

# JEFFREY JAUREGUI | Curriculum Vitae

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## POSITIONS

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### UNION COLLEGE

Associate Professor of Mathematics (2019 - present)  
John D. MacArthur Assistant Professor (2015 - 2016)  
Assistant Professor of Mathematics (2013 - 2015, 2016 - 2019)

2013 - present  
Schenectady, NY

### UNIVERSITY OF PENNSYLVANIA

Hans Rademacher Instructor of Mathematics (Postdoc)

2010 - 2013  
Philadelphia, PA

## EDUCATION

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### DUKE UNIVERSITY

Ph.D. in Mathematics  
Thesis: Mass estimates, conformal techniques, and singularities in general relativity  
Advisor: Hubert L. Bray

2005 - 2010  
Durham, NC

### HARVEY MUDD COLLEGE

B.S. in Mathematics and Physics  
Graduated with High Distinction

2001 - 2005  
Claremont, CA

## AWARDS, FELLOWSHIPS, GRANTS

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Co-PI, NSF grant DMS-2154896: 2022 Union College Mathematics Conference	2022
Union College MOSH Maker grant	2019
Union College Faculty Research Fund grant	2017
Union College Teaching with Technology grants	2015, 2016
Research member: MSRI, Berkeley	August 2013
Nominee for Dean's Award for Distinguished Teaching (UPenn)	2013
Math Department Good Teaching Award (UPenn)	2011, 2013
L.P. and Barbara Smith Award for Excellence in Teaching (Duke)	2009
James B. Duke Fellowship	2005 - 2009
NSF Graduate Research Fellowship	2006 - 2008, 2009 - 2010

## ARTICLES

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- (with R. Perales and J. Portegies) **Semicontinuity of capacity under pointed intrinsic flat convergence.** Preprint available at [HTTPS://ARXIV.ORG/ABS/2204.09732](https://arxiv.org/abs/2204.09732)
- ADM mass and the capacity-volume deficit at infinity.** To appear in Comm. Anal. Geom.
- Scalar curvature and the relative capacity of geodesic balls.** Proc. Amer. Math. Soc., Vol 149, No. 11, (2021), pp. 4907–4921.
- (with D. Lee) **Lower semicontinuity of ADM mass under intrinsic flat convergence.** Calc. Var. Partial Differential Equations, Vol. 60, No. 2, (2021).
- Smoothing the Bartnik boundary conditions and other results on Bartnik's quasi-local mass.** J. Geom. Phys., Vol. 136, (2019), pp. 228–243.
- Lower semicontinuity of the ADM mass in dimensions two through seven.** Pacific J. Math., Vol. 301, No. 2, (2019), pp. 441–466.
- (with M. Anderson) **Embeddings, immersions, and the Bartnik quasi-local mass conjectures.** Ann. Henri Poincaré, Vol. 20, No. 5, (2019), 1651–1698.
- (with D. Lee) **Lower semicontinuity of mass under  $C^0$  convergence and Huisken's isoperimetric mass.** J. Reine Angew. Math. (Crelle's Journal), Vol. 756 (2019), pp. 227–257.

11. **Penrose-type inequalities with a Euclidean background.** Ann. Global Anal. Geom., Vol. 54, No. 4 (2018), pp. 509–527.
10. **On the lower semicontinuity of the ADM mass,** Comm. Anal. Geom., Vol. 26, No. 1 (2018), pp. 85–111.
9. (with H. Bray and M. Mars) **Time flat surfaces and the monotonicity of the spacetime Hawking mass II,** Ann. Henri Poincaré, Vol. 17, No. 6 (2016), pp. 1457–1475.
8. (with W. Wylie) **Conformal diffeomorphisms of gradient Ricci solitons and generalized quasi-Einstein manifolds,** J. Geom. Anal., Vol. 25, No. 1 (2015), pp. 668–708.
7. (with H. Bray) **On curves with nonnegative torsion,** Arch. Math., Vol. 104, No. 6 (2015), pp. 561–575.
6. (with H. Bray) **Time flat surfaces and the monotonicity of the spacetime Hawking mass,** Comm. Math. Phys., Vol. 335, No. 1 (2015), pp. 285–307.
5. (with H. Li et al.) **Epilepsy Treatment Simplified through Mobile Ketogenic Diet Planning,** J. Mobile Technology, Vol. 3, No. 2 (2014).
4. (with P. Miao and L.-F. Tam) **Extensions and fill-ins with nonnegative scalar curvature,** Class. Quantum Grav. Vol. 30 (2013) 195007.
3. (with H. Bray) **A geometric theory of zero area singularities in general relativity,** Asian J. Math., Vol. 17, No. 3 (2013), pp. 525–560.
2. **Fill-ins of nonnegative scalar curvature, static metrics, and quasi-local mass,** Pacific J. Math., Vol. 261, No. 2 (2013), pp. 417–444.
1. **Invariants of the harmonic conformal class of an asymptotically flat manifold,** Comm. Anal. Geom., Vol. 20, No. 1 (2012), pp. 163–202.

