CURRICULUM VITAE

Kaan Şimşek
April 2025

🏛️ Department of Physics & Astronomy, Northwestern University 📍 Evanston, IL USA ✉️ ksimsek@u.northwestern.edu 🔗 kagsimsek.github.io

Education

🎓 Physics Ph.D. candidate
🏛️ Northwestern University
📍 Evanston, IL USA
🗓️ Aug 2020 - Present
📖 Precision phenomenology and new physics probes at future colliders (in progress)
🗣️ Francis John Petriello

🎓 Physics M.Sc.
🏛️ Middle East Technical University
📍 Ankara, Turkey
🗓️ Feb 2017 - Jul 2019
📖 Exploring extra dimensions through rare processes (July 12, 2019)
🗣️ İsmail Turan 🗣️ İsmet Yurdușen (Hacettepe University)

🎓 Physics B.Sc. (double major)
🏛️ Middle East Technical University
📍 Ankara, Turkey
🗓️ Sep 2012 - Feb 2017
📖 Exploring universal extra dimensions (January 20, 2017)
🗣️ İsmail Turan

🎓 Civil Engineering B.Sc.
🏛️ Middle East Technical University
📍 Ankara, Turkey
🗓️ Sep 2009 - Feb 2016
📖 Redesign of METU pedestrian bridge (January 19, 2016)
🗣️ Alp Caner

Academic employment

💼 Teaching assistant
🏛️ Northwestern University
📍 Evanston, IL USA
🗓️ Sep 2020 - Present

💼 Visiting student
🏛️ Argonne National Laboratory
📍 Lemont, IL USA
🗓️ Jan 2023 - Jul 2023

💼 Teaching assistant
🏛️ University of Rochester
📍 Rochester, NY USA
🗓️ Aug 2019 - Aug 2020

💼 Teaching assistant
🏛️ Middle East Technical University
📍 Ankara, Turkey
🗓️ Oct 2017 - Aug 2019

💼 Student assistant
🏛️ Middle East Technical University
📍 Ankara, Turkey
🗓️ Oct 2016 - Jun 2017

Research interests

hep-ph • QCD/EW precision, collider physics, effective field theories, hadron physics, top physics, rare processes theories with extra dimensions

Teaching interests

Quantum mechanics, particle physics, general physics

Teaching experience

During my graduate years at Northwestern, I assisted the following courses:
Undergraduate level
Physics 125-1 General Physics ISP (1 qtr.) • *Graded homework and exam papers; designed discussion problems; led discussion sessions*
Physics 130-3 College Physics (1 qtr.) • *Graded quiz papers; designed discussion problems; led discussion sessions*
Physics 135-2,3 General Physics (1 qtr.) • *Graded quiz and exam papers; designed discussion problems; led discussion sessions*
Physics 136-2 General Physics Laboratory (1 qtr.) • *Led lab sessions; graded lab reports*
Physics 126-2,3 Physics for ISP Lab Electricity & Magnetism (2 qtrs.) • *Led lab sessions; graded lab reports*
Graduate level
Physics 411-1 Methods of Theoretical Physics (3 qtrs.) • *Graded homework and exam papers*
Physics 412-1,2,3 Quantum Mechanics (5 qtrs.) • *Graded homework and exam papers; led discussion sessions; prepared 100+ pages of supplemental material including computational resources*
Physics 416-0 Introduction to Statistical Mechanics (1 qtr.) • *Graded homework papers*

During my graduate year at the University of Rochester, I assisted the following courses:
Undergraduate level
Physics 113, 114 General Physics I, II Laboratory (2 smtrs.) • *Designed lab manual; led lab sessions; graded lab reports*
Physics 121, 122 Mechanics, Electromagnetism Laboratory (2 smtrs.) • *Designed lab manual; led lab sessions; graded lab reports*
Physics 142 Electricity & Magnetism Laboratory (1 smtr.) • *Led lab sessions; graded lab reports*
Physics 123 Waves & Modern Physics (1 smtr.) • *Led lab sessions; graded lab reports and homework and exam papers; led discussion sessions*

