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Academic Positions

- 2025 Jun - present **CERN**, Department of Theoretical Physics, Geneva, Switzerland
- **Scientific Associate**
- 2022 Jun - 2025 May **Massachusetts Institute of Technology (MIT)**, Center of Theoretical Physics & Institute of Artificial Intelligence and Fundamental Interactions, Cambridge, USA
- **Postdoctoral Fellow**, Advisor: Prof. Dr. Jesse Thaler
- 2020 Oct - 2022 May **Scuola Internazionale Superiore di Studi Avanzati (SISSA)**, Department of Physics, Trieste, Italy
- **Postdoctoral Fellow**, Advisor: Dr. David Marzocca

Education

- 2016 Dec - 2020 Sep **Universität Zürich**, Zürich, Switzerland
- **Ph.D. in Physics**, Advisor: Prof. Dr. Gino Isidori
- 2015 Feb - 2016 Nov **Eidgenössische Technische Universität Zürich (ETH)**, Zürich, Switzerland
- **M.Sc. in Physics**, Advisor: Prof. Dr. Gino Isidori
- 2011 Oct - 2014 Sep **Technische Universität Dortmund**, Dortmund, Germany
- **B.Sc. in Physics**, Advisor: Prof. Dr. Emmanuel A. Paschos

Awards and Grants

- 2023 **SNSF Return Grant** (PZ00P2_223581), Switzerland
- 2022 **SNSF Postdoc.Mobility Grant** (P500PT_203156), Switzerland
- 2020 **INFN Assegno di Ricerca Fellowship** (2017L5W2PT), Italy
- 2018 **Invisibles Plus Exchange Scholarship**, Lawrence Berkeley Lab, USA
- 2016 **ETH & Tokyo Tech Exchange Scholarship**, Tokyo, Japan
- 2016 Global Essay Competition Finalist, 46th St. Gallen Symposium, Switzerland

Continuing Education

- 2024 Feb Brookhaven National Lab, EIC Visitor program, Upton, USA
- 2023 Jun Jefferson Lab, Quantum Computing Bootcamp, Newport News, USA
- 2022 Aug IAIFI, Summer school & Workshop, Cambridge, USA
- 2020 Aug EPFL, Machine Learning in High Energy Physics, Geneva, Switzerland (online)
- 2018 May Higgs Centre for Theoretical Physics, Edinburgh, United Kingdom

2017 Jul Institute for Advanced Study, Prospects in High Energy Physics, Princeton, USA

Teaching Experience

Workshop tutorial leader, IAIFI Summer School

2024 August ○ Representation/Manifold Learning (Prof. M. Weber)

Teaching assistant, Universität Zürich

2019 Fall ○ Quantum Field Theory III (Prof. G. Isidori)

2019 Spring ○ Advanced Field Theory (Dr. Lazopoulos)

2018 Fall ○ Quantum Field Theory I (Prof. A. Gehrmann-De Ridder),

2018 Spring ○ Quantum Mechanics II (Prof. A. Signer)

2017 Fall ○ General Relativity (Prof. G. M. Graf)

2017 Spring ○ Quantum Field Theory II (Prof. N. Beisert)

Replacement lecturer, Universität Zürich

2019 Fall ○ Quantum Field Theory III (Prof. G. Isidori)

2018 Spring ○ Quantum Mechanics II (Prof. A. Signer)

2015 **Seminar for Didactics**, ETH Department of Education and Technology

2015-2016 **Teaching assistant**, ETH, undergraduate courses

Mentoring

Graduate student research advisor

2025-present ○ Alexandra P. Klipfel (MIT)

2025-present ○ Thomas Driscoll (U. of Oregon)

2024-2025 ○ Kate Richardson (MIT)

2024-2025 ○ Chaja Baruch (Technion)

2023-2025 ○ Ta'el Coren (Technion)

2023-2025 ○ Sean Benevedes (MIT)

2023 ○ Pamela Pajarillo (MIT)

2022 ○ Miguel Vanvlasselaer (SISSA, now: PostDoc at U. Barcelona)

Undegraduate student research advisor

2025-present ○ Dylan Perez (Caltech)

