Dimitrios Ntounis

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Google Scholar • 741 citations • h-index 14
(last updated: 26 August 2026)

EDUCATION

Stanford University, Stanford CA, 94305
Ph.D. in Physics & Ph.D. Minor in Computer Science 06/2022 – 06/2027 (Expected)

- Research Interests: High Energy Physics, Machine Learning, AI For Science
- Relevant graduate-level coursework:
  - PHYSICS 212: Statistical Mechanics
  - PHYSICS 220: Classical Electrodynamics
  - PHYSICS 266: Statistical Methods in Experimental Physics
  - PHYSICS 330: Quantum Field Theory
  - CS 221: Artificial Intelligence – Principles and Techniques
  - CS 229: Machine Learning
  - EE 263: Introduction to Linear Dynamical Systems
  - APPPHYS 293: Theoretical Neuroscience
  - EE 364A/CME 364A: Convex Optimization
  - AA 222/CS 361: Engineering Design Optimization
  - CS 205L: Continuous Mathematical Methods with an Emphasis on Machine Learning
  - CS 231N: Deep Learning for Computer Vision
  - STATS 300A: Theory of Statistics
  - CS 223A: Introduction to Robotics

MS in Physics 10/2022 – 06/2024

- Awarded for 45 units of graduate-level coursework
- Degree conferral date: June 2024

National and Kapodistrian University of Athens (NKUA), Athens, Greece 09/2016 - 07/2021
BSc in Physics (240 ECTS)

- Grade: 9.89/10, Excellent (1st in my class of 300)
- Direction: Nuclear and Particle Physics
- Relevant Coursework:
  - Introduction to Nuclear Physics and Elementary Particles
  - Elementary Particles I
  - Nuclear Physics I
  - Nuclear Physics Laboratory
  - Special Topics in Nuclear Physics and Elementary Particles
  - Modern Quantum Physics and Applications
- Thesis: "*Search for a Signal of New Physics with Four Jets in the Final State with the CMS Experiment at CERN*"
  Supervisor: Prof. Niki Saoulidou

Nationwide University Entrance Examination score: 19,560 / 20,000 (top 1% nationwide and 1st among all students entering Physics Departments in Greece) 06/2016

RESEARCH EXPERIENCE

Research Assistant, Caterina Vernieri's Group & SLAC ATLAS Group 06/2023 – ongoing
(Contact: Prof. Caterina Vernieri, SLAC & Stanford)

- Higgs Physics with the ATLAS Experiment at the CERN LHC:
  - Core analysis member for the boosted, all-hadronic $VH(b\bar{b})$ Run 2 analysis
  - Main analyzer for the extended (full Run 2 plus partial Run 3) iteration of the analysis
- ATLAS authorship qualification task:
  - HGTD integration in ACTS for 4D tracking at the HL-LHC
- Simulation Studies for the Cool Copper Collider (C^3):
  - Beam- and machine-induced background and interplay with detector design
  - Luminosity optimization
  - Sustainable construction and operation considerations
- Physics analyses for Future Colliders:
  - Double Higgs production at ILC/C^3
  - Graph neural networks for jet flavor tagging across future-collider detector geometries
- Machine Learning for HEP and future-collider design:
  - Differentiable and GPU-accelerated particle-in-cell simulations for gradient-based collider design optimization
  - Mamba selective state-space models for jet tagging.
  - Automated end-to-end detector design optimization for Future Colliders.
- AI4Science:
  - Mapping scientific innovations in document embedding spaces

Rotation Research Assistant, Gratta Lab 04/2023 – 06/2023
(Contact: Prof. Giorgio Gratta, Stanford)

- Tests of gravity at the µm scale using levitated microspheres, focusing on laser-beam wavefront modulation with Spatial Light Modulators (SLMs)

Rotation Research Assistant, SLAC LUX-ZEPLIN (LZ) Group 01/2023 – 03/2023
(Contacts: Prof. Daniel Akerib & Dr. M.E. Monzani, SLAC & Stanford)

- Dark Matter direct detection search with the LZ experiment, focusing on the optimization of selection criteria for the removal of accidental background events

Rotation Research Assistant, SLAC ATLAS Group 06/2022 – 12/2022
(Contact: Prof. Caterina Vernieri, SLAC & Stanford)

- Higgs Physics with the ATLAS Experiment at the CERN LHC, focusing on the boosted full-hadronic $VH(b\bar{b})$ analysis
- Beam- and machine-induced background simulation studies for C^3

Research Assistant, CMS Dijet Resonance Search Team 02/2020 – 06/2022
(Contacts: Dr. Robert Harris, Fermilab & Prof. Niki Saoulidou, NKUA)

- Participated in biweekly meetings with senior CMS scientists
- Delivered presentations contributing to ongoing CMS analyses, including calculations of non-asymptotic cross section limits and global significance estimation

Lab & Research Assistant, High Energy Physics Lab, NKUA 07/2019 - 07/2021
(Contact: Prof. Niki Saoulidou, NKUA)

- Carried out research in the Exotica group of the CMS experiment at CERN
- Developed a novel technique of selection criteria optimization implementing Genetic Algorithms
- Investigated the use of Gaussian Process models for machine learning in High Energy Physics

SELECTED PUBLICATIONS

As a qualified author of the ATLAS collaboration since May 2025, I am a co-author on all collaboration publications thereafter. Additionally, I have contributed to community white papers and technical reports. The highlighted papers below reflect substantial personal contribution. A full list of publications can be found on my INSPIRE-HEP and Google Scholar profiles.

