

# Soner Albayrak

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## ACADEMIC POSITIONS

### Middle East Technical University, Ankara, Turkey

Doktor Öğretim Üyesi (Assistant Professor)

Oct 2023 - present

Ek Görevli Öğretim Görevlisi (Part Time Lecturer)

Sep 2023 - Oct 2023

### University of Amsterdam, Amsterdam, Netherlands

Onderzoeker (Researcher)

Sep 2021 - Sep 2023

(Contact: Daniel Baumann)

### National Taiwan University, Taipei, Taiwan

Visiting Researcher

Apr 2023 - Jun 2023

(Contact: Yu-tin Huang)

## ACADEMIC AND PROFESSIONAL PREPARATION

### Yale University, New Haven, USA

Doctor of Philosophy in Physics

Aug 2016 - Jun 2021

(Advisor: David Poland)

Dissertation title: *Analytic Studies of Fermions in the Conformal Bootstrap*

Master of Philosophy in Physics

Master of Science in Physics

### California Institute of Technology, Pasadena, USA

Visiting Student Researcher

Jul 2018 - Jun 2019

(Host: David Simmons Duffin)

Simons Bootstrap Collaboration Graduate Student Exchange

### Middle East Technical University, Ankara, Turkey

Master of Science in Physics

Sep 2008 - Feb 2016

(Advisor: İsmail Turan)

Thesis: *A Lorentz Violating Theory: Its Nonminimal Extension in the Photon Sector*

Bachelor of Science in Physics

Bachelor of Science in Electrical & Electronics Engineering

## CURRENT RESEARCH INTERESTS

Conformal bootstrap

AdS/CFT

Cosmological bootstrap

Scattering amplitudes

## PEER REVIEWED PUBLICATIONS

**S. Albayrak**, S. Kharel and X. Wang, *Momentum-space formulae for AdS correlators for diverse theories in diverse dimensions*, [JHEP 07 \(2024\) 281](#)

**S. Albayrak**, P. Benincasa and C. D. Pueyo, *Perturbative unitarity and the wavefunction of the Universe*, [SciPost Phys. 16, 157 \(2024\)](#)

**S. Albayrak** and S. Kharel, *All plus four point (A)dS graviton function using generalized on-shell recursion relation*, [JHEP 05 \(2023\) 151](#)

**S. Albayrak**, Rajeev Erramilli, Zhijin Li, David Poland and Yuan Xin, *Bootstrapping  $N_f = 4$  conformal QED<sub>3</sub>*, [Phys.Rev.D 105 \(2022\)](#)

**S. Albayrak**, S. Kharel and D. Meltzer, *On duality of color and kinematics in (A)dS momentum space*, [JHEP 03 \(2021\) 249](#)

- S. Albayrak**, C. Chowdhury and S. Kharel, *On loop celestial amplitudes for gauge theory and gravity*, [Phys.Rev.D 102 \(2020\)](#)
- S. Albayrak** and S. Kharel, *Spinning loop amplitudes in Anti-de Sitter space*, [Phys.Rev.D 103 \(2021\) 2](#)
- S. Albayrak**, D. Meltzer and D. Poland, *The Inversion Formula and 6j Symbol for 3d Fermions*, [JHEP 09 \(2020\) 148](#)
- S. Albayrak**, C. Chowdhury and S. Kharel, *Study of momentum space scalar amplitudes in AdS spacetime*, [Phys.Rev.D 101 \(2020\) 12](#)
- S. Albayrak** and S. Kharel, *Towards the higher point holographic momentum space amplitudes. Part II. Gravitons*, [JHEP 12 \(2019\) 135](#)
- S. Albayrak**, C. Chowdhury and S. Kharel, *New relation for Witten diagrams*, [JHEP 10 \(2019\) 274](#)
- S. Albayrak**, D. Meltzer and D. Poland, *More Analytic Bootstrap: Nonperturbative Effects and Fermions*, [JHEP 08 \(2019\) 040](#)
- S. Albayrak** and S. Kharel, *Towards the higher point holographic momentum space amplitudes*, [JHEP 02 \(2019\) 040](#)

