










# CURRICULUM VITAE










Kaan Şimşek  
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## Education

-  Physics Ph.D.
  -  Northwestern University
  -  Evanston, IL USA
  -  Aug 2020 - Jun 2025
  -  Precision phenomenology and new physics probes at future colliders (June 16, 2025)
  -  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 Yurduşen (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 - Jun 2025
-  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*

## 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

Total citations: 269 • *h*-index: 7 (INSPIRE)

- [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, U. D'Alesio, M. Arratia, A. Bacchetta, M. Battaglieri *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  $B_{QQ}^* \rightarrow B_{QQ} \gamma$  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  $\rho$ ,  $\pi$ , 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. Alrebbi, T. M. Aliev, K. Şimşek • PRD **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 • PRD **100** (2019) 054030 • arXiv 1907.08017

## Seminars and talks

- [13] Precision phenomenology and new physics probes at future colliders • talk  
*Dissertation talk* 📍 Northwestern University 📅 June 16, 2025
- [12] SMEFT probes in future precision DIS experiments • talk  
*New Perspectives 2023* 📍 Fermilab 📅 June 27, 2023
- [11] Precision electroweak measurements and SMEFT studies at the EIC • talk  
*Phenomenology 2023 Symposium* 📍 University of Pittsburgh 📅 May 9, 2023
- [10] 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
- [9] 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
- [8] SMEFT projections at the EIC and LHeC to NLO QCD • talk  
*Candidacy talk* 📍 Northwestern University 📅 December 2, 2022
- [7] SMEFT projections of neutral-current PVDIS asymmetries at the EIC • invited talk  
*EIC Early Career Workshop 2022* 📍 remote 📅 July 25, 2022
- [6] 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
- [5] Neutral-current SMEFT studies at the EIC • invited talk  
*CFNS Workshop: High-Luminosity EIC (EIC Phase II)* 📍 remote 📅 June 21, 2022
- [4] Neutral-current SMEFT studies at the EIC • seminar  
*HEP Seminars* 📍 Northwestern University 📅 April 18, 2022
- [3] Applications of MUED to rare top quark processes • talk  
*2020 GSRM Talks* 📍 University of Rochester 📅 February 8, 2020
- [2] Exploring extra dimensions through rare processes • talk  
*Dissertation talk* 📍 Middle East Technical University 📅 July 12, 2019
- [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

- [4] Office of Research Postdoctoral Fellowship 📍 Kennesaw State University 🇹🇷 Aug 2025 - Aug 2026
- [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 - Jun 2025
- [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, MCFM

*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

### Research

Takhmasib M. Aliev • *Professor* 📍 Middle East Technical U 📞 +90 (312) 210-5046 ✉️ [taliiev@metu.edu.tr](mailto:taliiev@metu.edu.tr)

Radja Boughezal • *Physicist* 📍 Argonne National Lab 📞 +1 (630) 252-6965 ✉️ [rboughezal@anl.gov](mailto:rboughezal@anl.gov) • *Adj. Assoc. Professor* 📍 Northwestern U

John Joseph M. Carrasco • *Assoc. Professor* 📍 Northwestern U 📞 +1 (847) 467-5080 ✉️ [carrasco@northwestern.edu](mailto:carrasco@northwestern.edu)

Francis John Petriello • *Professor* 📍 Northwestern U 📞 +1 (847) 467-3196 ✉️ [f-petriello@northwestern.edu](mailto:f-petriello@northwestern.edu) • *Physicist* 📍 Argonne National Lab

İsmail Turan • *Professor, Vice Chair* 📍 Middle East Technical U 📞 +90 (312) 210-5083 ✉️ [ituran@metu.edu.tr](mailto:ituran@metu.edu.tr)

### Teaching

Deborah Anne Brown • *Assist. Professor of Instr.* 📍 Northwestern U 📞 +1 (847) 467-5789 ✉️ [d-brown4@northwestern.edu](mailto:d-brown4@northwestern.edu)

Anupam Garg • *Professor* 📍 Northwestern U 📞 +1 (847) 491-3229 ✉️ [agarg@northwestern.edu](mailto:agarg@northwestern.edu)

Pallab Goswami • *Assist. Professor* 📍 Northwestern U 📞 +1 (847) 491-5621 ✉️ [pallab.goswami@northwestern.edu](mailto:pallab.goswami@northwestern.edu)

### Other academic references

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Hande Toffoli • *Assoc. Professor, Chair Advisor* 📍 Middle East Technical U 📞 +90 (312) 210-3264 ✉️ [ustunel@metu.edu.tr](mailto:ustunel@metu.edu.tr)