2025-present ○ Angelos Sirbu (University of Crete)

2023-present ○ Sabina Tomasicchio (U. of Seville, now Ph.D. at UMass Amherst)

2023-2024 ○ Victor Samuel Pérez Díaz (Universidad del Rosario, now: Ph.D. at NYU)

2023 Jun-Oct ○ Alicia Mand (U. of Wisconsin-Madison, Ph.D. at U. of Wisconsin Madison)

2023-2024 ○ Dhruv Kumar (IIT Guwahati, now: Intern at CADSL IIT Bombay)

2023 Jun-Oct ○ Acchhyut Jolly (BITS Pilani)

2023 Jun-Oct ○ Soham Sanyashiv (IISER Kolkata, now: Intern at TIFR, Mumbai)

2023 Jun-Oct ○ Gokhula Prasad (The American College, Madurai, now: Ph.D. at NIT Tiruchirappalli)

2023 Jun-Oct ○ Abhay Singh Rawat (HNBGU, now: Ph.D. at HNBGU)

International Baccalaureate Diploma tutor

2016 ○ Dustin Fichmann (United World College Costa Rica, now: Scientist at World Data Lab)

Conference and Workshop Talks

“Fundamental Interactions from Quantum Information”

2025 Sep **Invited:** CERN TH Institute on Quantum Simulation & Computation in High-Energy Physics, Geneva, Switzerland

2025 Apr **Invited plenary:** Quantum Observables for Collider Physics, Florence, Italy

2025 Mar **Invited plenary:** Moriond Electroweak Interactions & Unified Theories, La Thuile, Italy

2025 Feb **Invited plenary:** KEK Theory Meeting, Tsukuba, Japan

“From Neurons to Neutrons: An interpretable AI for nuclear physics”

2025 Dec **Invited plenary:** Christmas Symposium on Theoretical Physics, Thessaloniki, Greece

2025 Oct Contributed: 16th European Research Conference on Electromagnetic Interactions with Nucleons and Nuclei, Paphos, Cyprus

2025 Aug **Invited plenary:** IAIFI Summer Workshop, Cambridge, USA

2024 Aug Contributed: XVIth Quark Confinement and the Hadron Spectrum, Cairns, Australia

2024 Jun **Peer-Reviewed Poster:** ICML2024, Vienna, Austria

2023 Aug Poster: AI for Science, Chicago

“Charting the Universe with Primordial Black Holes”

2025 Aug Contributed: Black Holes & Cosmology, Reykjavík, Iceland

“New Physics at Colliders: The present, the future and the far future”

2024 Jul **Invited plenary:** Light Dark World, Daejeon, Korea

“BSM at the Muon Synchrotron Ion Collider: Let the MuSIC play!”

2025 Mar Contributed: Empowering the New Vision in High Energy Physics, Aspen, USA

2024 Nov **Invited plenary:** Uncovering New Laws of Nature at EIC, Upton, USA

“Pulsar Timing Arrays gravitational waves and JWST early galaxies”

2024 Jun **Invited plenary:** SynCRETism 2024, Rethymno, Greece

2024 Mar **Invited:** Workshop on PBHs, MIT LIGO Lab, Cambridge, USA

2024 Mar Contributed: Black Holes & Cosmology, Nassau, Bahamas

2023 Dec **Invited:** Xmas Theoretical Physics Workshop, Athens, Greece

2023 Aug **Invited:** Invisibles Workshop, Göttingen, Germany

“Standard Model PDFs for the Muon Collider”

2023 Mar **Invited:** LISHEP2023, Rio de Janeiro, Brazil

2022 Aug Contributed: Vietnam Flavour Physics Conference, Quy Nhon, Vietnam

“A Minimal Explanation of Flavour Anomalies”

2021 Sep Contributed: Workshop on the Standard Model and Beyond, Corfu, Greece

“Collider Signatures of Coannihilating Dark Matter”

- 2021 Jun Contributed: Workshop on Axions WIMPs and WISPs, Trieste, Italy (online)
2020 Mar Invited: La Thuile, Aosta Valley, Italy; canceled

“Exploring the flavour structure of the high-scale MSSM”

