

# Nabil Iqbal

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## Current position

Associate Professor, Department of Mathematical Sciences, Durham University

## Areas of specialization

I pursue a broad research program in theoretical physics. My main interests are applications of quantum field theory, holographic duality, and string theory.

## Education and Employment

2020-...	Associate Professor, Durham University
2017-2020	Assistant Professor, Durham University
2014-2016	Postdoctoral Scholar, University of Amsterdam
2011-2014	Postdoctoral Scholar, Kavli Institute for Theoretical Physics
2006-2011	PhD in Physics, Massachusetts Institute of Technology
2002-2006	B.A. in Physics and Mathematics, Cornell University

## Honors & awards

2015-2016	Delta-ITP Postdoctoral Fellowship, University of Amsterdam
2010	Andrew M. Lockett III Memorial Fund Award, Massachusetts Institute of Technology
2010	Henry Kendall Teaching Award, Massachusetts Institute of Technology
2006-2009	National Science Foundation Graduate Fellowship
2006	Donald R. Yennie Prize in Physics, Cornell University
2002-2006	Pauline and Irving Tanner Dean's Scholar, Cornell University

## Teaching and Supervision

### *At Durham University:*

2020	Lecturer for Statistical Mechanics III/IV (third/fourth year course)
2017-2020	Lecturer for Quantum Field Theory 2, MSc (path integral methods in quantum field theory)
2017-2020	Lecturer for General Relativity IV (fourth year course)
2017-2019	Tutor for Single Mathematics B (first-year calculus for non-mathematics majors), Analysis in Multiple Variables II (second-year multivariable calculus), Dynamics I (first-year classical mechanics), Statistical Concepts II (second-year statistical analysis)

### *Supervision*

- 2019-... Supervisor of PhD student Arpit Das
- 2017-... Supervisor of PhD student Kieran Macfarlane.
- 2019 Supervisor of MSc student Simon Guisset.
- 2018-2020 Supervisor of nine undergraduate theses.

### *Teaching Assistant for the following courses at MIT:*

- Spring 2011 8.962 – General Relativity
- Fall 2009 8.02 – Electricity and Magnetism

### *Lecture series:*

- 12/2020 Lectures on “*Introduction to AdS/CFT*” at India-Bangladesh Winter School, Dhaka, Bangladesh.
- 7/2019 Lectures on “*Introduction to String Theory*” at Palestinian Advanced Physics School, Birzeit University, Palestine.
- 9/2015 Lectures on “*Entanglement in Field Theory and Gravity*” at Modave Summer School, Belgium.

### *Other mentorship experience:*

- 2013-2014 Tutor for School on Wheels program for disadvantaged youth in Santa Barbara, California.
- Summer 2010 Mentor for the Research Science Initiative 2010 program at MIT supervising high-school student research.

### Professional activities

- 2020 In response to Covid-19 crisis, sat on the National Data Analytics Task Force for the government of Bangladesh (my home country). Provided mathematical support to epidemiology team: worked on algorithm for real-time monitoring of reproductive number  $R(t)$  for government dashboard, co-authored guidelines for rollout of antigen testing program.
- 2020 Course director for MSc in Particles, Strings and Cosmology at Durham University. Led development of new online version of course suitable for Covid-19.
- 2018 - 2020 Research grant referee for Dutch Research Council (NWO), Ernest Rutherford Fellowships awarded by Science and Technologies Facilities Council (STFC), UK. and the Czech Science Foundation.
- 2016 - 2018 Served on Ph.D defense committee of six doctoral students (at Cambridge U. (1), Durham U. (1), U. of Amsterdam (2), and U. Libre Bruxelles (2))
- 2019 Co-organizer of first India-Bangladesh Winter School held in Dhaka, Bangladesh.
- 2016 - 2019 Co-organizer of Palestinian Advanced Physics Schools held in Birzeit and Jenin, Palestine.
- 2016 Co-organizer of D-ITP Entanglement Workshop at University of Amsterdam.
- 2014 - 2015 Co-organized seminars at University of Amsterdam.
- 2012 - 2013 Co-organized seminars at Kavli Institute for Theoretical Physics.
- 2010 - 2019 Referee for the journals *Phys. Rev. Lett.*, *Phys. Rev. D*, *JHEP*, *Phys. Lett. B*, *Sci-Post Physics*.

### Invited talks

Approximately 70 invited talks at workshops, conferences, and research seminars.

### Toward a 3d Ising model with a weakly coupled string dual

- 1/2021 Seminar, Quantum Aspects of Spacetime and Matter (online seminar series)
- 1/2021 Seminar, Wuerzburg University (delivered online due to Covid)
- 8/2020 Seminar, Massachusetts Institute of Technology (delivered online due to Covid)
- 6/2020 Seminar, IIT Kanpur (delivered online due to Covid)
- 6/2020 Seminar, University of Surrey (delivered online due to Covid)
- 5/2020 Seminar, Max Planck Institute, Potsdam (delivered online due to Covid)

### From generalized global symmetries to pulsar magnetospheres

- 8/2020 Seminar, Carnegie Mellon University (delivered online due to Covid)
- 10/2019 Triangle Seminar, King's College London
- 10/2019 Theoretical physics seminar, IFT Madrid
- 9/2019 String theory seminar, CERN
- 8/2019 Aspen Center for Theoretical Physics Program: Generalized Symmetries, Anomalies and Observables
- 6/2019 Seminar, CEA Saclay
- 1/2019 Workshop: Qubits on the Horizon, Aruba

