

# Dr. Federico Vigolo

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## Academic career

- 2020-Now Post-doc at the Cluster of Excellence Mathematics Münster: Dynamics – Geometry – Structure
- 2018-2020 Post-doc at the Weizmann Institute of Science
- 2014-2018 PhD student at University of Oxford, supervised by Prof C. Druţu
- 2009-2014 Allievo Ordinario at Scuola Normale Superiore (Diploma di licenza, 70/70)
- 2012-2014 Master student at Università di Pisa (master degree, 110/110 cum laude)
- 2009-2012 Bachelor student at Università di Pisa (bachelor degree, 110/110 cum laude)

## PhD thesis

- title *Geometry of actions, expanders and warped cones*
- supervisor Prof C. Druţu

## Teaching experience

- 2021 Co-organizing a seminar on  $L^2$ -invariants (TBC)
- 2019 Main lecturer for a course on 'Riemann surfaces and mapping class groups'
- 2017-2018 Non-stipendiary Lecturer in mathematics at St Catherine's College (tutoring for Linear Algebra, Rings and Modules, Integration, Group Theory)
- 2016 TA for Geometric Group Theory
- 2016 TA for Linear Algebra and Topology for Exeter College
- 2015 Tutor for Groups and Group Actions for Hertford College
- 2015 TA for Topology and Groups

## Conferences co-organised

- Jun 2021 *Interactions between expanders, groups and operator algebras*, Münster (Germany, TBC)
- 5-8 Mar 2020 *Connections to Random Walks, Equidistribution, and Rigidity*, Nir David (Israel)

## List of publications and preprints

- (joint with A. Leitner) *Coarse groups*. In preparation (2020)
- (joint with K. Li and J. Zhang) *A Markovian and Roe-algebraic approach to asymptotic expansion in measure*. Preprint (2020)

- (joint with K. Li and J. Zhang) *Asymptotic expansion in measure and strong ergodicity*. Preprint (2020)
- (joint with A. Khukhro, K. Li and J. Zhang) *On the structure of asymptotic expanders*. Preprint (2019)
- (joint with R. Kropholler) *A new construction of  $CAT(0)$  cube complexes*. Preprint (2018)
- *Remarks on partitions into expanders*. Aequationes Mathematicae (to appear)
- (joint with R. Kropholler) *Embedding cube complexes into products of trees and fly maps*. Appendix to the paper: “Hyperbolic groups with almost finitely presented subgroups”. Groups, Geometry, and Dynamics (to appear)
- *Discrete fundamental groups of warped cones and expanders*. Mathematische Annalen **373** (2019), no. 1-2, 355–396.
- (joint with T. de Laat) *Superexpanders from group actions on compact manifolds*. Geometriae Dedicata **200** (2019), no. 1, 287–302.
- *Measure expanding actions, expanders and warped cones*. Transactions of the American Mathematical Society **371** (2019), no. 3, 1951–1979.
- *Fundamental groups as limits of discrete fundamental groups*. Bulletin of the London Mathematical Society **50.5** (2018): 801-810.

## Minicourses

20-31 Jul 20 *Expander graphs, Geometric group theory without boundaries (Virtual)*

## Invited talks

- 1 Dec 2020 *Markov operators and ghost projections, Oberseminar  $C^*$ -Algebren (Münster - Virtual)*
- 23 Nov 2020 *Coarse groups and their coarse actions, GGT Seminar (Münster - Virtual)*
- 17 Aug 2020 *Asymptotic expander graphs, Symmetries in Newcastle (Newcastle Aus - Virtual)*
- 1 Jul 2020 *Of measurable actions and finite graphs, Online geometry seminar (ETH Zurich - Virtual)*
- 27 May 2020 *From group actions to finite graphs and back, Operator Algebras Seminar (Copenhagen - Virtual)*
- ~~19-Mar-2020~~ *(TBA) Géométrie et Topologie (Sorbonne, Paris) — Postponed to Fall term*
- ~~17-Mar-2020~~ *A geometric approach to an analytic characterization of strong ergodicity Action (UMPA, Lyon) — Postponed to Fall term*
- 18 Jul 2019 *On metrics, measures and dynamics: expanders via warped cones, colloquium (Karlsruhe)*
- 5 Jun 2019 *Geometry of actions on metric/measure spaces, Simons Semester on Geometric and Analytic Group Theory (IMPAN)*
- 10 May 2019 *Discrete fundamental group: the large and the small, Junior Topology and Group Theory seminar (Oxford)*
- 11 Apr 2019 *An introduction to warped cones, Probability and Ergodic Theory seminar (Ben-Gurion University)*

