BEKİR BAYTAŞ

Department of Mathematics, Izmir Institute of Technology (IZTECH)
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arXiv ∘ Google Scholar

RESEARCH INTERESTS

- *Entanglement and gauge symmetries in loop quantum gravity*
- *Cosmological signatures of quantum gravity*
- *Semi-classical effective methods in quantum systems*
- *Foundations and philosophy of relational materialism*

PUBLICATIONS

1) "The architecture of relational materialism: A categorial formation of onto-epistemological premises" by Ekin Derin, Ozan and Baytaş, Bekir, *Foundations of Science, 1-51* (2025)

2) "Effective geometry of Bell-network states on a dipole graph" by Baytaş, Bekir and Yokomizo, Nelson, *Class. Quantum Grav. 42, 025001* (2024)

3) "Cosmological states in loop quantum gravity on homogeneous graphs" by Baytaş, Bekir and Yokomizo, Nelson, *Physical Review D 107 (6), 066009* (2023)

4) "Faithful realizations of semiclassical truncations" by Baytaş, Bekir; Bojowald, Martin and Crowe, Sean, *Annals of Physics, Volume 420, 168247* (2020)

5) "Minisuperspace results for causal dynamical triangulations" by Baytaş, Bekir; Bojowald, Martin; Crowe, Sean and Mielczarek, Jakub, *Journal of Cosmology and Astroparticle Physics, Volume 2020*, (2020)

6) "Equivalence of models in loop quantum cosmology and group field theory" by Baytaş, Bekir; Bojowald, Martin and Crowe, Sean, *Universe, 5(2), 41* (2019)

7) "Effective potentials from semiclassical truncations" by Baytaş, Bekir; Bojowald, Martin and Crowe, Sean, *Phys. Rev. A 99, 042114* (2019)

8) "Correlations in Quantum Gravity and Cosmology" by Baytaş, Bekir, Ph.D. Thesis, *The Pennsylvania State University ProQuest Dissertations Publishing* (2018)

9) "Canonical Tunneling Times in Ionization Experiments" by Baytaş, Bekir; Bojowald, Martin and Crowe, Sean, *Phys. Rev. A 98, 063417* (2018)

10) "Gluing polyhedra with entanglement in loop quantum gravity" by Baytaş, Bekir; Bianchi, Eugenio and Yokomizo, Nelson, *Phys. Rev. D 98, 026001* (2018)

11) "Minisuperspace models of discrete systems" by Baytaş, Bekir and Bojowald, Martin, *Phys. Rev. D 95, 086007* (2017)

12) "Space of non-Gaussian fields with single-clock bispectra" by Baytaş, Bekir and Shandera, Sarah, *Phys. Rev. D 94, 043510* (2016)

13) "Nonlocal bispectra from super cosmic variance" by Baytaş, Bekir; Kesavan, Aruna; Nelson, Elliot and Shandera, Sarah, *Phys. Rev. D 91, 083518* (2015)

ACADEMIC POSITIONS

Izmir Institute of Technology *April 2025 - Present*
Assistant Professor

Middle East Technical University *September 2024 - February 2025*
Lecturer

Penn State Abington *August 2022 - August 2024*
Lecturer

University of Missouri *September 2021 - August 2022*
Visiting Scholar

CRG, Beijing Normal University *September 2019 - August 2021*
Postdoctoral Scholar

IGC, Pennsylvania State University *September 2018 - August 2019*
Research Associate

Perimeter Institute for Theoretical Physics *August 2015 - December 2015*
Visiting Graduate Fellow

EDUCATION

The Pennsylvania State University *September 2012 - August 2018*
Ph.D. in Physics
Thesis: Correlations in Quantum Gravity and Cosmology

Boğaziçi University *September 2007 - June 2012*
B.S. in Physics
Graduated with High Honors (Top student)

SCHOLARSHIPS, HONORS & CERTIFICATES

Downsbrough Graduate Fellowship, PSU *Fall 2016*

David C. Duncan Graduate Fellowship, PSU *Fall 2012, Fall 2015*

Student Fellowship, Turkish Physics Society *Spring 2011*

3rd Best Score Kanguru Mathematics International Olympiads, Austria *Spring 2006*

CONFERENCES, WORKSHOPS & SCHOOLS

Faithful realizations of semi-classical truncations in quantum systems *Fall 2025*
41th International Physics Congress - Turkish Physics Society

A class of entangled and diffeomorphism-invariant states in LQG: Bell-network states *Summer 2025*
GR24 & Amaldi16, Glasgow, UK

Loops'21 - Summer School, CPT and ENS, France *Summer 2021*

Poincare invariance of macroscopic observables in a lattice theory *Spring 2020*
APS April Meeting, Washington D.C., USA (Online)

Loops'19 - Summer school, Bard College and PSU, USA *Summer 2019*

Gluing polyhedra with entanglement in loop quantum gravity *Fall 2018*
9th Relativistic Quantum Information - North, University of Vienna, Austria

Quantum shape-matching in loop quantum gravity *Fall 2017*
27th Midwest Relativity Meeting, University of Michigan, USA

Geometry and Physics, PSU, USA *Summer 2017*

Eastern Gravity Meeting, PSU, USA *Spring 2017*

Space of bispectra for single-clock inflation *Spring 2016*
Essential Cosmology for the Next Generation, Cancun, Mexico

Neighborhood Workshop on Astrophysics and Cosmology, PSU, USA *Spring 2016*

Space of bispectra for single-clock inflation *Fall 2015*
Perimeter Institute, Toronto, Canada

General Relativity & Gravitation: A Centennial Perspective, PSU, USA *Summer 2015*

Neighborhood Workshop on Astrophysics and Cosmology, PSU, USA *Spring 2015*

Mode coupling for Primordial Nonlocal Non-Gaussianity *Fall 2014*
APS Meeting, PSU, USA

TEACHING AND MENTORING

Special Functions for Physicists, Lecturer, METU *Spring 2024 - Fall 2024*

General Physics I-II, Lecturer, METU *Spring 2024 - Fall 2024*

General Physics I-II, Lecturer, Penn State Abington *Fall 2022 - Summer 2024*

Special and General Relativity, Teaching Assistant, PSU *Spring 2018*

General Physics I-II-III, Teaching Assistant, PSU *Fall 2012 - Fall 2017*

SERVICE AND OUTREACH

CA23130 - BridgeQG, COST *June 2025 - Present*
WG1 Member and WG5 Member

CA23115 - RQI, COST *May 2025 - Present*
WG2 Member

International Society on Loop Quantum Gravity *March 2024 - Present*
Senior Member