- 2021 Aug Contributed: SUSY International Conference on Supersymmetry and the Unification of Fundamental Interactions, Beijing, China
2017 Dec Contributed: SUSY International Conference on Supersymmetry and the Unification of Fundamental Interactions, Mumbai, India
2017 Feb Contributed: PRISMA Symposium "A Matter of Flavor", Mainz, Germany

“The bridge between R-parity violating SUSY and flavoured Dark Matter”

- 2019 Jun Contributed: PLANCK International Conference from the Planck Scale to the Electroweak Scale, Granada, Spain
2019 May Contributed: SUSY International Conference on Supersymmetry and the Unification of Fundamental Interactions, Corpus Christi, USA

Invited Seminar Talks & Colloquia

“The Phenomenologist’s Guide to the Dark Universe”

- 2026 Mar Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany (**colloquium**)
2026 Feb University of Pittsburgh, Pittsburgh, USA
2026 Feb National Centre of Scientific Research “Demokritos”, Athens, Greece
2025 Jun University of Crete, Heraklion, Greece (**colloquium**)

“Fundamental Interactions from Quantum Information”

- 2025 Dec Complutense University of Madrid, Madrid, Spain
2025 Oct University of Cyprus, Nicosia, Cyprus
2025 Oct Aristotle University, Thessaloniki, Greece
2025 Sep University of Oxford, Oxford, UK
2025 May Northwestern University, Evanston, Illinois
2025 Apr Indian Institute of Science, Bangalore, India (online)
2025 Jan Kavli IPMU, Kashiwa, Japan
2025 Jan Lawrence Berkeley National Laboratory, Berkeley, USA
2024 Dec UC San Diego, San Diego, USA

“From Neurons to Neutrons: An interpretable AI for nuclear physics”

- 2025 Oct CERN TH (Heavy-Ion Seminar), Geneva, Switzerland
2025 Oct Queen Mary University of London, London, UK

“Charting the Universe with Primordial Black Holes”

- 2025 May Kavli Institute for Cosmological Physics, Chicago, Illinois
2025 Feb Chinese Academy of Sciences, Beijing, China

	“New Physics at Colliders: The present, the future and the far future”
2025 Jan	University of Tokyo, Tokyo, Japan
2024 Sep	University of Melbourne, Melbourne, Australia
2024 Mar	Argonne National Laboratory, Lermont, USA
2024 Mar	Brookhaven National Laboratory, Upton, USA
	“Pulsar Timing Arrays gravitational waves and JWST early galaxies”
2023 Dec	UC Berkeley, Berkeley, USA
2023 Dec	Vrije Universiteit Brussel, Brussels, Belgium
2023 Oct	Chinese Academy of Sciences, Beijing, China (online)
	“Attracting the electroweak scale to a tachyonic trap”
2023 Mar	Majorana-Raychaudhuri Seminars Series (online)
2023 Jan	Technion, Haifa, Israel
	“Standard Model PDFs for the Muon Collider”
2023 Mar	Technion, Haifa, Israel
2023 Mar	University of Chicago, Chicago, USA
2022 Sep	MIT, Cambridge, USA
	“The bridge between R-parity violating SUSY and flavoured Dark Matter”
2019 Sep	FermiLab, Batavia, USA
2019 Sep	Cornell, Ithaca, USA
2019 Aug	Lawrence Berkeley National Laboratory, Berkeley, USA
2019 Aug	UC Santa Cruz, Santa Cruz, USA

Academic Service and Scientific Societies

2025-2026	Lead Conference Organizer: Quantum Observables for Collider Physics 2026, CERN
2025-2026	Conference Organizer: PLANCK2026 & 6th EuCAPT Symposium, CERN
2025-present	Member: Greek Astrophysical Society
2025-present	Member: European Astrophysical Society
2025-present	Member: Asymmetry network
2023-2024	School & Workshop Organizer: IAIFI Summer School & Workshop 2024
2019-present	Journal referee: Physical Review Letters, Physical Review A, Physical Review D, European Physical Journal C, Physical Letters B
2023-present	Machine Learning Conference referee: NeurIPS, ICML
2018 Jan	Workshop organizer: Zurich Phenomenology Workshop
2018-2019	Organizer: Theoretical Physics Journal Club of Zürich

