

# Reto Buzano | Curriculum Vitae

Dipartimento di Matematica "Giuseppe Peano", Università degli Studi di Torino  
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## Personal Information

Born 1980 as Reto Müller in Switzerland. Name change to Reto Buzano in 2015 due to marriage. Fluent in Swiss German, German, English and Italian.

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## Academic Employment

- 04/2019– **Associate Professor in Geometry**, Università degli Studi di Torino (UniTo).
- 10/2019–03/2022 **Reader in Pure Mathematics**, Queen Mary University of London (QMUL).
- 10/2017–09/2019 **Senior Lecturer in Pure Mathematics**, QMUL.
- 09/2013–09/2017 **Lecturer in Pure Mathematics**, QMUL.
- 11/2011–08/2013 **Junior Research Fellow**, Imperial College London.
- 01/2010–03/2010 **Postdoctoral Research Fellow**, University of Warwick.
- 08/2009–10/2011 **Postdoctoral Research Fellow**, Scuola Normale Superiore di Pisa.

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## Education

- 05/2005–04/2009 **PhD in Mathematics**, ETH Zürich,  
Thesis: Ricci flow coupled with harmonic map heat flow.  
Advisor: Prof. Michael Struwe.
- 10/2000–04/2005 **Diploma in Mathematics with distinction**, ETH Zürich,  
Thesis: Differential Harnack inequalities for parabolic equations.  
Advisor: Prof. Michael Struwe.

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## Awards and Recognitions

- 10/2022 Italian Habilitation (Abilitazione Scientifica Nazionale) for Full Professor in Geometry.
- 10/2022 Italian Habilitation (Abilitazione Scientifica Nazionale) for Full Professor in Analysis.
- 01/2019 QMUL Faculty of Science and Engineering Research Excellence Award.
- 03/2017 Fellow of the UK Higher Education Academy (FHEA).
- 11/2005 ETH Medal for outstanding Diploma Thesis.<sup>1</sup>

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## Large Research Grants as Principal Investigator

- 09/2019–08/2022 **Research Support Fund of the Faculty of Science and Engineering**, Queen Mary University of London, GBP 65.000.
- 01/2019–09/2022 **Standard Grant**<sup>2</sup>, *Advances in Mean Curvature Flow: Theory and Applications*, Engineering and Physical Sciences Research Council (EPSRC), GBP 754.245.
- 02/2015–04/2017 **First Grant**, *The Formation of Singularities in Ricci Flow and Harmonic Ricci Flow*, Engineering and Physical Sciences Research Council (EPSRC), GBP 125.651.
- 11/2011–10/2014 **Junior Research Fellowship**, *Ricci flow singularities in higher dimensions and related problems*, Imperial College London, GBP 124.650.

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<sup>1</sup>Published in slightly revised and extended version as a book in the EMS Series of Lectures in Mathematics.

<sup>2</sup>After leaving QMUL in March 2022, Huy Nguyen became PI of this grant for the final 6 months.