During my undergraduate and graduate years at Middle East Technical University, I assisted the following courses:
Undergraduate level
Physics 105, 106 General Physics I, II Laboratory (7 smtrs.) • *Led lab sessions; graded lab reports and quizzes*
Physics 207 Concepts of Modern Physics (1 smtr.) • *Graded quiz papers*
Physics 407, 408 Particle Physics I, II (3 smtrs.) • *Graded homework papers; led theoretical discussion sessions; designed quiz and homework*

problems; delivered lectures; taught shell scripting, Mathematica, FeynArts, FormCalc, Package X, LanHEP, and CalcHEP

Graduate level

Physics 507, 508 Quantum Mechanics I, II (4 smtrs.) • *Graded homework and exam papers; led discussion sessions; prepared homework and exam problems; prepared 100+ pages of supplemental material; delivered lectures*

Physics 545, 546 Particle Physics I, II (2 smtrs.) • *Graded homework and exam papers; design discussion and exam problems; delivered lectures*

Publications

[12] *Transverse spin asymmetries and the electron Yukawa coupling at an FCC-ee*
R. Boughezal, F. Petriello, K. Şimşek • PRD **110** (2024) 075026 • arXiv 2407.12975

[11] *SMEFT analysis with LHeC, FCC-eh, and EIC DIS pseudodata*
C. Bissolotti, R. Boughezal, K. Şimşek • arXiv 2307.09459

[10] *SMEFT probes in future precision DIS experiments*
C. Bissolotti, R. Boughezal, K. Şimşek • PRD **108** (2023) 075007 • arXiv 2306.05564

[9] *Neutral-current electroweak physics and SMEFT studies at the EIC*
R. Boughezal, A. Emmert, T. Kutz, S. Mantry, M. Nycz, F. Petriello, K. Şimşek, D. Wiegand, X. Zheng • PRD **106** (2022) 016006 • arXiv 2204.07557

[8] *Snowmass 2021 White Paper: Electron Ion Collider for high energy physics*
R. Abdul Khalek *et al.* • arXiv 2203.13199

[7] *Strong coupling constants of charmed and bottom mesons with light vector mesons in QCD sum rules*
T. M. Aliev, K. Şimşek • PRD **104** (2021) 074034 • arXiv 2107.02735

[6] *Strong $B^*_{QQ'}B_{QQ'}V$ vertices and the radiative decays of $B^*_{QQ} \to B_{QQ}\gamma$ in the light-cone sum rules*
T. M. Aliev, T. Barakat, K. Şimşek • EPJA **57** (2021) 160 • arXiv 2101.10264

[5] *Strong vertices of doubly heavy spin-3/2 baryon to spin-1/2 baryon with light mesons in light-cone QCD sum rules*
T. M. Aliev, K. Şimşek • PRD **103** (2021) 054044 • arXiv 2011.07150

[4] *Gravitational form-factors of the ρ, π, and K mesons in QCD sum rules*
T. M. Aliev, T. Barakat, K. Şimşek • PRD **103** (2021) 054001 • arXiv 2008.04385, 2009.07926

[3] *Strong coupling constants of doubly heavy baryons with vector mesons in QCD*
T. M. Aliev, K. Şimşek • EPJC **80** (2020) 976 • arXiv 2009.03464

[2] *Determination of the strong vertices of doubly heavy baryons with pseudoscalar mesons in QCD*
H. I. Alrebdi, T. M. Aliev, K. Şimşek • PRD **102** (2020) 074007 • arXiv 2008.05098

[1] *$N^*(1535) \to N$ transition form-factors due to the axial current*
T. M. Aliev, T. Barakat, K. Şimşek • PRD **100** (2019) 054030 • arXiv 1907.08017

Seminars and talks

[11] SMEFT probes in future precision DIS experiments • talk
New Perspectives 2023 📍 Fermilab 🗓 June 27, 2023

[10] Precision electroweak measurements and SMEFT studies at the EIC • talk
Phenomenology 2023 Symposium 📍 University of Pittsburgh 🗓 May 9, 2023