Public Outreach

- 2025-present CERN guide: Volunteer in guided tours in CERN facilities and local outreach events organized by Science Gateway.
- 2022-2025 Committee member: Organizer and representative of the public outreach events of IAIFI
- 2023 Oct **Public lecture:** “Spot the Difference: AI vs Reality in Physics”, Cambridge Science Festival, Cambridge, USA
- 2023 Aug **Public lecture:** “The Interplay between Physics and Artificial Intelligence”, Museum of Science of Boston, Boston, USA
- 2023 Jul **Public lecture:** “Machine Learning Application to Physics”, Remote Experience for Young Researchers, Berkeley, USA
- 2023 Jun **Invited industry talk:** “AI technologies: the new frontier”, Industry Seminar FONTIS Beratung, Zürich, Switzerland

Languages

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

Coding

Languages C++, Python, Julia, Mathematica.

Packages Madgraph5, Pythia8, Delphes3, FastJet3, MicroOMEGAs, MontePython, COLOSSUS, CLASS, PTArcade, CosmoLattice, OriginPro, Python libraries (Pytorch, Numpy, SciPy, scikit-learn, Pandas, PySR, JAX etc.), wandb.ai, Slurm.

Publications in Peer-Review Journals

❖ For a complete list of publications see my [Inspire page](#).

29. “On Exclusive Coherent Production of Bosons in Electron-Proton Collisions”. R. Balkin, T. Coren, A. Jentsch, H. Liu, M. Ovchynnikov, Y. Soreq, **S. Trifinopoulos**, submitted for peer review
28. “Shocks from Exploding Primordial Black Holes in the Early Universe”. M. Vanvlasselaer, **S. Trifinopoulos**, A. P. Klipfel, D. I. Kaiser, submitted for peer review • arXiv: 2603.15746 [astro-ph]
27. “The Dark Side of the Moon: Listening for Scalar-Induced Gravitational Waves”. D. Blas, J. W. Foster, Y. Gouttenoire, A. J. Iovino, I. Musco, **S. Trifinopoulos**, M. Vanvlasselaer, submitted for peer review • arXiv: 2602.12252 [astro-ph]
26. “Braking protons at the EIC: from invisible meson decay to axion searches”. R. Balkin, T. Coren, A. Jentsch, H. Liu, M. Ovchynnikov, Y. Soreq, **S. Trifinopoulos**, submitted for peer review • arXiv: 2601.00068 [hep-ph]
25. “Large-Scale Structure Probes of the Post-Inflationary Axiverse”. M. Gorghetto, **S. Trifinopoulos**, G. Valogiannis, submitted for peer review • arXiv: 2511.04734 [astro-ph, hep-ph]
24. “Quantum Information at the Electron-Ion Collider”. K. Cheng, T. Han, **S. Trifinopoulos**, submitted for peer review • arXiv: 2510.23773 [hep-ph, quant-ph]
23. “Implications for Pulsar Timing Arrays of Sub-solar Black Hole Detections: From LVK to Einstein Telescope and Cosmic Explorer”. Y. Gouttenoire, **S. Trifinopoulos**, M. Vanvlasselaer, JCAP 02 (2026) 072 • arXiv: 2508.19328 [astro-ph]
22. “Spin versus Magic: Lessons from Gluon and Graviton Scattering”. J. Gargalionis, N. Moynihan, **S. Trifinopoulos**, E. N. V. Wallace, C. D. White, and M. J. White, accepted by Phys. Rev. D • arXiv: 2508.14967 [hep-th, quant-ph]
21. “The DNA of nuclear models: How AI predicts nuclear masses”. K. A. Richardson, **S. Trifinopoulos**, M. Williams, submitted for peer review • arXiv: 2508.04767 [nucl-th, cs.ai]
20. “Effective Field Theory Constraints on Primordial Black Holes from the High-Redshift Lyman- α Forest”. M. M. Ivanov, **S. Trifinopoulos**, accepted by Phys. Rev. Lett. • arXiv: 2508.04767 [astro-ph]
19. “Searching for exotic scalars at fusion reactors”. C. Baruch, P. J. Fitzpatrick, T. Menzo, Y. Soreq, **S. Trifinopoulos**, J. Zupan, JHEP 10 (2025) 215 • arXiv: 2502.12314 [hep-ph]
18. “New Physics at the Muon (Synchrotron) Ion Collider: MuSIC for several scales”. H. Davoudiasl, H. Liu, R. Marcarelli, Y. Soreq, **S. Trifinopoulos**, JHEP 03 (2025) 046 • arXiv: 2412.13289 [hep-ph]
17. “Flavor Patterns of Fundamental Particles from Quantum Entanglement?”. J. Thaler, **S. Trifinopoulos**, Phys. Rev. D 111 (2025) 5, 056021 • arXiv: 2408.10297 [hep-ph, quant-ph]