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## Publications

### Articles in Journals

- R. Buzano and L. Yudowitz, *Bubble-tree convergence and local diffeomorphism finiteness for gradient Ricci shrinkers*, **Math. Z.** 304, No. 7 (2023), 32 pages.
- R. Buzano and L. Yudowitz, *Gaussian upper bounds for the heat kernel on evolving manifolds*, **J. London Math. Soc.** 108 (2023), 1747–1768.
- R. Buzano and G. Di Matteo, *A local singularity analysis for the Ricci flow and its applications to Ricci flows with bounded scalar curvature*, **Calc. Var.** 61, No. 65 (2022), 36 pages.
- L. Ambrozio, R. Buzano, A. Carlotto, and B. Sharp, *Geometric convergence results for closed minimal surfaces via bubbling analysis*, **Calc. Var.** 61, No. 25 (2022), 16 pages.
- R. Buzano, R. Haslhofer, and O. Hershkovits, *The moduli space of two-convex embedded spheres*, **J. Differential Geom.** 118, No. 2 (2021), 189–221.
- L. Ambrozio, R. Buzano, A. Carlotto, and B. Sharp, *Bubbling analysis and geometric convergence results for free boundary minimal surfaces*, **J. Ec. Polytech. Math.** 6, (2019) 621–664.
- R. Buzano, R. Haslhofer, and O. Hershkovits, *The moduli space of two-convex embedded tori*, **Int. Math. Res. Not. (IMRN)** 2019, No. 2 (2019), 392–406.
- R. Buzano and H. Nguyen, *The higher-dimensional Chern-Gauss-Bonnet formula for singular conformally flat manifolds*, **J. Geom. Anal.** 29, No. 2 (2019), 1043–1074.
- R. Buzano and H. Nguyen, *The Chern-Gauss-Bonnet formula for singular non-compact four-dimensional manifolds*, **Commun. Anal. Geom.** 27, No. 8 (2019), 1697–1736.
- R. Buzano and B. Sharp, *Qualitative and quantitative estimates for minimal hypersurfaces with bounded index and area*, **Trans. Amer. Math. Soc.** 370 (2018), 4373–4399.
- R. Buzano and M. Rupflin, *Smooth long-time existence of Harmonic Ricci Flow on surfaces*, **J. London Math. Soc.** 95 (2017), 277–304.
- C. Mantegazza and R. Müller, *Perelman’s entropy functional at Type I singularities of the Ricci flow*, **J. Reine Ang. Math. (Crelle)** 703 (2015), 173–199.
- R. Haslhofer and R. Müller, *A note on the compactness theorem for 4d Ricci shrinkers*, **Proc. Amer. Math. Soc.** 143, No. 10 (2015), 4433–4437.
- R. Haslhofer and R. Müller, *Dynamical stability and instability of Ricci-flat metrics*, **Math. Ann.** 360 (2014), 547–553.
- R. Müller, *Ricci flow coupled with harmonic map flow*, **Ann. Sci. Ec. Norm. Sup.** 45, fascicule 1 (2012), 101–142.
- R. Haslhofer and R. Müller, *A compactness theorem for complete Ricci shrinkers*, **Geom. Funct. Anal. (GAFA)** 21 (2011), 1091–1116.
- J. Enders, R. Müller, and P. Topping, *On Type I singularities in Ricci flow*, **Commun. Anal. Geom.** 19 No. 5 (2011), 905–922.
- R. Müller, *Monotone volume formulas for geometric flows*, **J. Reine Ang. Math. (Crelle)** 643 (2010), 39–57.

### Preprints

- R. Buzano and S. Maillot, *Mean curvature flow and Heegaard surfaces in lens spaces*, Preprint 2023, ArXiv:2312.07232, 22 pages.
- R. Buzano, H. Nguyen, and M. Schulz, *Noncompact self-shrinkers for mean curvature flow with arbitrary genus*, Preprint 2021, ArXiv:2110.06027, 18 pages.

### Monograph

- Reto Müller, *Differential Harnack inequalities and the Ricci flow*, **EMS Series Lect. Math.**, Vol. 5 (2006), EMS publishing house, 100 pages.

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## Invited Talks (Selection)

**Over 100 invited talks** in seminars, workshops and colloquia, at universities in Europe, North America, Asia and Australia, and at major conference centres including BIRS (Banff), Centro De Giorgi (Pisa), Fields Institute (Toronto), Hausdorff Institute (Bonn), KIAS (Seoul), ICMS (Edinburgh), Institut Fourier (Grenoble), MFO (Oberwolfach), MSRI (Berkeley).