PUBLISHED IN PEER-REVIEWED JOURNALS

1. [March 2026] Linear Collider Vision Collaboration, **D. Ntounis**, "*A linear collider vision for the future of particle physics* ", Eur. Phys. J. Spec. Top. (2026)
2. [February 2026] **D. Ntounis**, L. Gordon, L. Gray, E. Mettner, T. Barklow, E. A. Nanni and C. Vernieri, "*Beam-Beam Backgrounds for the Cool Copper Collider*", JINST **21** P02024
3. [June 2025] W. H. Tan, G. White, **D. Ntounis**, Z. Li, D. Kim, H. Xu, E. Simakov, and E. A. Nanni, "*Emittance Preservation in the C^3 Main Linear Accelerator*", Nuclear Instruments and Methods in Physics Research A 1080 (2025) 170660
4. [June 2024] **D. Ntounis**, E.A. Nanni and C. Vernieri, "*Luminosity and beam-induced background studies for the Cool Copper Collider*", Phys. Rev. Accel. Beams **27**, 061001
5. [March 2024] ATLAS Collaboration, **D. Ntounis**, "*Study of High-Transverse-Momentum Higgs Boson Production in Association with a Vector Boson in the qqbb Final State with the ATLAS Detector*", Phys. Rev. Lett. **132**, 131802[1]
6. [October 2023] M. Breidenbach, B. Bullard, E. A. Nanni, **D. Ntounis**, and C. Vernieri, "*Sustainability Strategy for the Cool Copper Collider*", PRX Energy **2**, 047001
7. [July 2023] C. Vernieri, **D. Ntounis** et al., "*A 'Cool' route to the Higgs boson and beyond. The Cool Copper Collider*", JINST **18** P07053
8. [July 2023] CMS Collaboration, **D. Ntounis**, "*Search for resonant and nonresonant production of pairs of dijet resonances in proton-proton collisions at $\sqrt{s} = 13$ TeV*", J. High Energ. Phys. **2023**, 161 (2023) [2]

PREPRINTS

1. [September 2025] M. Berggren, B. Bliewert, J. List, **D. Ntounis**, T. Suehara, J. Tian, J. M. Torndal and C. Vernieri, "*Update of the Higgs Self-coupling Projections from Di-Higgs Production in Detailed Simulation of the ILD Concept*", ILD-PHYS–2025-001
2. [January 2025] **D. Ntounis**, L. Gouskos and C. Vernieri, "*Evaluating the Impact of Detector Design on Jet Flavor Tagging for Future Colliders* ", arXiv:2501.16584

[1] Granted exceptional authorship by the ATLAS collaboration for significant contributions to the paper.
[2] Granted exceptional authorship by the CMS collaboration for significant contributions to the paper.

INTERNAL DOCUMENTS

1. [October 2023] ATLAS Collaboration Internal Note HIGG-2021-11 (internal ATLAS document): "*Measurement of high-momentum Higgs boson production in association with a vector boson in the qqbb final state with the ATLAS detector*"
2. [December 2021] CMS Collaboration Analysis Note AN-20-190 (internal CMS document): "*Searches for paired dijet resonances with the full Run II dataset at 13 TeV*"

MANUSCRIPTS IN PREPARATION / WORKSHOP SUBMISSIONS

1. [2026] **D. Ntounis**, "*GUINEAGRAD: A Differentiable Beam-Beam Interaction Simulator for Gradient-Based Collider Optimization*", accepted to the ICML 2026 Workshop on AI for Physics
2. [2026] **D. Ntounis** et al., "*JetMamba: Efficient State Space Models for Jet Flavor Classification in High Energy Physics*", in preparation for *Machine Learning: Science and Technology*
3. [2026] **D. Ntounis**, A. Schwartzman, "*Detecting Conceptual Revolution via Counterfactual Ablation of Document Embedding Spaces*", in preparation