- 19 Mar 2019 *Discrete fundamental groups and warped cones*, (Indiana University Bloomington)
- 14 Mar 2019 *Proving hyperbolicity for cube complexes*, Spring Topology and Dynamics Conference (Birmingham, AL)
- 12 Mar 2019 *Cube complexes with coupled links*, Geometric Group Theory and Topology seminar (Tufts, Boston)
- 10 Jan 2019 *Cube complexes with coupled links*, Geometry and Topology seminar (Technion)
- 12 Oct 2018 *Expander graphs and how to find them*, Geometry Graduate Colloquium (ETH Zurich)
- 4 Oct 2018 *Expanders via actions on manifolds*, Geometry Tea (Cambridge)
- 23 Aug 2018 *Non-positively curved cube complexes with hyperbolic fundamental group*, (KAIST, Daejeon)
- 18 May 2018 *Geometric constructions of expanders*, Combinatorics Seminar (Warwick)
- 18 Apr 2018 *Coarse geometry of approximating graphs: discrete fundamental group*, Mini-Workshop on Superexpanders and Their Coarse Geometry (Oberwolfach)
- 26 Mar 2018 *Warped systems of actions on metric spaces*, Groups, Actions and von Neumann algebras seminar (Orsay)
- 29 Jan 2018 *A geometric construction of expanders*, Algebra, Combinatorics, Measure Seminar (Lancaster)
- 22 Jan 2018 *Coarse geometry of expanders*, Kleines Seminar (Münster)
- 30 Sep 2017 *Super-expanders via approximating graphs*, Workshop on Operator algebras, Geometry and Actions (Warsaw)
- 2 May 2017 *Approximating graphs: a geometric constructions of expanders*, Seminaire Groupes et Analyse (Neuchâtel)
- 27 Feb 2017 *An introduction to expanders and how to construct them*, Junior Geometry and Topology Seminar (Warwick)

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### Contributed talks

- 15 Oct 2019 *Strong Property (T) in the proof of the Zimmer Conjecture*, Arbeitsgemeinschaft (Oberwolfach)
- 19 Jul 2018 *Constructing expanders by approximating geometric actions*, GAGTA (Seoul)
- 5 Jul 2018 *Warped cones: a coarse geometric invariant of actions*, workshop on Dynamical methods in Algebra, Geometry and Topology (Udine)
- 24 May 2018 *Cube Complexes with Coupled Links*, workshop on Nonpositively Curved Groups on the Mediterranean (Nahsholim)
- 29 Jun 2017 *Approximating graphs: a geometric constructions of expanders*, conference yGAGTA (Bilbao)

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## Positions awarded

- *Participant at the Simons Semester "Geometric and Analytic Group Theory"*, 2 Jun. - 7 Jul. 2019, Warsaw
- *Early career participant at the INI Programme "Non-positive curvature group actions and cohomology"*, 3 Jan. - 23 Jun. 2017, Cambridge
- *Programme associate at the MSRI Semester "Geometric Group Theory"*, 15 Aug. - 16 Dec. 2016, Berkeley

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## Prizes and scholarships

- My graduate studies were funded by an EPSRC scholarship and the J.T.Hamilton scholarship.
- I earned scholarships at the following schools of excellence:
  - Scuola Normale Superiore (Pisa),
  - Scuola Galileiana di Studi Superiori (Padova), (declined)
  - IUSS (Pavia), (declined)
  - Scuola Superiore dell'Università di Udine (Udine). (declined)
- In 2009 I won a national competitive exam for an INDAM grant. (declined)

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## Other activities

From early 2013 to August 2014 I was volunteering for MaDE@DM: an outreach society that organises mathematical exhibitions in the surroundings of Pisa.