### Generalized global symmetries: from counting strings to magnetohydrodynamics

- 11/2018 Department of Mathematical Sciences Research Colloquium, Durham University

### Applications of higher form symmetries

- 10/2018 Seminar, Swansea University
- 10/2018 GQFI Workshop on AQFT, Modular Techniques, and Renyi Entropy, MPI Potsdam
- 9/2018 Nordita Workshop: Bounding Transport and Chaos in Condensed Matter and Holography

### Bulk entanglement entropy in perturbative excited states

- 8/2018 CERN Workshop: Black holes, quantum information, and space-time reconstruction

### Generalized global symmetries, Goldstone modes, and photonization

- 12/2018 Seminar, Edinburgh Mathematical Physics Group
- 5/2018 North British Mathematical Physics Seminar, University of York

### Generalized global symmetries, Goldstone modes, and hydrodynamics

- 12/2017 Seminar, Maynooth University
- 11/2017 Center for Particle Theory Colloquium, Durham University
- 11/2017 Theoretical Physics Colloquium (*Colloque Theorique*), University of Geneva

## Generalized global symmetries and holography

- 10/2017 Seminar, Imperial College London
- 9/2017 Delta-ITP Holography Triangle Meeting, Leiden University
- 9/2017 Seminar, Nordita, Stockholm
- 9/2017 Seminar, Universite Libre de Bruxelles

## Generalized global symmetries and dissipative magnetohydrodynamics

- 6/2017 Aspen Center for Theoretical Physics Program: Information in Quantum Field Theory
- 5/2017 HEP/GR Colloquium, Cambridge University
- 4/2017 Workshop: Holography, gauge theory, and black holes, Southampton University
- 12/2016 Cosmology Seminar, University of Amsterdam
- 11/2016 Seminar, Leiden University
- 7/2016 Nordita Workshop: Black Holes and Emergent Spacetime, Stockholm

## Higher spin Wilson lines and the eternal black hole

- 5/2016 Seminar, Niels Bohr Institute, Copenhagen

## Anomalies of the entanglement entropy in chiral theories

- 2/2016 Seminar, Durham University
- 12/2015 Holograv Workshop: Applied Holography in Condensed Matter Systems, Porto
- 11/2015 Seminar, Oxford University
- 7/2015 Seminar, Tsinghua University, Beijing

## Electric fields and quantum wormholes

- 7/2015 KITPC Workshop: Holographic Duality for Condensed Matter Physics, Beijing
- 5/2015 Seminar, Southampton University
- 5/2015 Seminar, Perimeter Institute
- 4/2015 Gauge/Gravity Duality 2015 Workshop, Florence
- 3/2015 Paris Joint Theory Seminar, Rencontres Theoriciennes
- 2/2015 Seminar, Leiden University

## Monopole correlations in holographically flavored liquids

- 3/2015 Seminar, Crete Center for Theoretical Physics
- 2/2015 Seminar, Cambridge University
- 11/2014 Seminar, ICTP, Trieste
- 11/2014 Seminar, CERN
- 9/2014 Delta-ITP Holography Triangle Meeting, Leiden University
- 7/2014 APCTP Focus Program on Aspects of Holography, Pohang, South Korea
- 7/2014 Amsterdam String Workshop

## Holographic entanglement entropy and gravitational anomalies

- 10/2014 Seminar, Utrecht University
- 5/2014 Seminar, Kavli Institute for Theoretical Physics

- 5/2014 Seminar, Massachusetts Institute of Technology  
4/2014 Solvay Workshop on Holography for Black Holes and Cosmology, Brussels  
4/2014 Seminar, University of Michigan  
3/2014 Seminar, Boston University  
2/2014 Seminar, UCLA
- Wilson lines and entanglement entropy in higher spin gravity
- 10/2013 Seminar, SLAC  
9/2013 Workshop: Mathematics and Physics of the Holographic Principle, Cambridge University  
8/2013 APS Division of Particles and Fields Meeting, University of California, Santa Cruz  
4/2013 Seminar, University of Victoria  
3/2013 Seminar, Texas A&M University
- Recent developments in charged holographic fluids
- 12/2012 ICAP 2013, Shahjalal University of Science and Technology, Sylhet, Bangladesh
- Friedel oscillations and horizon charge in 1D holographic liquids
- 2/2013 Holography and Applied String Theory Workshop, Banff  
12/2012 Seminar, University of Washington  
11/2012 Seminar, University of Amsterdam  
10/2012 Seminar, University of Minnesota  
7/2012 Strings 2012, Munich  
5/2012 Seminar, Massachusetts Institute of Technology
- Luttinger's theorem, superfluid vortices, and holography
- 3/2012 Seminar, University of Texas, Austin  
1/2012 Seminar, Kavli Institute for Theoretical Physics  
10/2011 Southern California String Seminar, UCLA
- Quantum phase transitions and holographic models of symmetry breaking
- 12/2010 Seminar, Perimeter Institute  
6/2010 Condensed Matter, Holographic QCD, and Fluid Mechanics Workshop, McGill University  
5/2010 Condensed Matter/Keck Seminar, Rice University  
3/2010 Applications of AdS/CFT to Condensed Matter and Nuclear Physics Workshop, Texas A&M University
- Charge transport by holographic non-Fermi liquids
- 1/2010 Seminar, Harvard University
- String theory: from black holes to superconductors
- 1/2010 General Physics Seminar, Shahjalal University of Science and Technology, Sylhet, Bangladesh