The following is a list of **talks since 2021**:

- *European Doctorate School of Differential Geometry (ESdg)*, Granada (2024).
- Workshop *Non-linear critical point theory in analysis and geometry*, BIRS Kelowna (2023).
- Oberseminar *Differentialgeometrie*, Universität Münster (2023).
- Math Bites Colloquium, Università di Trento (2023).
- Workshop *Ricci flow and related topics*, University of Warwick (2023).
- *Milan-Grenoble-Turin Meeting in Geometry and Topology*, Institut Fourier Grenoble (2023).
- Geometric Analysis Seminar, Iowa State University (2022, online).
- Workshop *Differential Geometry and Geometric Analysis*, Università di Firenze (2022).
- Online workshop *Geometric Analysis: Past, Present and Future, Season 1*, Jeonbuk National University (2022, online).
- Workshop *Variational Aspect of Minimal Surfaces*, Institut Poincaré & University of Paris (2022).
- *8<sup>th</sup> European Congress of Mathematics (8ECM)*, Portorož (2021, online).
- Workshop *Real and Complex Manifolds – Mathematical Heritage of Edoardo Vesentini*, Scuola Normale Superiore di Pisa (2021, online).
- Analysis Seminar, University of Bath (2021, online).

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## Organisation of Seminars and Workshops (Selection)

- **Monthly colloquium of the mathematics department** *Lezioni Lagrangiane*, Università di Torino, main organiser together with Elena Issoglio (since Jan 2023).
- **International workshop** *A Complex Differential Geometry Meeting at UniTo*, Università di Torino (May 2023).
- **International workshop** *Mean Curvature Flow and Related Topics*, Queen Mary University of London, main organiser together with Huy Nguyen (Jul 2022).
- **International workshop** *A Geometric Analysis Meeting at UniTo*, Università di Torino (May 2023).
- **International workshop** *Geometric Analysis Days II*, Queen Mary University of London, main organiser con Shabnam Beheshti (Oct 2018).
- **International workshop** *Geometric Analysis Days*, Queen Mary University of London, main organiser (Apr 2017).
- **CIMPA Research School** *On Geometric Flows*, Jadavpur University, India (Dec 2016).
- **Quarterly seminar** *Brussels-London Geometry Seminar*, 21 events total, including two at QMUL as main organiser (Nov 2013–May 2020).
- **Weekly research seminar** *Geometry and Analysis*, Queen Mary University of London, main organiser together with Xin Li (Sep 2014–Aug 2017).
- **Weekly research seminar** *Geometry and Analysis*, Imperial College London, main organiser together with André Neves (Mar 2012–Aug 2013).
- **International workshop** *Ricci Solitons Days*, Centro di Ricerca Matematica Ennio De Giorgi a Pisa (Apr 2011).

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## Teaching Experience

Lecture courses, tutorials, reading classes and seminars at all levels (for Bachelor, Master, and PhD students, as well as postdocs) in mathematics and other sciences. Experience in teaching courses in English, Italian, and German.

### At Università di Torino (UniTo)

- *Geometria Differenziale*, 2022/23, 23/24 (MSc Mathematics).
- *Mathematics Discreta, Algebra e Geometria*, 2023/24 (BSc Computer Science).
- *Metodi Geometrici*, 2019/20, 20/21, 21/22 (BSc Math Finance).
- *Matematica II*, 2018/19, 19/20, 20/21, 21/22, 22/23 (BSc Chemistry).

### At Queen Mary University of London (QMUL)

- *Metric Spaces and Topology*, 2017/18, 18/19 (BSc Mathematics).
- *Convergence and Continuity*, 2013/14, 14/15, 15/16, 16/17 (BSc Mathematics).
- *Research Methods in Mathematical Sciences*, 2014/15 (MSc Mathematics).
- Organisation, coordination, and regular talks at *Reading seminar: PDE and Geometric Analysis*, 2017/18, 18/19, 19/20 (PhD students and postdocs in Mathematics).
- Organisation, coordination and training sessions for *Third-Year/MSci Projects*, 2014/15 (BSc & MSc Mathematics).
- Tutorials for
  - *Calculus III*,
  - *Convergence and Continuity* (4 times),
  - *Differential and Integral Analysis*,
  - *Introduction to Algebra*,
  - *Mathematical Structures* (3 times),
  - *Metric Spaces and Topology* (twice),
  - *Numbers, Sets, and Functions*,
  - *Research Methods in Mathematical Sciences*.

