT, CSC, TGC, RPC 2011
- **Workshop on Comparison of Data with Simulation** **CERN**

MDT simulation and comparison with Data 2010
- **Testbeam Workshop** **CERN**

t0 and maximum drift time results of barrel MDTs 2004

Presentations at internal meetings

More than 100 presentations within the ATLAS collaboration working meetings

Publications

The full list of publications where I participate as cosignatory or as major author is here: [List of Publications](#)

The following is a list of publications where my contribution has been more significant

1. ATLAS Collaboration,
JHEP03(2018)009,
"Searches for heavy ZZ and ZW resonances in the llqq and vvqq final states in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector"

[https://doi.org/10.1007/JHEP03\(2018\)009](https://doi.org/10.1007/JHEP03(2018)009)

2. Aaboud, M., Aad, G., Abbott, B. et al.,
Eur. Phys. J. C (2017) 77: 367,
"Precision measurement and interpretation of inclusive W+, W- and Z/ γ^* production cross sections with the ATLAS detector"

<https://doi.org/10.1140/epjc/s10052-017-4911-9>

3. ATLAS Collaboration,
Physics Letters B Volume 753, 10 February 2016, Pages 552-572,
"Measurements of four-lepton production in pp collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector"

<http://dx.doi.org/10.1016/j.physletb.2015.12.048>

4. G. Aad et al. (ATLAS Collaboration),
Phys. Rev. D 93, 092004, 2016,
"Measurements of WZ production cross sections in pp collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector and limits on anomalous gauge boson self-couplings"

<https://doi.org/10.1103/PhysRevD.93.092004>

-
5. ATLAS Collaboration,
Science 338 (6114), 1576-1582,
"A Particle Consistent with the Higgs Boson Observed with the ATLAS Detector at the Large Hadron Collider"

DOI: <https://doi.org/10.1126/science.1232005>

<https://cds.cern.ch/record/1511050/files/Science-2012--1576-82.pdf>

-
6. ATLAS Collaboration, "Muon reconstruction efficiency and momentum resolution of the ATLAS experiment in proton-proton collisions at $\sqrt{s} = 7$ TeV in 2010", *Eur. Phys. J.*, vol. C74, no. 9, p. 3034, 2014

DOI: <https://doi.org/10.1140/epjc/s10052-014-3034-9>

-
7. ATLAS Collaboration,
Eur. Phys. J., vol. C74, no. 11, p. 3130, 2014,
"Measurement of the muon reconstruction performance of the ATLAS detector using 2011 and 2012 LHC proton-proton collision data"

DOI: <https://doi.org/10.1140/epjc/s10052-014-3130-x>

-
8. ATLAS Collaboration,
Phys. Lett., vol. B716, pp. 1-29, 2012,
"Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC"

DOI: <https://doi.org/10.1016/j.physletb.2012.08.020>

-
9. ATLAS Collaboration,
Nucl. Phys., vol. B850, pp. 387-444, 2011
"Measurement of the differential cross-sections of inclusive, prompt and non-prompt J/ψ production in proton-proton collisions at $\sqrt{s} = 7$ TeV"

DOI: [10.1016/j.nuclphysb.2011.05.015](https://doi.org/10.1016/j.nuclphysb.2011.05.015)

-
10. ATLAS Collaboration,
Eur. Phys. J., vol. C70, pp. 875-916, 2010,
"Commissioning of the ATLAS Muon Spectrometer with cosmic rays",

DOI: <https://doi.org/10.1140/epjc/s10052-010-1415-2>

11. C. Adorisio et al.,
Nucl. Instrum. Meth., vol. A598, pp. 400-415, 2009
"Study of the ATLAS MDT spectrometer using high energy CERN combined test beam data",

DOI: <https://doi.org/10.1016/j.nima.2008.09.031>

12. Aad, G., Abbott, B., Abdallah, J. et al.,
Eur. Phys. J. C (2016) 76: 403
"Charged-particle distributions in pp interactions at $\sqrt{s}=8\text{TeV}$ measured with the ATLAS detector"

<https://dx.doi.org/10.1140/epjc/s10052-016-4203-9>

13. K. Bachas, K. Bouzakis, A. Krepouri, A. Liolios, C. Petridou, D. Sampsonidis, I. Tsiafis, C. Valderanis, and J. Wotschack,
Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, Volume 581, Issues 1-2, 21 October 2007, Pages 198-201,
"The construction and the quality assurance-quality control of the 112 MDT-Barrel Inner Small precision chambers of the ATLAS Muon Spectrometer"

