Daniele Zuddas

Academic curriculum vitæ

Contact information

Dipartimento di Matematica e Geoscienze, Università di Trieste
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Research interests

My research is in the area of Geometric Topology in low dimensions. I study 4-manifolds from the topological and differentiable viewpoints, mainly using Lefschetz fibrations, branched coverings, handle decompositions and trisections, with applications to invariants of 4-manifolds, as well as to symplectic and complex geometry.

Education

10/3/2008	**PhD in Mathematics**, *Scuola Normale Superiore*, Pisa, Italy, with honors. Thesis: *Branched coverings and 4-manifolds*, supervisor: Prof. Riccardo Piergallini
19/7/2000	**Laurea in Matematica**, *Università degli Studi di Camerino*, Italy, with honors

Qualification

○ Abilitazione Scientifica Nazionale, 01/A2 Geometria e Algebra, II fascia, valid in Italy from 30/11/2017 through 30/11/2027.

Current position

Since 29/11/2022	**Associate professor of Geometry**, *University of Trieste*, Italy Research area: low-dimensional geometry and topology.

Previous positions

2019–2022	**Assistant professor of Geometry (RTD-b)**, *University of Trieste*, Italy
2017–2019	**ERC postdoctoral researcher in Mathematics**, *University of Bayreuth*, Germany
2013–2017	**Research fellow in Mathematics**, *Korea Institute for Advanced Study*, Seul, South Korea
2013	**Postdoctoral researcher**, *Max Planck Institute for Mathematics*, Bonn, Germany
2009–2012	**Research fellow in Mathematics**, *Università di Cagliari*, Italy
2007–2008	**Research fellow in Mathematics**, *Scuola Normale Superiore*, Pisa, Italy

Scientific member in international research projects

2017–2019	2013 ERC Advanced Research Grant 340258 *Topological, Algebraic, Differential Methods in Classification and Moduli Theory (TADMICAMT)*, Lehrstuhl Mathematik VIII, Mathematisches Institut, University of Bayreuth. Principal investigator: Prof. Fabrizio Catanese.
2010–2015	Research Networking Programme *Contact and Symplectic Topology (CAST)*, European Science Foundation. Principal investigator: Prof. Frédéric Bourgeois.

Funding

2013–2017 Research grants from KIAS, Seoul, South Korea (€ 35.000).

2010–2012 Research grant from Regione Autonoma della Sardegna (FSE 2007–2013), Italy. Project: Lefschetz fibrations on 4-manifolds – CRP3_43 (€ 70.000).

Selected invited talks at international conferences

- *Constructions of branched coverings in dimension four*, 'Geometric Topology, Art, and Science (GRAS70)', 8-10 June 2023, Modena and Reggio Emilia, Italy.

- *How to present all compact topological 4-manifolds*, 'Joint meeting of the Italian Mathematical Union, the Italian Society of Industrial and Applied Mathematics and the Polish Mathematical Society', 17-20 September 2018, Wrocław, Poland.

- *The smooth presentation of non-smoothable 4-manifolds*, 'Differential, Algebraic and Topological Methods in Complex Algebraic Geometry', 6-15 September 2018, Cetraro, Italy.

- *Branched coverings of 4-manifolds*, AIM Workshop 'Symplectic four-manifolds through branched coverings', 14-18 May 2018, American Institute of Mathematics, San Jose, CA, USA.

- *Branched covering representation of 4-manifolds and their submanifolds*, 2017 KIAS Research Station Busan on "Self-distributive system and quandle (co)homology theory in algebra and low-dimensional topology", 12-16 June 2017, Busan, South Korea.

- *New holomorphic fillings in contact geometry*, '2nd KAST–Lincei Bilateral Symposium', 6/12/2016, KIAS, Seoul, South Korea.

- *Topological 4-manifolds as branched covers of S^4*, conference '4-Dimensional Topology', 21-23 November 2014, Osaka City University, Japan.

- *An equivalence theorem for Lefschetz fibrations over the disk*, 'OCAMI Workshop on Knots and Related Topics', 7-8 June 2014, Osaka City University, Japan.

Selected contributed talks at international conferences

- *Branched coverings of CP^2 and other basic 4-manifolds*, 'Topology, Geometry, and Dynamics: Rokhlin – 100', 19-23 August 2019, The Euler International Mathematical Institute, Saint Petersburg, Russia.

- *Cobordisms of Lefschetz fibrations on 4-manifolds*, 'Knots and Low Dimensional Manifolds', a satellite conference of ICM 2014, 22-26 August 2014, Busan, South Korea.

- *Cobordisms of Lefschetz fibrations on 4-manifolds*, 'ICM 2014', 13-21 August 2014, Seoul, South Korea.