#### CONFERENCES & PRESENTATIONS

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4. ODTÜ Fizik Topluluğu Çalıştay, METU - Ankara Invited Talk: <i>Teorik Fizikteki Problemler</i>	Mar 2025
Departmental Seminar, Bosphorus University - İstanbul Invited Talk: <i>Conformal QED in 3d: The Numerical Bootstrap Approach</i>	Feb 2025
A life dedicated to theoretical physics: in memory of Durmuş Ali Demir, Sabancı University - İstanbul Invited Talk: <i>A geometric approach to the perturbative unitarity in cosmology</i>	Feb 2025
StarFin 2024 Bilim Kongresi, online seminar Invited Talk: <i>Teorik Fizikteki Problemler</i>	Dec 2024
Bootstrap 2024, Complutense University	Jul 2024
Yüksek Enerji Fiziği Çalıştay (YEFİST 2024), İstanbul University - İstanbul Talk: <i>Problems in Theoretical Physics</i>	May 2024
21 <sup>th</sup> Workshop on Quantization, Dualities and Integrable Systems, online seminar Talk: <i>Perturbative Unitarity and the Wavefunction of the Universe</i>	Apr 2024
Astronomi ve Fizik Günleri, Bosphorus University - İstanbul Invited Talk: <i>Problems in Theoretical Physics</i>	Apr 2024
Conformal Bootstrap Annual Meeting, Simons Foundation - New York	Nov 2023
Fuzzy Sphere Meets Bootstrap, SCGP-Stony Brook	Nov 2023
Bootstrap 2023, ICTP – SAIFR	Jul 2023
National Taiwan University, seminar Invited Talk: <i>A geometric approach to the perturbative unitarity in cosmology</i>	May 2023

Middle East Technical University, seminar Invited Talk: <i>Extending the flat space techniques to curved spacetimes</i>	Mar 2023
University of Amsterdam String Theory Journal Club Talk: <i>Conformal QED in 3d: The Numerical Bootstrap Approach</i>	Feb 2023
Positivity, Princeton Center for Theoretical Science	Dec 2022
Bootstrapping Nature, Galileo Galilei Institute Invited Talk: <i>Inverting the 3d Fermions</i>	Nov 2022
ATITPhysics 2022S, online school Colloquium: <i>Problems in Theoretical Physics</i>	Sep 2022
Middle East Technical University, online seminar Invited Talk: <i>Conformal QED in 3d: The Numerical Bootstrap Approach</i>	Jun 2022
20 <sup>th</sup> Workshop on Quantization, Dualities and Integrable Systems, online seminar Talk: <i>Conformal QED in 3d: The Numerical Bootstrap Approach</i>	Apr 2022
Holography@D-ITP meetings, Utrecht University Invited Talk: <i>Conformal QED in 3d: The Numerical Bootstrap Approach</i>	Apr 2022
Case Western Reserve University, online seminar Invited Talk: <i>Conformal QED in 3d: The Numerical Bootstrap Approach</i>	Apr 2022
Boundaries and Defects in CFT and Holography, online school	Mar 2022
Conformal Bootstrap Annual Meeting, Simons Foundation - New York	Nov 2021
ICTP – School on Superstring Theory and Related Topics, online school	Oct 2021
University of Amsterdam String Theory Journal Club Talk: <i>Fermions in CFTs: The Analytic Bootstrap Approach</i>	Oct 2021
International Society for Quantum Gravity, online meeting	Oct 2021
All Lambdas Holography @ Prague, online workshop	Oct 2021
ATITPhysics 2021, online school Lecture Series: <i>Conformal Symmetry in Field Theories</i>	Sep 2021
Bootstrap 2021, online conference	Jul 2021
19 <sup>th</sup> Workshop on Quantization, Dualities and Integrable Systems, online seminar Talk: <i>Fermions in CFTs: The Analytic Bootstrap Approach</i>	Apr 2021
THK University, online seminar Invited Talk: <i>Simetriler: Niçin evrenimiz böyle?</i>	Mar 2021
Porto University, online seminar Invited Talk: <i>On Witten diagrams in momentum space</i>	Feb 2021
Bootstrap 2020, online conference	Jun 2020
Middle East Technical University, online seminar Invited Talk: <i>Recent Developments in Conformal Bootstrap</i>	Nov 2020
Zoomplitudes 2020, online conference	May 2020
Online seminar series in theoretical physics in Turkey Talk: <i>Recent Developments in Conformal Bootstrap</i>	May 2020
Conformal Bootstrap Annual Meeting, Simons Foundation - New York	Nov 2019

