

Sokratis Trifinopoulos

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Appointments

- 2022-present **Massachusetts Institute of Technology**, Center of Theoretical Physics & Institute of Artificial Intelligence and Fundamental Interactions, Cambridge, USA
- **Postdoctoral Fellow**, Advisor: Prof. Dr. Jesse Thaler
- 2020-2022 **Scuola Internazionale Superiore di Studi Avanzati**, Department of Physics, Trieste, Italy
- **Postdoctoral Fellow**, Advisor: Dr. David Marzocca

Education

- 2016-2020 **Universität Zürich**, Zürich, Switzerland
- **Ph.D. in Physics**, Advisor: Prof. Dr. Gino Isidori
- 2015-2016 **Eidgenössische Technische Universität Zürich**, Zürich, Switzerland
- **M.Sc. in Physics**, Advisor: Prof. Dr. Gino Isidori
- 2011-2014 **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 & TokyoTech Exchange Scholarship**, Tokyo, Japan
- 2016 **Global Essay Competition Finalist**, 46th St. Gallen Symposium, Switzerland

Continuing Education

- 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, USA
- 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

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),

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

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

Replacement lecturer, Universität Zürich

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

Ph.D. student research supervisor

2024-present ○ Chaja Baruch (Technion)

2023-present ○ Ta'el Coren (Technion)

2023-present ○ Sean Benevedes (MIT)

2023-present ○ Pamela Pajarillo (MIT)

2022 ○ Miguel Vanvlasselaer (SISSA)

M.Sc. student research supervisor

2023-present ○ Victor Samuel Pérez Díaz (Universidad del Rosario, now: Ph.D. at NY University)

2023-present ○ Sabina Tomasicchio (University of Seville)

2023 Jun-Sep ○ Alicia Mand (University of Wisconsin-Madison)

2023-present ○ Dhruv Kumar (IIT Guwahati)

2023 Jun-Sep ○ Acchhyut Jolly (BITS Pilani)

2023 Jun-Sep ○ Soham Sanyashiv (IISER Kolkata)

2023 Jun-Sep ○ Gokhula Prasad (The American College, Madurai)

2023 Jun-Sep ○ Abhay Singh Rawat (HNBGU)

International Baccalaureate Diploma tutor

2016 ○ Dustin Fichmann (United World College Costa Rica)

Conference and Workshop Talks

2024 Aug **Conference speaker**: XVIth Quark Confinement and the Hadron Spectrum, Cairns, Australia

2024 Aug **Invited conference speaker**: Light Dark World, Daejeon, Korea

2024 Jul **Conference participant**: ICML2024, Vienna, Austria

2024 Jun **Invited workshop speaker**: SynCRETism 2024, Rethymno, Greece

2024 Jun **Invited conference speaker:** Large Hadron Collider Physics, Boston, USA; declined

2024 Mar **Invited conference plenary speaker:** Black Holes & Cosmology, Nassau, Bahamas

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

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

2023 May **Invited conference speaker:** LHCP2023, Belgrade, Serbia; declined

2023 Mar **Conference poster presenter:** AI for Science, Chicago

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

2022 Nov **Workshop participant:** ML4Jets2022, New Jersey, USA

2022 Aug **Invited conference speaker:** Vietnam Flavour Physics Conference, Quy Nhon, Vietnam

2021 Sep **Invited workshop speaker:** Workshop on the Standard Model and Beyond, Corfu, Greece

2021 Jun **Workshop speaker:** Workshop on Axions WIMPs and WISPs, Patras, Greece

2021 Aug **Conference speaker:** SUSY International Conference on Supersymmetry and the Unification of Fundamental Interactions, Beijing, China

2020 Mar **Invited conference speaker:** La Thuile, Aosta Valley, Italy; canceled

2019 Jun **Conference speaker:** PLANCK International Conference from the Planck Scale to the Electroweak Scale, Granada, Spain

2019 May **Conference speaker:** SUSY International Conference on Supersymmetry and the Unification of Fundamental Interactions, Corpus Christi, USA

2018 Jan **Workshop participant:** Zurich Phenomenology Workshop

2017 Dec **Conference speaker:** SUSY International Conference on Supersymmetry and the Unification of Fundamental Interactions, Mumbai, India

2017 Feb **Workshop speaker:** PRISMA Symposium "A Matter of Flavor", Mainz, Germany

Invited Seminar Talks

2024 Sep University of Melbourne, Melbourne, Australia

2024 Mar Argonne National Laboratory, Lermont, USA

2024 Feb Brookhaven National Laboratory, Upton, USA

2024 Jan UC Berkeley, Berkeley, USA

2023 Dec Vrije Universiteit Brussel, Brussels, Belgium

2023 Oct Chinese Academy of Sciences (online)

2023 Mar Majorana-Raychaudhuri Seminars Series (online)

2023 Mar Technion, Haifa, Israel

2023 Mar University of Chicago, Chicago, USA

2023 Jan Technion, Haifa, Israel

2022 Sep MIT, Cambridge, USA

2019 Sep FermiLab, Batavia, USA

2019 Sep Cornell, Ithaca, USA

2019 Sep Lawrence Berkeley National Laboratory, Berkeley, USA

2019 Aug UC Santa Cruz, Santa Cruz, USA

Academic Service

- 2023-2024 **School Organizer:** IAIFI Summer School & Workshop 2024
- 2019-present **Journal referee:** Physical Review Letters, Physical Review D, European Physical Journal C, Physical Letters B
- 2023-present **Workshop referee:** NeurIPS, ICML
- 2018 Jan **Workshop organizer:** Zurich Phenomenology Workshop
- 2018-2019 **Organizer:** Theoretical Physics Journal Club of Zürich

Public Outreach

- 2022-present **Committee member:** Organizer and representative of the public outreach events of IAIFI
- 2023 Oct **Public lecturer:** “Spot the Difference: AI vs Reality in Physics”, Cambridge Science Festival, Cambridge, USA
- 2023 Aug **Public lecturer:** “The Interplay between Physics and Artificial Intelligence”, Museum of Science of Boston, Boston, USA
- 2023 Jul **Invited speaker:** “Machine Learning Application to Physics”, Remote Experience for Young Researchers, Berkeley, USA
- 2023 Jun **Invited speaker:** “AI technologies: the new frontier”, Industry Seminar FONTIS Beratung, Zürich, Switzerland

Languages

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

Coding

- Languages C++, Python, Mathematica.
- Packages Madgraph5, Pythia8, Delphes3, FastJet3, MicroOMEGAs, CLASS, COLOSSUS, CLASS, CosmoLattice, OriginPro, Python libraries (Pytorch, Numpy, SciPy, scikit-learn, Pandas, PySR etc.).

Publications in Peer-Review Journals

16. “Spontaneous symmetry breaking, gauge hierarchy and electroweak vacuum metastability”. S. Benevedes, T. Steingasser, S. Trifinopoulos, submitted at PRD • arXiv: 2408.10297 [hep-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 [cs.LG]
14. “Scrutinizing the Primordial Black Holes Interpretation of PTA Gravitational Waves and JWST Early Galaxies”. Y. Gouddenoire, **S. Trifinopoulos**, G. Valogiannis, M. Vanvlasselaer, accepted at PRD • 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]
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. 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

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]

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