## TEACHING

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### UNION COLLEGE

Math 062\*: Mathematics of Elections and Polls  
 Math 100: Calculus with Precalculus  
 Math 110: Differential Calculus  
 Math 113: Accelerated Single-Variable Calculus  
 Math 115: Differential Multivariable Calculus  
 Math 117: Integral Multivariable Calculus  
 IMP 120/121: Integrated Math and Physics I and II  
 Math 130: Ordinary Differential Equations  
 Math 140\*: Applied Linear Algebra  
 Math 199: Introduction to Logic and Set Theory  
 Math 248\*: Intermediate Topics in Mathematics  
 Math 340: Linear Algebra  
 Math 336: Real Analysis  
 Math 437\*: Real Analysis II  
 Math 448: Differential Geometry  
 Math 49X: Senior Thesis

\* indicates a newly-designed (or co-designed) course

### UNIVERSITY OF PENNSYLVANIA

Math 104: Calculus I  
 Math 180: Analytical Methods in Economics, Law, and Medicine  
 Math 312: Linear Algebra  
 Math 313/513: Computational Linear Algebra  
 Math 500: Point-Set Topology  
 Math 501: Differential Geometry of Curves and Surfaces  
 Math 660: Riemannian Geometry

<b>Joint Mathematics Meetings</b> Special Session on Scalar Curvature and Convergence (virtual talk)	Zoom April 9, 2022
<b>Universität Regensburg</b> Mathematical Physics working seminar (virtual talk)	Regensburg, Germany November 19, 2021
<b>Mathematisches Forschungsinstitut Oberwolfach</b> Workshop: Mathematical Aspects of General Relativity (virtual talk)	Oberwolfach, Germany September 3, 2021
<b>Duke University</b> Geometry and General Relativity Group Seminar (virtual talk)	Durham, NC October 27, 2020
<b>Harvard University</b> CMSA General relativity seminar (virtual talk)	Cambridge, MA October 23, 2020
<b>Virtual Workshop on Ricci and Scalar Curvature</b> Online seminar (virtual talk)	Zoom September 2020
<b>Rutgers Univeresity</b> Geometric analysis seminar	New Brunswick, NJ March 10, 2020
<b>University of Tokyo</b> Conference: Geometric Analysis and General Relativity	Tokyo, Japan November 21, 2019
<b>CUNY Graduate Center</b> New York General Relativity Seminar	New York, NY November 29, 2018
<b>Institute for Advanced Study</b> Emerging Topics Working Group: Scalar Curvature and Convergence	Princeton, NJ October 18, 2018
<b>Humboldt Universität</b> Conference: Stability Phenomena in Mathematical Physics	Berlin, Germany October 11, 2018
<b>Mathematisches Forschungsinstitut Oberwolfach</b> Workshop: Mathematical General Relativity	Oberwolfach, Germany August 7, 2018
<b>Simons Center for Geometry and Physics</b> Workshop: Mass in General Relativity	Stony Brook, NY March 30, 2018
<b>CMS Winter Meeting</b> Scientific session on geometric analysis	Waterloo, CA December 10, 2017
<b>CUNY Graduate Center</b> CUNY Flat Convergence Workshop 2017	New York, NY June 13, 2017
<b>Rutgers University</b> Geometric analysis seminar	New Brunswick, NJ April 25, 2017
<b>AMS Southeastern Section Meeting</b> Special session on geometric analysis and general relativity	Charleston, SC March 12, 2017
<b>Pacific Northwest Geometry Seminar</b> Lewis and Clark College	Portland, OR March 5, 2017
<b>CUNY ADM Mass and <math>\mathcal{F}</math> convergence reading seminar</b> CUNY Graduate Center	New York, NY January 10, 2017
<b>University of Connecticut</b> PDE and Differential Geometry Seminar	Storrs, CT November 14, 2016
<b>Banff International Research Station</b> Geometric Analysis and General Relativity	Banff, Canada July 18, 2016
<b>Universität Tübingen</b> Static Metrics and Bartnik's Quasi-local Mass Conjecture	Tübingen, Germany May 17, 2016
<b>St. Michael's College</b> Hudson River Undergraduate Mathematics Conference	Colchester, VT April 2, 2016
<b>AMS Eastern Section Meeting</b> Special Session on Mathematical and General Relativity	Stony Brook, NY March 19, 2016
<b>Williams College</b> FrankFest 2016: Conference on Isoperimetric Problems	Williamstown, MA February 6, 2016
<b>Joint Mathematics Meetings</b> Special Session on Analytic Methods in Geometry	Seattle, WA January 9, 2016

