


CURRICULUM VITAE

Kaan Şimşek

May, 2024

Personal details

| | | |
|---------------------|---|--|
| Contact information | Department of Physics & Astronomy Northwestern University Evanston 60208, IL, USA | ✉ ksimsek@u.northwestern.edu 🌐 kagsimsek.github.io 🆔 0000-0003-1741-8908 |
| Date of birth | September 1, 1991 | |
| Place of birth | Tekirdağ, Turkey | |
| Nationality | Turkish | |
| Citizenship |  | |

Education

Northwestern University, Evanston, IL, USA
Physics, Ph.D. candidate, Aug 2020 – Present
Advisor: Francis John Petriello

University of Rochester, Rochester, NY, USA
Physics, Ph.D. student, Aug 2019 – Aug 2020

Middle East Technical University, Ankara, Turkey
Physics, M.Sc., Feb 2017 – Jul 2019
Dissertation: *Exploring extra dimensions through rare processes*
Advisor: İsmail Turan
Coadvisor: İsmet Yurduşen (Hacettepe University)

Middle East Technical University, Ankara, Turkey
Physics, B.Sc. (double major), Sep 2012 – Feb 2017
Dissertation: *Exploring universal extra dimensions*
Advisor: İsmail Turan

Middle East Technical University, Ankara, Turkey
Civil engineering, B.Sc., Sep 2009 – Feb 2016
Dissertation: *Redesign of METU pedestrian bridge*
Advisor: Alp Caner

Employment

Argonne National Laboratory, Lemont, IL, USA
Visiting student
January 2023 – July 2023

Northwestern University, Evanston, IL, USA
Graduate student, teaching assistant, research assistant
September 2020 – Present

University of Rochester, Rochester, NY, USA
Teaching assistant
August 2019 – August 2020

Middle East Technical University, Ankara, Turkey
Teaching assistant
October 2017 – August 2019

Middle East Technical University, Ankara, Turkey
Student assistant
October 2016 – June 2017

Asil Proje Teknik Hizmetler Mim. Müh. İnş. Tic. Ltd. Şti., Ankara, Turkey
Civil engineer
August 2015 – September 2015

Arslanlar İnşaat Ticaret ve Turizm Ltd. Şti., Ankara, Turkey
Assistant site chief
August 2013 – September 2013

Eynehan İnşaat Taahhüt Ticaret Ltd. Şti., Ankara, Turkey
Civil engineering intern
June 2011 – September 2011

Research interest

My main field of study is theoretical particle physics. I am profoundly interested in phenomenological studies. My research area includes theories with extra dimensions, physics beyond the Standard Model, top physics, rare processes, QCD, hadron physics, and the Standard Model effective field theory.

Teaching experience

During my graduate years at Northwestern University, I assisted the following courses:

- Undergraduate level

| | |
|------------------|---|
| Physics 125-1 | General Physics ISP (2021-1) <i>Graded homework and exam papers; prepared discussion problems; delivered discussion sessions</i> |
| Physics 130-3 | College Physics (2021-3) <i>Graded quiz papers; prepared discussion problems; delivered discussion sessions</i> |
| Physics 135-2, 3 | General Physics (2021-4) <i>Graded quiz and exam papers; prepared discussion problems; delivered discussion sessions</i> |

- Graduate level

| | |
|------------------|--|
| Physics 411-1 | Methods of Theoretical Physics (2021-1; 2022-1; 2023-1) <i>Graded homework and exam papers</i> |
| Physics 412-1, 3 | Quantum Mechanics (2022-1, 3; 2023-1, 2, 3) <i>Graded homework and exam papers; delivered discussion sessions</i> |
| Physics 416-0 | Introduction to Statistical Mechanics (2021-2) <i>Graded homework papers</i> |

During my graduate year at the University of Rochester, I assisted the following courses:

- Undergraduate level

| | |
|------------------|---|
| Physics 113, 114 | General Physics I, II (Laboratory) (2019-1, 3) <i>Graded lab report; conducted experiments; prepared lab manual</i> |
| Physics 121, 122 | Mechanics, Electromagnetism (Laboratory) (2019-1, 3) <i>Graded lab reports; conducted experiments; prepared lab manual</i> |
| Physics 142 | Electricity & Magnetism (Laboratory) (2019-1) <i>Graded lab reports; conducted experiments</i> |
| Physics 123 | Waves & Modern Physics (2019-2) <i>Graded lab reports, and homework and midterm papers; conducted experiments; delivered workshops</i> |

