

# Ryan Unger

email | website

Fine Hall 408  
Washington Rd  
Princeton, NJ 08544  
USA

## EDUCATION

---

### Princeton University

Princeton NJ, USA

*Ph.D. candidate in Mathematics*

*2019 - ongoing*

Advisor: Mihalis Dafermos

Visiting student at **University of Cambridge** from Michaelmas 2022 - Easter 2023

### University of Tennessee

Knoxville TN, USA

*B.S. in Mathematics, summa cum laude*

*2015 - 2019*

Advisor: Alexandre Freire

Thesis: **Some problems in scalar curvature geometry**

## RESEARCH INTERESTS

---

General relativity, nonlinear wave equations, and scalar curvature geometry.

## PAPERS

---

### Event horizon gluing and black hole formation in vacuum: the very slowly rotating case

2023

*with Christoph Kehle*

arXiv:2304.08455. Submitted.

### Gravitational collapse to extremal black holes and the third law of black hole thermodynamics

2022

*with Christoph Kehle*

arXiv:2211.15742. Submitted.

### Noncompact fill-ins of Bartnik data

2022

*with Dan A. Lee and Martin Lesourd*

arXiv:2211.06280. Submitted.

### Density and positive mass theorems for incomplete manifolds

2022

*with Dan A. Lee and Martin Lesourd*

arXiv:2201.01328. Submitted.

### Density and positive mass theorems for initial data sets with boundary

2021

*with Dan A. Lee and Martin Lesourd*

*Commun. Math. Phys.* **395**, 643–677 (2022).

### The positive mass theorem with arbitrary ends

2021

*with Martin Lesourd and Shing-Tung Yau*

arXiv:2103.02744. To appear in Journal of Differential Geometry.

### Positive scalar curvature on noncompact manifolds and the Liouville theorem

2020

*with Martin Lesourd and Shing-Tung Yau*

arXiv:2009.12618. To appear in Communications in Geometry and Analysis.

## INVITED TALKS

---

Edinburgh analysis seminar	April 2023
Oxbridge PDE conference	March 2023
Rutgers hyperbolic and dispersive PDE seminar	February 2023
Berkeley analysis seminar	February 2023
Vanderbilt analysis seminar	February 2023
Harvard BHI colloquium	February 2023
Cambridge Friday GR seminar	January 2023
Zürich mathematical physics & PDE seminar	December 2022
Imperial College London junior analysis seminar	November 2022
YMNCGA Texas A&M	August 2022
Cambridge analysis student seminar	June 2022
Harvard CMSA workshop on scalar curvature and minimal surfaces	May 2022
Joint Mathematics Meeting special session on scalar curvature and convergence	April 2022
Princeton graduate student seminar	October 2021
Johns Hopkins analysis seminar	April 2021
Harvard CMSA general relativity seminar	April 2021
Princeton junior general relativity seminar	March 2021
Princeton graduate student seminar	October 2019

## TEACHING EXPERIENCE

---

Part II Differential Geometry supervisions	Lent 2023 (Cambridge)
Part III Analysis of PDE examples class instructor	Michaelmas 2022 (Cambridge)
Part III General Relativity examples class instructor	Michaelmas 2022 (Cambridge)
Calculus I precept instructor	Spring 2022 (Princeton)
Teaching assistant for Calculus III, Linear Algebra, Real Analysis, PDE	(Princeton)

## AWARDS AND HONORS

---

Porter Ogden Jacobus Fellowship	2023
John H. Barrett Memorial Scholarship	2019
James A. Cooley Memorial Scholarship	2018
UTK Office of Undergraduate Research Grant	2017
Pi Mu Epsilon Tennessee Delta Chapter	2017
Cooper D. Schmitt Memorial Scholarship	2017, 2018
Lucile and Herbert E. Lee Memorial Scholarship	2017
UTK Nuclear Engineering Top Freshman Academic Award	2016
Tennessee Volunteer Scholarship	2015-2019

## SERVICE

---

Referee for Annales Henri Poincaré	
Princeton Graduate Student Seminar Organizer	Fall 2020-Spring 2021
Princeton First Year Student Seminar Organizer	Fall 2019-Spring 2020