[9] Beyond-the-Standard-Model search at the Large Hadron-electron Collider and the Electron-Ion Collider • invited talk
Physics and Astronomy Early Career Research Seminars 📍 Northwestern University 🗓 April 19, 2023

[8] Precision electroweak measurements and beyond the Standard Model searches at the Electron-Ion Collider • invited talk
DIS2023: XXX International Workshop on DIS and Related Subjects 📍 Michigan State University 🗓 March 30, 2023

[7] SMEFT projections at the EIC and LHeC to NLO QCD • talk
Candidacy talk 📍 Northwestern University 🗓 December 2, 2022

[6] SMEFT projections of neutral-current PVDIS asymmetries at the EIC • invited talk
EIC Early Career Workshop 2022 📍 remote 🗓 July 25, 2022

[5] SMEFT projections using EIC PVDIS asymmetries • invited talk
INT Workshop: Parity-Violation and other Electroweak Physics at Jlab 12 GeV and Beyond 📍 remote 🗓 June 27, 2022

[4] Neutral-current SMEFT studies at the EIC • invited talk
CFNS Workshop: High-Luminosity EIC (EIC Phase II) 📍 remote 🗓 June 21, 2022

[3] Neutral-current SMEFT studies at the EIC • seminar
HEP Seminars 📍 Northwestern University 🗓 April 18, 2022

[2] Applications of MUED to rare top quark processes • talk
2020 GSRM Talks 📍 University of Rochester 🗓 February 8, 2020

[1] Universal extra dimensions • seminar
Seminars 📍 Middle East Technical University 🗓 December 6, 2018

Conferences, workshops, and schools attended

[7] *New Perspectives 2023* 📍 Fermilab 🗓 June 26-27, 2023

[6] *Phenomenology 2023 Symposium* 📍 University of Pittsburgh 🗓 May 8-10, 2023

[5] *DIS2023: XXX International Workshop on DIS and Related Subjects* 📍 Michigan State University 🗓 March 27-31, 2023

[4] *EIC User Group Early Career Workshop 2022* 📍 remote 🗓 July 24-25, 2022

[3] *2022 CTEQ Summer School on QCD and Electroweak Phenomenology* 📍 University of Pittsburgh 🗓 July 6-16, 2022

[2] *INT Workshop: Parity-Violation and other Electroweak Physics at Jlab 12 GeV and Beyond* 📍 remote 🗓 June 27-July 1, 2022

[1] *CFNS Workshop: High-Luminosity EIC (EIC Phase II)* 📍 remote 🗓 June 21-24, 2022

Awards

[3] *The most engaging and fun talk* award 🎤 New Perspectives 2023 📍 Fermilab 🗓️ June 27, 2023

[2] Scholarship covering full tuition and monthly stipend 📍 Northwestern University 🗓️ Aug 2020 - Present

[1] Scholarship covering full tuition and monthly stipend 📍 University of Rochester 🗓️ Aug 2019 - Jun 2020

Computer skills

Programming languages • Mathematica, Python, Fortran, R, C, Matlab
HEP software • FeynArts, FormCalc, LoopTools, FeynCalc, Package X, LanHEP, CalcHEP, LHAPDF, MadGraph
DataSci and machine learning • Numpy, Pandas, Matplotlib, Autograd, Pytorch, Tensorflow, Scikit-learn, unsupervised and supervised learning, neural networks, regression, classification, dimensional reduction, data visualization
Scientific computing • High-performance cluster computing, optimization, numerical simulations, Monte-Carlo methods
Tools and platforms • Git, Linux/Unix, shell, TeX, Jupyter, Markdown, system administration
Other skills • Algorithm design, data wrangling, statistical model and analysis

Hobbies

I play the piano, guitar, and pretty much anything I can get my hands on. I also compose and produce music as an independent artist on Spotify. I like playing chess and am a licensed player of Turkish Chess Federation. I am passionately into cycling, computers, collecting fountain pens, and learning new languages (human or computer).

Languages

🇹🇷 Native 🇬🇧 Fluent 🇩🇪 Beginner 🇫🇷 Beginner 🇪🇸 Beginner

References

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