

Luca Spolaor

Curriculum Vitae

UC San Diego (UCSD)
Department of Mathematics
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Personal Information

Born March 4, 1988 - Verona (VR), Italy
Citizenship Italian
Languages Italian (native), English (fluent), German (intermediate)

Positions held

Jul 2019 - Present **Assistant Professor (tenure-track)**, UC San Diego (UCSD).
Sep 2016 - Jun 2019 **CLE Moore Instructor**, Massachusetts Institute of Technology (MIT), Mentor: Prof. Tobias Colding.
Sep 2017 - Jun 2018 **Visiting Associate Research Scholar & Visiting Lecturer**, Princeton University, (on leave from MIT).
Sep 2015 - Aug 2016 **Postdoc**, Max Planck Institute for Mathematics in the Sciences, Leipzig, Mentor: Prof. Dr. Emanuele Spadaro.

Education

Sep 2012 - Aug 2015 **Ph.D. Student**, University of Zurich, Advisor: Prof. Camillo De Lellis.
Thesis: Regularity Theory for a class of 2-dimensional almost area minimizing currents.
Sep 2010-Jul 2012 **Master in Mathematics**, University of Trento, Advisor: Prof. Raul Serapioni.
Thesis: Regularity Theory for Stationary Varifolds

Grants and Awards

2021 - 2026 NSF CAREER grant DMS 2044954 (\$550,000)
2021 Miranda Prize
2018 - 2021 NSF grant DMS 1810645/1951070 (\$157,841)
2018 - 2019 AMS Simons travel grant (\$4,000)
2016 - 2017 Oberwolfach Leibniz Fellow (OWL)
2015 Oberwolfach Leibniz Graduate Student (OWLG)
2015 Year Prize of the Science Faculty of the University of Zurich
2012 Money prize for best graduated students of the University of Trento

Research

Research interests

Geometric Measure Theory, PDE, Geometric Analysis, Calculus of Variations, Regularity

Published/Accepted papers

1. Uniqueness of tangent cones for 2-dimensional almost minimizing currents (with C. De Lellis and E. Spadaro), *CPAM* 70 (2017), no. 7, 1402-1421

2. Regularity theory for 2-dimensional almost minimizing currents I: Lipschitz approximation (with C. De Lellis and E. Spadaro), *TAMS* 370 (2018), no. 3, 1783-1801
3. Regularity theory for 2-dimensional almost minimal currents II: branched center manifold (with C. De Lellis and E. Spadaro), *Ann. PDE* 3 (2017), no. 2, Art. 18, 85
4. Regularity theory for 2-dimensional almost minimal currents III: blowup (with C. De Lellis and E. Spadaro), *JDG* 116:1 (2020), 125-185
5. Almgren's type Regularity for semicalibrated currents, *Adv. in Math.* 350 (2019), 747-815
6. On the number of singular points for planar multivalued harmonic functions (with F. Ghiraldin), *Manuscripta Math.* 154 (2017), no. 3-4, 513-525
7. Quantitative estimate on singularities in isoperimetric clusters (with M. Colombo), *CAG* 27:6 (2019), 1233-1249
8. An epiperimetric inequality for the regularity of some free boundary problems: the 2-dimensional case (with B. Velichkov) *CPAM* 72:2 (2018), 375-421
9. A logarithmic epiperimetric inequality for the obstacle problem (with M. Colombo and B. Velichkov), *GAFSA Vol. 28* (2018) 1029-1061
10. Free boundary regularity for a multiphase shape optimization problem (with B. Trey and B. Velichkov), *CPDE* 45:2 (2019), 77-108
11. (Log-)epiperimetric inequality and regularity over smooth cones for almost Area-Minimizing currents (with M. Engelstein and B. Velichkov), *Geom. & Topol.* 23:1 (2019), 513-540
12. Direct epiperimetric inequalities for the thin obstacle problem and applications (with M. Colombo and B. Velichkov), *CPAM* 73 (2019), 384-420
13. On the asymptotic behavior of the solutions to parabolic variational inequalities (with M. Colombo and B. Velichkov), *J. reine angew. Math.* 768 (2020), 149-182
14. Uniqueness of the blow-up at isolated singularities for the Alt-Caffarelli functional (M. Engelstein and B. Velichkov), *Duke Math. J.* 169:8 (2020), 1541-1601
15. The singular set of minimal surfaces near polyhedral cones (with M. Colombo and N. Edelen), *accepted in JDG* (2020)
16. On the logarithmic epiperimetric inequality for the obstacle problem (with B. Velichkov), *accepted in Mathematics in Engineering* 3:1 (2021), 1-42
17. Regularity of the free-boundary for the two-phase Bernoulli problem (with G. De Philippis and B. Velichkov), *Invent. Math.* 225, 347-394 (2021)
18. Almost everywhere uniqueness of blow-up limits for the lower dimensional obstacle problem (with M. Colombo and B. Velichkov), *Interfaces and Free Boundaries* 2021
19. The Riemannian Quantitative Isoperimetric Inequality (with O. Chodosh and M. Engelstein), *accepted in JEMS* (2021)
20. Quantitative Stability for Minimizing Yamabe Metrics (with M. Engelstein and R. Neumayer), *accepted in TAMS* (2022)
21. Singular behavior and generic regularity of min-max minimal hypersurfaces (with O. Chodosh and Y. Liokumovich), *accepted in Ars Inven. Anal.* (2022)