### At Imperial College London

- *Riemannian Geometry*, 2012/13 (MSc Mathematics).
- *Convergence and Collapsing Results in Geometry (Oxford based TCC Course)*, 2012/13 (PhD students and postdocs in Mathematics).
- Organisation, coordination, and regular talks at *Reading seminar: Topics in Geometric Analysis*, 2011/12, 12/13 (PhD students and postdocs in Mathematics).

### At Università di Pisa

- *Einstein Manifolds*, 2010/11 (MSc and PhD in Mathematics).

### At ETH Zürich

- Tutorials for
  - *Analysis I* (3 times),
  - *Analysis II* (4 times),
  - *Analysis III (Measure Theory)* (twice),
  - *Complex Analysis*,
  - *Calculus for Engineers*,
  - *Functional Analysis and PDE*.

### International Research School Mini-Courses

- *The Singularity Formation in Mean Curvature Flow and Ricci Flow*, Jadavpur University Kolkata, India, Dec 2016 (PhD students and postdocs in Mathematics).
- *The Formation of Singularities in the Ricci Flow*, KIAS Seoul, South Korea, Jan 2013 (PhD students and postdocs in Mathematics).

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## Supervision of Postdoctoral Researchers

- 09/2019–08/2021 **Mario Schulz**, *Queen Mary University of London (QMUL)*,  
Left to postdoc at Universität Münster.
- 09/2019–08/2021 **Shengwen Wang**, *QMUL*,  
Left to postdoc at University of Warwick, now Lecturer at QMUL.

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## Supervision of PhD Students

- 09/2022 – **Alessandro Bertellotti**, *SISSA Trieste*.
- 09/2019–06/2023 **Louis Yudowitz**, *Queen Mary University of London (QMUL)*,  
Thesis: Some Results in Ricci Flow Related to Conical Structures,  
Left to postdoc at Royal Institute of Technology Stockholm (KTH).
- 09/2017–06/2021 **Gianmichele Di Matteo**, *QMUL*,  
Thesis: Local Singularity Theory for Ricci and Harmonic Ricci Flows,  
Left to postdoc at Karlsruher Institut für Technologie (KIT).

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## Visiting PhD Students

- 09/2018–02/2019 **Jasmin Hörter**, *Queen Mary University of London (QMUL)*,  
Home institution: Karlsruher Institut für Technologie.
- 10/2017–02/2018 **Lothar Schiemanowski**, *QMUL*,  
Home institution: Universität zu Kiel.
- 03/2017–04/2017 **Jason Ledwidge**, *QMUL*,  
Home institution: Universität Tübingen.

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## Supervision of Bachelor's and Master's Theses

- AY 2023–24 **Fabio Francesconi**, *Università di Torino (UniTo)*,  
Tesi di Laurea Magistrale (Msc) ongoing (working on  $Q$  curvature).
- AY 2023–24 **Francesco Ruatta**, *UniTo*,  
Tesi di Laurea Magistrale (Msc) ongoing (working on Ricci flow neckpinches).
- AY 2022–23 **Cosimo Miccoli**, *UniTo*,  
Tesi di Laurea (Bsc): Esistenza di geodetiche chiuse mediante il curve shortening flow.
- AY 2017–18 **Amina Assouda Ladjali**, *Queen Mary University of London (QMUL)*,  
Master's Thesis: The  $CAT(\kappa)$  condition is preserved under Gromov-Hausdorff limits.
- AY 2017–18 **Shazada Begum**, *QMUL*,  
Master's Thesis: Birkhoff's curve shortening process.
- AY 2016–17 **Sania Kibria**, *QMUL*,  
Master's Thesis: On maximum principles.
- AY 2014–15 **Maria Beresford**, *QMUL*,  
Master's Thesis: Closed geodesics on surfaces.
- AY 2014–15 **Chiagoziem Nwobodo**, *QMUL*,  
Bachelor's Thesis: Maximum principles.
- AY 2013–14 **Tanjina Ali**, *QMUL*,  
Master's Thesis: Curve shortening.
- AY 2012–13 **Lewis Smith**, *Imperial College London*,  
Master's Thesis: Non-collapsing in mean convex mean curvature flow.