- *Fibrazioni di Lefschetz universali*, Incontro del Progetto FIRB 2012 'Geometria Differenziale e Teoria Geometrica delle Funzioni', 23-25 October 2013, University of Florence, Italy.

- *Lefschetz fibration structures on 4-dimensional 2-handlebodies*, 'ICDG 2010', 6-10 September 2010, University of Veliko Tarnovo, Bulgaria.

- *Lefschetz fibration structures on 4-dimensional 2-handlebodies*, 'International Workshop on Global Analysis and PDE on Manifolds', 6-8 September 2010, Sofia, Bulgaria.

Selected departmental talks

- *Strutture complesse non Kähleriane su R^4*, 5 December 2019, University of Trieste, Italy.

- *Strutture complesse non Kähleriane su R^4*, 15 January 2020, University of Padua, Italy.

- *How to realize all compact topological 4-manifolds by a finite amount of data*, 4 February 2020, SISSA, Trieste, Italy.

Service to the University – Administrative positions

Since 2021 Member of *Commissione Paritetica Docenti Studenti* (CPDS), Dipartimento di Matematica e Geoscienze, Università di Trieste.

Since 2023 Committee member of the PhD Course in *Earth Science, Fluid-Dynamics, and Mathematics. Interactions and Methods*, Dipartimento di Matematica e Geoscienze, Università di Trieste.

Since 2023 Co-organizer of *I Lincei per una nuova didattica nella scuola: una rete nazionale*, Dipartimento di Matematica e Geoscienze, Università di Trieste, and Accademia Nazionale dei Lincei, Roma.

Teaching – Courses taught

2019–2020 Supplementary teaching for Geometria 2, Laurea Triennale in Matematica, University of Trieste, 24 hours (chair holder: Prof. Michela Brundu).

2020–2021 Geometria 1, Laurea Triennale in Matematica, Intelligenza Artificiale e Data Analytics, University of Trieste, 72 hours.

2020–2021 Precorso di Matematica, Laurea Triennale in Matematica, Fisica, Intelligenza Artificiale e Data Analytics, University of Trieste, 10 hours.

2021–2022 Geometria 1, Laurea Triennale in Matematica, Fisica, Intelligenza Artificiale e Data Analytics, University of Trieste, 72 hours.

2021–2022 Geometria 3 – Topologia, Laurea Triennale in Matematica, University of Trieste, 48 hours.

2021–2022 Topology, Postgraduate Diploma Course in Mathematics, ICTP Trieste, 15 hours.

2022–2023 Geometria, Laurea Triennale in Ingegneria Industriale e Ingegneria Navale, University of Trieste, 90 hours.

2022–2023 Geometria 3 – Topologia, Laurea Triennale in Matematica, University of Trieste, 48 hours.

2022–2023 Topology, Postgraduate Diploma Course in Mathematics, ICTP Trieste, 22.5 hours.

2023–2024 Geometria, Laurea Triennale in Ingegneria Industriale e Ingegneria Navale, University of Trieste, 90 hours.

2023–2024 Geometria 3 – Topologia, Laurea Triennale in Matematica, University of Trieste, 48 hours.

2023–2024 Topology, Postgraduate Diploma Course in Mathematics, ICTP Trieste, 22.5 hours.

Students – Master thesis advisor

2020 Chiara Meroni, *On a generalization of Reeb's sphere theorem* (acting as co-advisor).

2022 Valentina Bais, *Parallelization of orientable 3-manifolds*.

Outreach

○ *La matematica dei nodi. Breve introduzione alle curve annodate e qualche loro applicazione.* Seminar for high school students, "Circolo Matematico di Trieste", 23 April 2021, University of Trieste.

○ Six hours mini-course on elementary Euclidean and Hyperbolic Geometry for high school students, Modulo Formativo Estivo *Dalla geometria alle geometrie: ci mettiamo su un altro piano!*, 30 August – 3 September 2021, University of Trieste.

Language skills

Italian Native speaker

English Advanced level C1 of QCER

French Elementary

Publications

1) N. Kasuya and D. Zuddas, *On the strongly pseudoconcave boundary of a compact complex surface*, to appear, DOI: 10.1090/proc/16603.

2) V. Bais and D. Zuddas, *On Stiefel's parallelizability of 3-manifolds*, Expositiones Mathematicae 41 (2023) No. 1, 238–243, DOI: 10.1016/j.exmath.2023.01.001.

3) N. Kasuya and D. Zuddas, *A concave holomorphic filling of an overtwisted contact 3-sphere*, Algebraic & Geometric Topology 23 (2023) 2141–2156, DOI: 10.2140/agt.2023.23.2141.