16. “Spontaneous symmetry breaking, gauge hierarchy and electroweak vacuum metastability”. S. Benevedes, T. Steingasser, **S. Trifinopoulos**, Phys. Rev. D 110 (2024) 7, 075019 • arXiv: 2408.10297 [hep-ph, astro-ph]
15. “From Neurons to Neutrons: A Case Study in Interpretability”. O. Kitouni, N. Nolte, V. S. Pérez-Díaz, **S. Trifinopoulos**, M. Williams, ICML 2024 • arXiv:2405.17425 [cs.lg, nucl-th]
14. “Scrutinizing the Primordial Black Holes Interpretation of PTA Gravitational Waves and JWST Early Galaxies”. Y. Gouddenoire, **S. Trifinopoulos**, G. Valogiannis, M. Vanvlasselaer, Phys. Rev. D 109 (2024) 12, 123002 • arXiv: 2307.01457 [astro-ph]
13. “LePDF: Standard Model PDFs for High-Energy Lepton Colliders”. F. Garosi, D. Marzocca, **S. Trifinopoulos**, JHEP 09 (2023) 107 • arXiv: 2303.16964 [hep-ph]
12. “Cabibbo angle anomalies and oblique corrections: The remarkable role of the vectorlike quark doublet”. B. Belfatto, **S. Trifinopoulos**, Phys. Rev. D 108 (2023) 3, 035022 • arXiv: 2302.14097 [hep-ph]
11. “Attracting the Electroweak Scale to a Tachyonic Trap”. **S. Trifinopoulos**, M. Vanvlasselaer Phys. Rev. D 107 (2023) 7, L071701 • arXiv: 2210.13484 [hep-ph]
10. “New physics in $b \rightarrow s\mu\mu$: FCC-hh or a muon collider?” A. Azatov, F. Garosi, A. Greljo, D. Marzocca, J. Salko, **S. Trifinopoulos**, JHEP 08 (2022) 208 • arXiv: 2205.13552 [hep-ph, hep-ex]
9. “Radiative effects in the scalar sector of vector leptoquark models”. R. Houtz, J. Pagès, **S. Trifinopoulos**, JHEP 08 (2022) 208 • arXiv: 2204.06440 [hep-ph]
8. “Displaced searches for light vector bosons at Belle II”. T. Bandyopadhyay, S. Chakraborty, **S. Trifinopoulos**, JHEP 05 (2022) 141 • arXiv: 2203.03280 [hep-ph]
7. “Collider signatures of coannihilating dark matter in light of the B-physics anomalies”. M.J. Baker, D. A. Faroughy, **S. Trifinopoulos**, Phys. Rev. D 100, 115022 (2021) • arXiv: 2109.08689 [hep-ph]
6. “From B-meson anomalies to Kaon physics with scalar leptoquarks”. D. Marzocca, **S. Trifinopoulos**, E. Venturini, Phys. Rev. D 100, 115022 (2021) • arXiv: 2106.15630 [hep-ph]
5. “Minimal Explanation of Flavor Anomalies: B-Meson Decays, Muon Magnetic Moment, and the Cabibbo Angle”. D. Marzocca, **S. Trifinopoulos**, Phys. Rev. Lett. 127 (2021) 6, 2021 • arXiv: 2104.05730 [hep-ph]
4. “Exploring the flavour structure of the high-scale MSSM”. G. Isidori, **S. Trifinopoulos**, Eur.Phys.J.C 80 (2020) • arXiv: 1912.09940 [hep-ph]
3. “B-physics anomalies: The bridge between R-parity violating Supersymmetry and flavoured Dark Matter”. **S. Trifinopoulos**, Phys. Rev. D 100, 115022 (2019) • arXiv: 1904.12940 [hep-ph]
2. “Revisiting R-parity violating interactions as an explanation of the B-physics anomalies”. **S. Trifinopoulos**, Eur. Phys. J. C78 (2018) no.10, 803 • arXiv: 1807.01638 [hep-ph]