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## Outreach Activities

- 12/2020 Lectio Magistralis “L’affascinante mondo delle sfere”, Campus Invernale di Matematica, Fisica e Astrofisica (Torino).
- 07/2017 Taster Day Talk “Spheres”, seminar for Year 10 high-school students, QMUL.
- 07/2014 Goldsmiths’ Company Course “Game Theory”, mini-course for high-school teachers.
- 04/2014 Taster Day Talk “I’ve Got Proof – Infinite Sums”, seminar for Year 10 high-school students, QMUL.

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## Administrative Duties (Selection)

- **Director of Postgraduate Research (DPGR)**, Queen Mary University of London (April 2017 – April 2019). Deputy Director of PGR, PGR Recruitment Coordinator, and PGR Admissions Tutor (Sep 2013 – Sep 2015 and again in Sep 2020 – March 2022).
- **Member** of the following committees at Università di Torino: Consiglio di Dipartimento of mathematics department (2019 – present), Consiglio di Corso di Studio of mathematics department (2019 – present), Consiglio di Corso di Studio of chemistry department (2020 – 2023), Consiglio di Corso di Studio of informatics department (2023 – present), Curriculum Revision Committee of the chemistry department, responsible for all math courses taught at the chemistry department (AY 2021–22, 2022–23), PhD and postdoc hiring committees.
- **Member** of the following committees at Queen Mary University of London: Senior Management Team (Sep 2018 – Apr 2019), Research Committee (AY 2013–14, 2017–18, 2018–19), Postgraduate Research Committee (AY 2013–14, 2014–15 and as chair Apr 2017 – Apr 2019), Teaching and Learning Committee (AY 2017–18), Head of School Advisory Group (AY 2016-17, 2017-18), Student Experience Working Group (AY 2016–17), and PhD, postdoc, and academic staff hiring committees.

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## Miscellaneous

- **Editor** for *Geometric Flows* (De Gruyter Open), 2014–20.
- **Referee** for over 25 different peer-reviewed mathematical journals, including in particular: Ann. Global Anal. Geom. (AGAG), Ann. Sc. Norm. Super. Pisa Cl. Sci., Calc. Var. PDE, Comm. Anal. Geom. (CAG), Comm. PDE, Geom. Dedicata, Geom. Funct. Anal. (GAFA), J. Reine Angew. Math. (Crelle), J. Diff. Geom. (JDG), J. Funct. Anal., J. Eur. Math. Soc (JEMS), J. Geom. Anal., J. Math. Phys., Manuscripta Math., Math. Ann., Math. Nachr., Math. Res. Lett., Math. Z. e Trans. Amer. Math. Soc. (TAMS).
- **Reviewer** for Mathematical Reviews (MathSciNet / AMS) and for zbMATH Open.
- **Reviewer** for various Grant Proposals from the EPSRC, The Leverhulme Trust, and RCUK’s Future Leadership Grants Scheme.
- **External Examiner for the PhD vivas** of Michael Coffey, University of Warwick (March 2015), Mattia Miglioranza, University College London (December 2019), and Albert Wood, University College London (August 2020). **Independent Examination Chair for the PhD vivas** of Matthew Eric Bassett, Queen Mary University of London (October 2018), and Jarrod Williams, Queen Mary University of London (May 2019).
- **Member** of the European Mathematical Society and the American Mathematical Society. Former member of the London Mathematical Society (2014–2023)