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) (2016-1, 2; 2017-1, 2, 3; 2018-1, 2) <i>Graded lab reports and quizzes; conducted experiments</i> |
| Physics 207 | Concepts of Modern Physics (2017-1) <i>Graded quiz papers</i> |
| Physics 407, 408 | Particle Physics I, II (2017-1, 2; 2018-2) <i>Graded homework papers; prepared theoretical recitation hours, quizzes, and homework problems; delivered lectures; taught shell scripting, Mathematica, FeynArts, FormCalc, Package X, LanHEP, and CalcHEP</i> |

- Graduate level

| | |
|------------------|--|
| Physics 507, 508 | Quantum Mechanics I, II (2017-1, 2; 2018-1, 2) <i>Graded homework and midterm papers; prepared recitation hours and homework and midterm problems; delivered lectures</i> |
| Physics 545, 546 | Particle Physics I, II (2018-1, 2) <i>Graded homework and midterm papers; prepared recitation hours and midterm problems; delivered lectures</i> |

Papers

- 12 *Transverse spin asymmetries and the electron Yukawa coupling at an FCC-ee*
R. Boughezal, F. Petriello, K. Şimşek
Submitted to Phys. Rev. D
[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
[Phys. Rev. D **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
[Phys. Rev. D **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
[Phys. Rev. D **104** \(2021\) 074034](#)
[arXiv: 2107.02735](#)
- 6 *Strong $B_{QQ'}^* B_{QQ'} V$ vertices and the radiative decays of $B_{QQ}^* \rightarrow B_{QQ} \gamma$ in the light-cone sum rules*
T. M. Aliev, T. Barakat, K. Şimşek
[Eur. Phys. J. A **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
[Phys. Rev. D **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
[Phys. Rev. D **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
Eur. Phys. J. C **80** (2020) 976
[arXiv: 2009.03464](#)
- 2 *Determination of the strong vertices of doubly heavy baryons with pseudoscalar mesons in QCD*
H. I. Alrebdı, T. M. Aliev, K. Şimşek
Phys. Rev. D **102** (2020) 074007
[arXiv: 2008.05098](#)
- 1 *$N^*(1535) \rightarrow N$ transition form-factors due to the axial current*
T. M. Aliev, T. Barakat, K. Şimşek
Phys. Rev. D **100** (2019) 054030
[arXiv: 1907.08017](#)

Seminars & Talks

- 11 **SMEFT probes in future precision DIS experiments**
New Perspectives 2023
Fermilab
Talk
June 27, 2023
- 10 **Precision electroweak measurements and SMEFT studies at the EIC**
Phenomenology 2023 Symposium
University of Pittsburgh
Talk
May 9, 2023
- 9 **Beyond-the-Standard-Model searches at the Large Hadron-electron Collider and the Electron-Ion Collider**
Physics and Astronomy Early Career Research Seminars
Northwestern University
Talk (invited)
April 19, 2023
- 8 **Precision electroweak measurements and beyond the Standard Model searches at the Electron-Ion Collider**
DIS2023: XXX International Workshop on Deep-Inelastic Scattering and Related Subjects
Michigan State University
Talk (invited)
March 30, 2023
- 7 **SMEFT projections at the EIC and LHeC to NLO QCD**
Candidacy talk
Northwestern University
Talk
December 2, 2022
- 6 **SMEFT projections of neutral-current PVDIS asymmetries at the EIC**
EIC Early Career Workshop 2022
CFNS Stony Brook University and remote
Talk (invited)
July 25, 2022
- 5 **SMEFT projections using EIC PVDIS asymmetries**
INT Workshop: Parity-Violation and other Electroweak Physics at JLab 12 GeV and Beyond
Remote
Talk (invited)
June 27, 2022
- 4 **Neutral-current SMEFT studies at the EIC**
CFNS Workshop: High-Luminosity EIC (EIC Phase II)
Remote
Talk (invited)
June 21, 2022

