

# 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**, P. Benincasa and C. D. Puenzo, *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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Bootstrap 2024, Complutense University	Jul 2024
Yüksek Enerji Fiziği Çalıştayı (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	Apr 2022
Talk: <i>Conformal QED in 3d: The Numerical Bootstrap Approach</i>	
Holography@D-ITP meetings, Utrecht University	Apr 2022
Invited Talk: <i>Conformal QED in 3d: The Numerical Bootstrap Approach</i>	
Case Western Reserve University, online seminar	Apr 2022
Invited Talk: <i>Conformal QED in 3d: The Numerical Bootstrap Approach</i>	
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	Oct 2021
Talk: <i>Fermions in CFTs: The Analytic Bootstrap Approach</i>	
International Society for Quantum Gravity, online meeting	Oct 2021
All Lambdas Holography @ Prague, online workshop	Oct 2021
ATITPhysics 2021, online school	Sep 2021
Lecture Series: <i>Conformal Symmetry in Field Theories</i>	
Bootstrap 2021, online conference	Jul 2021
19 <sup>th</sup> Workshop on Quantization, Dualities and Integrable Systems, online seminar	Apr 2021
Talk: <i>Fermions in CFTs: The Analytic Bootstrap Approach</i>	
THK University, online seminar	Mar 2021
Invited Talk: <i>Simetriler: Niçin evrenimiz böyle?</i>	
Porto University, online seminar	Feb 2021
Invited Talk: <i>On Witten diagrams in momentum space</i>	
Bootstrap 2020, online conference	Jun 2020
Middle East Technical University, online seminar	Nov 2020
Invited Talk: <i>Recent Developments in Conformal Bootstrap</i>	
Zoomplitudes 2020, online conference	May 2020
Online seminar series in theoretical physics in Turkey	May 2020
Talk: <i>Recent Developments in Conformal Bootstrap</i>	
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

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

## EXPERIENCE

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<b>Instructor</b> , Middle East Technical University	2023-current
PHYS 777: <i>Bootstrap Methods in Theoretical Physics I</i>	Fall 2024
PHYS 210: <i>Mathematical Methods in Physics II</i>	Spring 2023
PHYS 209: <i>Mathematical Methods in Physics I</i>	Fall 2023, Fall 2024
PHYS 106: <i>General Physics II</i>	Spring 2023
PHYS 105: <i>General Physics I</i>	Fall 2023
<b>Teaching Assistant</b> , Yale University	2017-2021
PHYS 181: <i>University Physics</i>	Spring 2018, Spring 2020, Spring 2021
PHYS 180: <i>University Physics</i>	Fall 2017, Fall 2019, Summer 2020, Fall 2020
PHYS 166L: <i>General Physics Laboratory</i>	Spring 2017
<b>Teaching Assistant</b> , Middle East Technical University	2014-2016
PHYS 502: <i>Analytical Mechanics</i>	Fall 2015, Spring 2016
PHYS 408: <i>Particle Physics II</i>	Spring 2015, Spring 2016
PHYS 407: <i>Particle Physics I</i>	Fall 2014, Fall 2015
PHYS 311: <i>Classical Mechanics</i>	Fall 2014, Spring 2015, Fall 2015, Spring 2016
PHYS 105 - LAB: <i>General Physics I</i>	Fall 2014
<b>Intern</b> , PROMOD R&D Software, Ankara <i>worked for object tracking and camera calibration problems</i>	Jul & Aug 2013
<b>Intern</b> , SÖKTAŞ Textile, Aydın <i>worked in the control department</i>	Aug & Sep 2012

## OTHER ACTIVITIES

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Referee, <i>Journal of High Energy Physics</i>
Member, <i>University Forum (UVA)</i>
Organizer, <i>ATITPhysics Online School Series</i>
Advising Committee, <i>Joint Seminar Series in Theoretical Physics (Boun&amp;METU&amp;UTAA)</i>
Physics Outreach (in Turkish), <i>Evrin Ağacı</i>

## REFERENCES

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Available upon request