1. “Semileptonic B-physics anomalies: A general EFT analysis within $U(2)_n$ flavor symmetry”. M. Bordone, G. Isidori, **S. Trifinopoulos**, Phys. Rev. D 96 (2017) 1, 015038 • arXiv: 1702.07238 [hep-ph]

Large-Collaboration Publications & White Papers

9. “The Muon Collider”. C. Accettura et al (incl. **S. Trifinopoulos**) • arXiv: 2504.21417 [physics.acc-ph]

8. “Quantum Information meets High-Energy Physics: Input to the update of the European Strategy for Particle Physics” Y. Afik et al (incl. **S. Trifinopoulos**), Eur. Phys. J. Plus 140, 855 (2025); • arXiv: 2504.00086 [hep-ph]

7. “Interim report for the International Muon Collider Collaboration (IMCC)”. C. Accettura et al (incl. **S. Trifinopoulos**) • arXiv: 2407.12450 [physics.acc-ph]

6. “Towards a Muon Collider”. C. Accettura et al (incl. **S. Trifinopoulos**), Eur.Phys.J.C 83 (2023) 9, 864 • arXiv: 2303.08533 [physics.acc-ph]

5. “Simulated Detector Performance at the Muon Collider”. Muon Collider Collaboration (incl. **S. Trifinopoulos**), Contribution to Snowmass 2021 • arXiv: 2203.07964 [hep-ex]

4. “A Muon Collider Facility for Physics Discovery”. Muon Collider Collaboration (incl. **S. Trifinopoulos**), Contribution to Snowmass 2021 • arXiv: 2203.08033 [physics.acc-ph]

3. “Promising Technologies and R&D Directions for the Future Muon Collider Detectors”. Muon Collider Collaboration (incl. **S. Trifinopoulos**), Contribution to Snowmass 2021 • arXiv: 2203.07224 [physics.ins-det]

2. “Muon Collider Physics Summary”. C. Aime et al (incl. **S. Trifinopoulos**), Contribution to Snowmass 2021 • arXiv: 2203.07256 [hep-ph]

1. “The physics case of a 3 TeV muon collider stage”. Muon Collider Collaboration (incl. **S. Trifinopoulos**), Contribution to Snowmass 2021 • arXiv: 2203.07261 [hep-ph]

Workshop publications and proceedings

4. “r-process Nucleosynthesis: Identifying the significant nuclear properties”. S. G. Tomasicchio, **S. Trifinopoulos**, 2023 REYES Proceedings (<https://digitalcommons.odu.edu/reyes-2023/>)

3. “NuDyCLR: Nuclear Dynamic Co-Learned Representations”. V. S. Pérez-Díaz, **S. Trifinopoulos**, 2023 REYES Proceedings (<https://digitalcommons.odu.edu/reyes-2023/>)

2. “NuCLR: Nuclear Co-Learned Representations”. O. Kitouni, N. Nolte, **S. Trifinopoulos**, S. Kantamneni, M. Williams, accepted after peer review at ICML 2023 “1st workshop on Synergy of Scientific and Machine Learning Modeling” (SynS & ML) • arXiv: 2306.06099 [nucl-th, cs.lg]

1. “Explaining the Flavour Anomalies with Heavy Scalars”. **S. Trifinopoulos**, PoS CORFU2021 (2022) 052 • arXiv: 2203.09624 [hep-ph]