3 **Neutral-Current SMEFT Studies at the EIC**

HEP Seminars
Northwestern University
Seminar
April 18, 2022

2 **Applications of MUED to Rare Top Quark Processes**

2020 GSRM Talks
University of Rochester
Talk
February 8, 2020

1 **Universal Extra Dimensions**

Middle East Technical University
Seminar
December 6, 2018

Conferences, Workshops, and Schools attended

- 7 *New Perspectives 2023*, Fermilab, Batavia, IL, USA, June 26-27, 2023.
- 6 *Phenomenology 2023 Symposium*, University of Pittsburgh, Pittsburgh, PA, USA, May 8-10, 2023.
- 5 *DIS2023: XXX International Workshop on Deep-Inelastic Scattering and Related Subjects*, Michigan State University, East Lansing, MI, USA, March 27-31, 2023.
- 4 *EIC User Group Early Career Workshop 2022*, CFNS Stony Brook University, NY, USA and remote, July 24-25, 2022.
- 3 *2022 CTEQ Summer School on QCD and Electroweak Phenomenology*, University of Pittsburgh, PA, USA, 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, Batavia, IL, USA
June 27, 2023
- 2 Scholarship covering full tuition and monthly stipend
[Northwestern University, Evanston, IL, USA](#)
Aug 2020 – Present
- 1 Scholarship covering full tuition and monthly stipend
[University of Rochester, Rochester, NY, USA](#)
Aug 2019 – Jun 2020

Computer skills

My main tool for computations is MATHEMATICA. I am experienced in HEP packages such as FEYNARTS, FORMCALC, LOOPTOOLS, FEYNALC, PACKAGE X, LANHEP, CALCHEP, LHAPDF, and MADGRAPH, and proficient in \TeX , shell scripting, Python, and Fortran.

Hobbies

I play the piano, guitar, and pretty much anything I can get my hands on. I also compose and produce music. I am a licensed player of the Turkish Chess Federation. I am passionately into cycling, computers, collecting fountain pens, and learning new languages.

References

Takhmasib M. Aliev

Professor

Department of Physics
Middle East Technical University
06800, Ankara, Turkey

☎ +90.312.210.5046
✉ taliev@metu.edu.tr

Deborah Anne Brown

Assistant Professor of Instruction

Department of Physics & Astronomy
Northwestern University
60208, Evanston, IL, USA

☎ +1.847.467.5789
✉ d-brown4@northwestern.edu

Radja Boughezal

Physicist

High Energy Physics Division
Argonne National Laboratory
60439, Lemont, IL, USA

☎ +1.630.252.6965
✉ rboughezal@anl.gov
🌐 hep.anl.gov/rboughezal

Adjunct Associate Professor

Department of Physics & Astronomy
Northwestern University
60208, Evanston, IL, USA

John Joseph M. Carrasco

Associate Professor

Department of Physics & Astronomy
Northwestern University
60208, Evanston, IL, USA

☎ +1.847.467.5080
✉ carrasco@northwestern.edu
🌐 fancyphysics.org

Pallab Goswami

Assistant Professor

Department of Physics & Astronomy
Northwestern University
60208, Evanston, IL, USA

☎ +1.847.491.5621
✉ pallab.goswami@northwestern.edu

Francis John Petriello

Professor

Department of Physics & Astronomy
Northwestern University
60208, Evanston, IL, USA

☎ +1.847.467.3196
✉ f-petriello@northwestern.edu
🌐 gate.hep.anl.gov/fpetriello/index.html

B. Özgür Sarioğlu

Professor

Department of Physics
Middle East Technical University
06800, Ankara, Turkey

☎ +90.312.210.4337
✉ sarioglu@metu.edu.tr
🌐 metu.edu.tr/~sarioglu

Hande Toffoli

*Associate Professor,
Chair Advisor*

Department of Physics
Middle East Technical University
06800, Ankara, Turkey

☎ +90.312.210.3264
✉ ustunel@metu.edu.tr
🌐 physics.metu.edu.tr/~hande

İsmail Turan

*Professor,
Vice Chair*

Department of Physics
Middle East Technical University
06800, Ankara, Turkey

☎ +90.312.210.5083
✉ ituran@metu.edu.tr
🌐 metu.edu.tr/~ituran