TALKS

TALKS AT CONFERENCES

1. [October 2024] Third ECFA Workshop on e^+e^- Higgs/EW/Top Factories:
   (a) Parallel session talk: "*Evaluating strange-tagging performance for SiD fast- and full-simulation*"
   (b) Parallel session talk: "*Bunch Structure Studies at C^3*"
   (c) Co-author of one more talk: "*Projections for Higgs self-coupling measurements with double Higgs production with ILD at multiple CoM energies*"
2. [July 2024] 42nd International Conference on High Energy Physics (ICHEP 2024):
   (a) Parallel session talk: "*Sustainability Strategy for the Cool Copper Collider*"
3. [July 2024] 2024 International Workshop on Future Linear Colliders (LCWS2024):
   (a) Parallel session talk: "*Luminosity Studies for the Cool Copper Collider*"
   (b) Parallel session talk: "*Beam-Induced Backgrounds at the Cool Copper Collider*"
   (c) Co-convener of the Early-Career-Researcher (ECR) Panel.
   (d) Co-author of two more talks: "*A Sustainability Strategy for the Cool Copper Collider*" and "*Towards an update of the ILD ZHH analysis*"
4. [October 2023] Second ECFA Workshop on e^+e^- Higgs/EW/Top Factories:
   (a) Parallel session talk: "*Beam-induced background simulation studies for C^3*"
   (b) Co-author of two more talks: "*Optimizing the Higgs self-coupling measurement at ILC and C^3*" and "*Out-of-Time Pileup Mixing for the C^3 Collider Concept*".
5. [May 2023] 2023 International Workshop on Future Linear Colliders (LCWS2023):
   (a) Parallel session talk: "*Muon Backgrounds from Beam Interactions with the Accelerator Structure at C^3*"
   (b) Presentation at Early Career Poster Session: "*Simulation of Beam- and Machine-induced Backgrounds for the Cool Copper Collider*"
   (c) Co-author of two more talks: "*Pair Production and Hadron Photoproduction Backgrounds at C^3*" and "*Sustainability studies for the Cool Copper Collider*"

INVITED TALKS AT WORKSHOPS/MEETINGS

1. [June 2024] "*Sustainability Strategy for the Cool Copper Collider*" at the Sustainable HEP 2024 - 3rd edition workshop.
2. [March 2024] "*Simulation of Beam-Related Backgrounds at Higgs Factories*" at the Open Meeting of the ILC International Development Team (IDT-WG3-Phys Working Group).
3. [February 2024] "*Activities/plans from C^3 event generators*" at the Meeting on Event Generator for Linear Colliders.

4. [February 2024] "*Luminosity Studies*" at the SLAC Cool Copper Collider Workshop.
5. [January 2024] "*Beam-beam simulations for e^+e^- Higgs factories*" at the SLAC Multi-TeV Beam-Beam meeting
6. [February 2023] "*Overview of beam- and machine-induced background studies for C^3*" at the 2nd general meeting of the ILC-Japan Physics Working Group.

TEACHING EXPERIENCE

Teaching Assistant for PHYSICS 152/252 (Introduction to Particle Physics) 04/2024 – 06/2024
(Instructor: Prof. Caterina Vernieri, SLAC & Stanford)

- Sole teaching assistant responsible for around 20 students (both graduate and undergraduate), leading weekly discussion sections, holding biweekly office hours, reviewing and updating lecture and section notes and preparing exercises for weekly problem sets

Teaching Assistant for PHYSICS 166/266 (Statistical Methods in Experimental Physics) 01/2024 – 03/2024
(Instructor: Prof. Ariel Schwartzman, SLAC & Stanford)

- Sole teaching assistant responsible for 10 students (6 graduate students, 4 undergraduates), leading weekly discussion sections with a theoretical and computational component, holding biweekly office hours, reviewing and updating exercises for weekly problem sets

Teaching Assistant for PHYSICS 43 (Electricity and Magnetism) 04/2023 – 06/2023
(Instructor: Prof. Mark Kasevich, Stanford)

- Responsible for 30 students, helping with questions during lectures and leading weekly discussion sections involving lecture material overview and collaborative problem solving

Private Tutor Volunteer in university-level Physics courses, Athens, Greece 09/2018 - 10/2021

- Taught courses of Classical Mechanics, Mathematical Physics, Special Relativity, Electromagnetism, and Elementary Particles to small groups of Physics and Engineering students

SOCIETIES & AFFILIATIONS

- Mentor for the Stanford Physics Directed Reading Program 03/2025 - 06/2025
- Mentor for the Stanford University Physics Society Graduate Mentoring Program 10/2024 - 06/2025
- Financial Officer of the Hellenic Association of Stanford 09/2023 - 06/2026
- Member of the ATLAS Collaboration at CERN ("Doctoral Student") 06/2022 - ongoing
- Member of the CMS Collaboration at CERN ("Non-Doctoral Student") 09/2019 - 06/2022

HONORS & AWARDS

- Co-recipient, Breakthrough Prize in Fundamental Physics (ATLAS Collaboration) 04/2025
- Co-recipient, Breakthrough Prize in Fundamental Physics (CMS Collaboration) 04/2025
- 26th National Physics Competition, 2nd place among all 12th grade students 03/2016
- 25th National Physics Competition, 3rd place among all 11th grade students 03/2015
- 24th National Physics Competition, 4th place among all 10th grade students 03/2014

TECHNICAL SKILLS

- Programming Languages: Python, C/C++, CUDA, Julia
- ML/AI Frameworks: PyTorch, TensorFlow, JAX, ONNX, Keras
- ML Methods: Transformers, Convolutional and Graph Neural Networks, State-Space Models, Boosted Decision Trees, Genetic Algorithms, Gaussian Processes
- Scientific Computing: CERN ROOT, Mathematica, distributed and high-performance workflows
- Statistical Modeling: Maximum Likelihood Estimation, Kalman filtering, Monte Carlo methods, Bayesian Inference

LANGUAGES

- English (fluent), German (fluent), Greek (native)