4) D. Auckly, R. İ. Baykur, R. Casals, S. Kolay, T. Lidman and D. Zuddas, *Branched covering simply-connected 4-manifolds*, pp. 31–42 in Gauge theory and low-dimensional topology: progress and interaction, edited by J. A. Baldwin, H. U. Boden, J. B. Etnyre and L. Watson, Open Book Series 5, Mathematical Sciences Publishers, 2022, DOI: 10.2140/obs.2022.5.31.

5) R. Piergallini and D. Zuddas, *Branched coverings of CP^2 and other basic 4-manifolds*, Bulletin of the London Mathematical Society 53 (2021) No. 3, 825–842, DOI: 10.1112/blms.12463.

6) S. Behrens, B. Kalmár and D. Zuddas, *The Ball to Ball Theorem*, Chapter 10 in *The Disc Embedding Theorem*, edited by S. Behrens, B. Kalmár, M. H. Kim, M. Powell and A. Ray, Oxford University Press 2021, pages 131–151, DOI: 10.1093/oso/9780198841319.003.0010.

7) M. Freedman and D. Zuddas, *Certifying a compact topological 4-manifold*, Mathematical Research Letters 26 (2019), no. 1, 67–74, DOI: 10.4310/MRL.2019.v26.n1.a5.

8) R. Piergallini and D. Zuddas, *On branched covering representation of 4-manifolds*, Journal of the London Mathematical Society 100 (2019), no. 1, 1–16, DOI: 10.1112/jlms.12187.

9) R. Piergallini and D. Zuddas, *Special moves for open book decompositions of 3-manifolds*, Journal of Knot Theory and Its Ramifications 27, no. 11 (2018) 1843008, DOI: 10.1142/S0218216518430083.

10) A. J. Di Scala, N. Kasuya and D. Zuddas, *Non-Kähler complex structures on R^4, II*, Journal of Symplectic Geometry 16 (2018), no. 3, 631–644, DOI: 10.4310/JSG.2018.v16.n3.a2.

11) B. Cappelletti–Montano, A. Loi and D. Zuddas, *On codimension-1 submanifolds of the real and complex projective space*, Topology and its Applications 232 (2017), 237–241, DOI: 10.1016/j.topol.2017.10.015.

12) A. J. Di Scala, N. Kasuya and D. Zuddas, *Non-Kähler complex structures on R^4*, Geometry & Topology 21 (2017) n. 4, 2461–2473, DOI: 10.2140/gt.2017.21.2461.

13) A. J. Di Scala, N. Kasuya and D. Zuddas, *On embeddings of almost complex manifolds in almost complex Euclidean spaces*, Journal of Geometry and Physics 101 (2016), 19–26, DOI: 10.1016/j.geomphys.2015.11.008.

14) D. Zuddas, *Universal Lefschetz fibrations and Lefschetz cobordisms*, Geometry & Topology Monographs 19 (2015), 125–144, DOI: 10.2140/gtm.2015.19.125.

15) N. Apostolakis, R. Piergallini and D. Zuddas, *Lefschetz fibrations over the disc*, Proceedings of the London Mathematical Society 107 (2013), 340–390, DOI: 10.1112/plms/pds078.

16) D. Zuddas, *Universal Lefschetz fibrations over bounded surfaces*, Algebraic & Geometric Topology 12 (2012), 1811–1829, DOI: 10.2140/agt.2012.12.1811.

17) A. J. Di Scala and D. Zuddas, *Embedding almost-complex manifolds in almost-complex euclidean spaces*, Journal of Geometry and Physics 61 (2011), 1928–1931, DOI: 10.1016/j.geomphys.2011.05.002.

18) D. Zuddas, *Representing Dehn twists with branched coverings*, International Mathematics Research Notices 2009 (2009), 387–413, DOI: 10.1093/imrn/rnn134.

19) R. Piergallini and D. Zuddas, *A universal ribbon surface in B^4*, Proceedings of the London Mathematical Society 90 (2005), 763–782, DOI: 10.1112/S0024611504015072.

20) A. Loi and D. Zuddas, *Some remarks on Bergmann metrics*, Rivista di Matematica della Università di Parma 4 (2001), 71–86.

21) R. Piergallini and D. Zuddas, *Braiding non-orientable surfaces in S^4*, Atti del Seminario Matematico e Fisico dell'Università di Modena e Reggio Emilia, supplement to volum IL (2001), 229–239.

Preprints

1) A. Lerario, C. Meroni and D. Zuddas, *On smooth functions with two critical values*, arXiv:2206.06955 (2022), submitted.

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