Developments in the Numerical Bootstrap, SCGP-Stony Brook	Nov 2019
Bootstrap 2019, Perimeter Institute	Jul 2019
Bootstrap 2018, California Institute of Technology	Jul 2018
Analytic approaches to the bootstrap, Azores	May 2018
Particle theory group student talk: <i>On Wess-Zumino-Witten model</i> , Yale	Mar 2018
Signals for Nonminimal Lorentz and CPT Violation, IUCSS	Jun 2015
Poster presentation: <i>CPT-odd Photon in Vacuum-Orthogonal Model</i>	
Ankara High Energy Physics Days, METU	Feb 2015
Talk: <i>CPT Violating QED and Beyond</i>	
Recent Developments in High Energy Physics, METU	May 2013

#### AWARDS, HONORS, SCHOLARSHIPS, AND FELLOWSHIPS

The Science Academy Young Scientist Award (BAGEP 2024)	Apr 2024
<i>Durmuş Ali Demir Anısına BAGEP Anı Ödülü</i>	
International Fellowship for Early Stage Researchers Program (TÜBİTAK 2232b)	Oct 2023
Graduate Courses Performance Award	Apr 2015
<i>by Middle East Technical University</i>	
National Graduate Study Scholarship	Oct 2014
<i>by Scientific and Technological Research Council of Turkey</i>	
Dean's Honor and High Honor Lists	2009-2013
Outstanding Success Scholarship's	Aug 2008
<i>by METU, by Turkish Educational Foundation, and by Ministry of Youth and Sports</i>	

#### TEACHING EXPERIENCE

<b>Instructor</b> , Middle East Technical University	2023-current
PHYS 778: <i>Bootstrap Methods in Theoretical Physics II</i>	Spring '24
PHYS 777: <i>Bootstrap Methods in Theoretical Physics I</i>	Fall '24
PHYS 210: <i>Mathematical Methods in Physics II</i>	Spring '23, '24
PHYS 209: <i>Mathematical Methods in Physics I</i>	Fall '23, '24
PHYS 106: <i>General Physics II</i>	Spring '23
PHYS 105: <i>General Physics I</i>	Fall '23
<b>Teaching Assistant</b> , Yale University	2017-2021
PHYS 181: <i>University Physics</i>	Spring '18, '20, '21
PHYS 180: <i>University Physics</i>	Fall '17, '19, '20; Summer '20
PHYS 166L: <i>General Physics Laboratory</i>	Spring '17
<b>Teaching Assistant</b> , Middle East Technical University	2014-2016
PHYS 502: <i>Analytical Mechanics</i>	Fall '15; Spring '16
PHYS 408: <i>Particle Physics II</i>	Spring '15, '16
PHYS 407: <i>Particle Physics I</i>	Fall '14, '15
PHYS 311: <i>Classical Mechanics</i>	Fall '14, '15; Spring '15, '16
PHYS 105 - LAB: <i>General Physics I</i>	Fall '14

## OTHER ACTIVITIES

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### Active

Referee, <i>Turkish Journal of Physics</i>	2024-current
Referee, <i>Journal of High Energy Physics</i>	2023-current

### Past

Member, <i>University Forum (UVA)</i> <i>served on the representative group for postdoctoral researchers</i>	2022-2023
Organizer, <i>ATITPhysics Online School Series</i>	2021-2022
Advising Committee, <i>Joint Seminar Series (Boun&amp;METU&amp;UTAA)</i>	2021-2022
Physics Outreach (in Turkish), <i>Evrin Ağacı</i>	2017-2018
Electrical & Electronics Engr. Intern, PROMOD R&D Software, Ankara <i>worked for object tracking and camera calibration problems</i>	Jul & Aug 2013
Electrical & Electronics Engr. Intern, SÖKTAŞ Textile, Aydın <i>worked in the control department</i>	Aug & Sep 2012

## REFERENCES

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Available upon request