Submitted papers

22. Regularity of minimal surfaces near quadrtic cones (with N. Edelen), *submitted* 2019
23. Area minimizing hypersurfaces modulo p : a geometric free-boundary problem (with C. De Lellis, J. Hirsch, A. Marchese and S. Stuvard), *submitted* 2021

24. Rectifiability and almost everywhere uniqueness of the blow-up for the vectorial Bernoulli free boundaries (with G. De Philippis, M. Engelstein and B. Velichkov), *submitted 2021*
25. (Quasi-)conformal methods in two-dimensional free boundary problems (with G. De Philippis and B. Velichkov), *submitted 2021*
26. Fine structure of the singular set of area minimizing hypersurfaces modulo p (with C. De Lellis, J. Hirsch, A. Marchese and S. Stuvard), *submitted 2022*
27. A strong maximum principle for minimizers of the one-phase Bernoulli problem (with N. Edelen and B. Velichkov), *submitted 2022*

Scientific responsibilities

Referee work

Referee for *Inventiones Math.*, *Acta Math.*, *Annals of Math.*, *Analysis & PDE*, *Communications in Analysis and Geometry*, *Journal of Functional Analysis*, *Advances in Mathematics*, *Commentarii Mathematici Helvetici*, *Journal of Differential Geometry*, *JEMS*

Conferences Organized

- Jan 2023 AMS Special Sessions at JMM *Geometric Measure Theory and variational problems*, Boston, USA
- Jul 2022 Workshop: *Regularity Theory for Free Boundary and Geometric Variational Problems II*, Pisa, Italy
- Mar 2021 MSRI Workshop *Hot Topics: Regularity Theory for Minimal Surfaces and Mean Curvature Flow*, MSRI, Berkeley, USA
- Sep 2021 Workshop: *Regularity Theory for Free Boundary and Geometric Variational Problems*, Levico, Italy
- Mar 2019 AMS sectional meeting: *New Trends in Geometric Measure Theory*, University of Hawaii Manoa

Undergraduate Students' mentoring

- 2021-Present *Andrew Paul*
- 2020 *Xinkai Zhou* (2020 Undergraduate Summer Research Award sponsored by the Student Success Center at UCSD)
- 2018 Freshman advisor at MIT
- 2015 Coadvisor of the master student *Andrea Huber* at University of Zurich (main advisor C. De Lellis)

Graduate/Postdoc Students' mentoring

- 2022-Present *Davide Parise* (postdoc)
- 2022-Present *Eva Belmont* (postdoc), AWM mentor
- 2022-Present *Yuanfan Wang* (PhD)
- 2021-Present *Gongping Niu* (PhD), coadvised with B. Chow

Departmental service

- 2020-Present Undergraduate teaching reorganization committee
- Fall 2021 Organizer of Undergraduate Colloquium
- 2019-2021 Graduate hiring committee, EDI (Equity, Diversity and Inclusion) committee

Teaching Experience

- UCSD 19/Present Instructor for 109, 142A, 257A, 250A, 140B/C
MIT 18/19 Instructor for 18.100A
Spring 2018 Teaching Assistant at the Summer school in Harmonic Analysis in Park City
Fall 2017 Instructor for MAT103 at Princeton University
MIT 16/17 Teaching Assistant/Instructor for 18.01 and 18.03 at MIT
Fall 2015 Organiser of the graduate seminar Singularities of minimal hypersurfaces at MPI, Leipzig
Fall 2014 Organiser of the undergraduate Analysis Seminar for the degree course of Mathematics at the University of Zurich (held in German)
UZH 12/15 Teaching Assistant for the courses Topology and Geometry, Analysis III and Stochastic for the degree course of Mathematics at the University of Zurich
2011 - 2012 Tutor for the course Analysis I for the degree course of Mathematics at the University of Trento