<https://doi.org/10.1016/j.nima.2007.07.077>

14. G. Aad et al. (ATLAS Collaboration),
ATLAS-CONF-2016-016,
"Search for ZZ resonances in the llqq final state in pp collisions at $\sqrt{s} = 13 \text{ TeV}$ with the ATLAS detector"

- <https://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/CONFNOTES/ATLAS-CONF-2016-016/>

- <http://inspirehep.net/record/1434361>

15. ATLAS Collaboration,
ATLAS-CONF-2013-021,
"A Measurement of WZ Production in Proton-Proton Collisions at $\sqrt{s} = 8 \text{ TeV}$ with the ATLAS Detector"

<http://inspirehep.net/record/1229961>

16. ATLAS Collaboration,
ATLAS-CONF-2011-021, 2011,
"A measurement of the ATLAS muon reconstruction and trigger efficiency using J/ψ decays",
<http://inspirehep.net/record/1204061>

17. ATLAS Collaboration,
ATLAS-CONF-2010-062,
"A first measurement of the differential cross section for the $J/\psi \rightarrow \mu+\mu-$ resonance and the non-prompt to prompt J/ψ cross section ratio with pp collisions at $\sqrt{s} = 7$ TeV in ATLAS"
<http://inspirehep.net/record/1204026>

18. ATLAS Collaboration,
ATLAS-CONF-2010-045,
"First observation of the $J/\psi \rightarrow \mu+\mu-$ resonance in ATLAS pp collisions at $\sqrt{s} = 7$ TeV"
<http://inspirehep.net/record/1203944>

19. K.Bachas,
Nuovo Cim., vol. C038, no. 04, 2015,
"Electroweak Physics (diboson production) measurements with ATLAS"
DOI: <https://doi.org/10.1393/ncc/i2015-15140-0>

20. K.Bachas,
Nuovo Cim., vol. C036, no. 06, pp. 227-235, 2013,
"Diboson physics at ATLAS"
DOI: <https://doi.org/10.1393/ncc/i2014-11638-1>

21. ATLAS Collaboration,
ATLAS-CONF-2012-028,
"Observation of the B_c^\pm meson in the decay $B_c^\pm \rightarrow J/\psi (\mu+\mu-)\pi^\pm$ with the ATLAS detector at the LHC"
<https://inspirehep.net/record/1204191>

22. K. Bachas et al.,
Nuclear Physics B - Proceedings Supplements, Volumes 177-178, March 2008, Pages 255-257,
"Studies of Diboson Production with the ATLAS Detector"

DOI: <https://doi.org/10.1016/j.nuclphysbps.2007.11.119>

23. K. Bachas and S. Hassani,
J. Phys. Conf. Ser., vol. 119, p. 042002, 2008,
"Track based software package for measurement of the energy deposited by muons in the
calorimeters of the ATLAS detector"

DOI: <https://doi.org/10.1088/1742-6596/119/4/042002>

24. M. Aleksa, K. Bachas, R. Lafaye, J. F. Laporte, R. Nicolaidou, C. Petridou, and D. Sampsonidis,
Nucl.Instrum.Meth. A572 (2007) 117-119
"ATLAS H8 Testbeam data analysis combining information from the Liquid Argon Calorimeter
and a Monitored Drift Tube muon tracking chamber"

DOI: <https://doi.org/10.1016/j.nima.2006.10.267>

25. K. Bachas, Ch. Petridou, D. Sampsonidis, S. Hassani, J.F. Laporte, R. Nicolaidou,
Nucl.Phys.Proc.Suppl. 177-178 (2008) 320-321,
"Studies of catastrophic muon energy losses in ATLAS H8 combined Testbeam data"

DOI: <https://doi.org/10.1016/j.nuclphysbps.2007.11.145>

26. K. Bachas,
EPJ Web Conf. 129 (2016) 00008
"Search for heavy resonances in the llq final state in pp collisions at $\sqrt{s} = 13$ TeV with ATLAS"

DOI: <https://doi.org/10.1051/epjconf/201612900008>

27. ATLAS Collaboration,
CERN-OPEN-2008-020,
"Expected Performance of the ATLAS Experiment - Detector, Trigger and Physics",
Subsection: "Muons in the Calorimeters: Energy Loss Corrections and Muon Tagging"

<https://inspirehep.net/record/810300?ln=en>

28. K. Bachas PhD Thesis,
CERN-THESIS-2008-070
"Studies of the ATLAS Muon Spectrometer with testbeam and simulated physics data"

<http://inspirehep.net/record/887204/>

<https://drive.google.com/file/d/1Tn9IKW33fOj3Ftfrv434nSirD1U3-kba/view?usp=sharing>

29. K. Bachas MSc Thesis
CERN-THESIS-2003-076
"Studies of inter-strip capacitance in a silicon detector"

<http://inspirehep.net/record/640475>