<b>Pennsylvania State University</b> General Relativity and Gravitation Conference	State College, PA June 8, 2015
<b>Siena College</b> Math Department Colloquium	Albany, NY February 18, 2015
<b>CUNY Graduate Center</b> Differential Geometry Seminar	New York, NY February 10, 2015
<b>Joint Mathematics Meetings</b> Special session on Ricci curvature and homogeneous spaces	San Antonio, TX January 12, 2015
<b>AMS Southeastern Section Meeting</b> Special session on geometric analysis	Greensboro, NC November 8, 2014
<b>Syracuse University</b> Geometry/topology seminar	Syracuse, NY April 17, 2014
<b>Fordham University</b> Analysis seminar	Bronx, NY March 5, 2014
<b>Lehigh University</b> Lehigh University Conference on Geometry and Topology	Bethlehem, PA May 25, 2013
<b>M.I.T.</b> Workshop on minimal surfaces and related topics	Cambridge, MA April 28, 2013
<b>Penn Undergraduate Math Society</b> Colloquium	Philadelphia, PA April 3, 2013
<b>Swarthmore College</b> Math Department Colloquium	Swarthmore, PA February 15, 2013
<b>Reed College</b> Math Department Colloquium	Portland, OR February 12, 2013
<b>Bucknell University</b> Math Department Colloquium	Lewisburg, PA February 7, 2013
<b>Joint Mathematics Meetings</b> Session on Differential and Hyperbolic Geometry	San Diego, CA January 10, 2013
<b>Syracuse University</b> Analysis seminar	Syracuse, NY April 19, 2012
<b>University of Miami</b> Geometry and physics seminar	Coral Gables, FL April 11, 2012
<b>CUNY Graduate Center</b> Differential Geometry Seminar	New York, NY November 1, 2011
<b>University of Tennessee at Knoxville</b> UTK Barrett Lectures on Mathematical Relativity	Knoxville, TN May 14, 2011
<b>AMS Eastern Section Meeting</b> Special Session on Topics in PDE and Geometric Analysis	Worcester, MA April 10, 2011
<b>Lafayette College</b> Lafayette–Lehigh Geometry–Topology Seminar	Easton, PA March 25, 2011
<b>SUNY Stony Brook/Simons Center</b> Columbia/Stony Brook joint General Relativity Seminar	Stony Brook, NY March 18, 2011
<b>Haverford College</b> Haverford/Bryn Mawr Bi-College Colloquium	Haverford, PA February 14, 2011
<b>Temple University</b> Global Analysis Seminar	Philadelphia, PA September 29, 2010
<b>AMS Eastern Section Meeting</b> Special Session on Elliptic and Parabolic Problems in Geometry	Newark, NJ May 23, 2010
<b>Johns Hopkins University</b> Workshop on Mean Curvature Flows and Related Topics	Baltimore, MD March 15, 2010
<b>Joint Mathematics Meetings</b> Special Session on Mathematical Challenges of Relativity	San Francisco, CA January 13, 2010
<b>University of North Carolina</b> Analysis / PDE Seminar	Chapel Hill, NC December 2, 2009

**AMS Southeastern Section Meeting**  
Special Session on General Relativity and Related PDE  
**AMS Mathematical Research Communities**  
Mathematical Challenges of Relativity

Boca Raton, FL  
October 30, 2009  
Snowbird, UT  
June 18, 2009

## CONFERENCE ORGANIZATION

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**Union College Math Conference**  
Co-organizer

Union College  
2016, 2019, 2022

**Convergence and Low Regularity in General Relativity**  
Co-organizer of workshop

Simons Center for Geometry and Physics  
April 2019

**General Relativity and Geometric Analysis**  
Co-organizer of AMS Special Session

Portland State University  
April 2018

**Hudson River Undergraduate Math Conference**  
Co-organizer

Union College  
April 2015

## PROFESSIONAL SERVICE

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### Journal referee

Advances in Geometry  
Asian Journal of Mathematics  
Calculus of Variations and Partial Differential Equations  
Classical and Quantum Gravity  
Differential Geometry and its Applications  
International Mathematics Research Notices  
Journal für die reine und angewandte Mathematik (Crelle's Journal)  
Journal of Geometric Analysis  
Journal of Geometry and Physics  
Journal of Nonlinear Analysis  
Mathematical Research Letters  
Mathematische Nachrichten  
Pacific Journal of Mathematics

### Reviewer

AMS Mathematical Reviews (MR)

2012 – present, 17 reviews

## COLLEGE SERVICE

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### ACADEMIC AFFAIRS COUNCIL

Elected Position  
Served as chair March 2021 - August 2022

September 2020 - August 2023

Union College

### RETIREMENT PLAN COMMITTEE

Appointed Position

October 2017 - present

Union College

### LIBRARY LIAISON COMMITTEE

Elected Position

September 2017 - June 2019

Union College

### FACULTY REVIEW BOARD

Elected Position

September 2015 - June 2016

Union College