Seminars and Visits

Selected list of talks

- Jun 2022 *4 hours minicourse* at Geometric analysis and calibrated geometries, *FIM-ETH, Zurich*
Apr 2022 Geometry and Topology seminar, *CMU*
Apr 2022 Geometric Measure Theory *Special session JMM*
November 2021 Geometry and Topology seminar, *Caltech*
November 2021 PDE Seminar, *Chinese Academy of Sciences*
November 2021 Geometric Analysis Seminar, *Yale*
October 2021 Young Mathematician Lecture Series, *National University of Singapore (NUS)*
October 2021 Colloquium, *Howard University*
June 2021 Workshop on Minimal Surfaces and Related Topics, *Tongji University*
May 2021 Geometric Analysis seminar, *University of Toronto*
March 2021 Calderon-Zygmund analysis seminar, *University of Chicago*
Dec 2020 KIAS Geometry and Analysis Seminar, *KIAS*
Dec 2020 PDE seminar, *Oxford University*
Nov 2020 Analysis seminar, *University of Maryland*
Nov 2020 Analysis seminar, *UT Austin*
Oct 2020 Virtual Analysis and PDE Seminar (VAPS), *UCI & al.*
Sep 2020 Geometric Analysis seminar, *Rutgers*
May 2020 Analysis seminar, *Caltech & UCLA*
Feb 2020 Geometric Analysis seminar, *Stanford, San Francisco*
Jan 2020 Geometric Analysis seminar, *UC Irvine, Los Angeles*
Nov 2019 Special Session on Geometric Partial Differential Equations and Variational Methods, *UC Riverside, Los Angeles*
Nov 2019 Analysis & Math. Physics seminar, *IAS, Princeton*
Oct 2019 Geometric Analysis seminar, *UC San Diego, San Diego*
Jul 2019 Workshop in PDE, *Oberwolfach, Germany*
Mar 2019 Geometric Analysis seminar, *Columbia University, New York*

Jan 2019 Department Colloquium, *University of Washington*, Seattle
 Dec 2018 PDE seminar, *Brown*, Providence
 Nov 2018 Geometric Analysis seminar, *UC San Diego*, San Diego
 Nov 2018 Departmental Colloquium, *UC San Diego*, San Diego
 Nov 2018 Departmental Colloquium, *University of Minnesota*, Minneapolis
 Nov 2018 Departmental Colloquium, *University of Madison*, Madison
 Nov 2018 Geometric Analysis Colloquium, *University of Toronto*, Toronto
 Sep 2018 *Meeting on Applied Mathematics and Calculus of Variations*, Sapienza, Rome
 Jun 2018 Differential Geometry Seminar, *UCSB*, Santa Barbara
 May 2018 Geometric Analysis Seminar, *University of Beijing*, Beijing
 Apr 2018 Analysis Seminar, *Upenn*, Philadelphia
 Apr 2018 Analysis Seminar, *Courant Institute*, New York
 Mar 2018 Videoseminar UZH-Berkley-Bonn-Paris, *University of Zurich*, Zurich
 Jun 2017 *Curves and Networks in Geometric Analysis*, University of Pisa, Pisa
 Apr 2017 Differential Geometry seminar, *Harvard University*, Cambridge
 Feb 2017 Differential Geometry seminar, *University of Chicago*, Chicago
 Jan 2017 Analysis seminar, *University of Pisa*, Pisa
 Dec 2016 Geometric Analysis seminar, *MIT*, Cambridge
 Mar 2016 *Oxbridge*, Cambridge
 Mar 2016 Geometric Analysis seminar, *Imperial College*, London
 Jan 2016 Analysis seminar, *ETH*, Zurich
 01.21.2016 *XXVI Convegno Nazionale di Calcolo delle Variazioni*, Levico Terme, Trento
 Oct 2014 Arbeitsgemeinschaft Angewandte Analysis, *Max-Planck-Institut*, Leipzig
 Jan 2014 *XXIV Convegno Nazionale di Calcolo delle Variazioni*, Levico Terme, Trento
 Aug 2013 *ERC Workshop on Geometric Measure Theory, Analysis in Metric Spaces and Real Analysis*, Pisa

Short Visits

2016 - 2018 University of Zurich (several visits), invited by C. De Lellis and M. Colombo
 2016 - 2018 SISSA (several visits), invited by G. De Philippis
 2016 - 2018 Université Grenoble Alpes (several visits), invited by B. Velichkov
 Feb 2017 Northwestern University (two weeks), invited by A. Naber
 May 2016 University of Cambridge (two weeks), invited by N. Wickramasekera and C. Bellettini
 2013 - 2015 Max Planck Institute for Mathematics in the Sciences (several visits), invited by E. Spadaro

References

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