

Curriculum Vitae

Sara Azzali

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Current position

Since April 2022 Assistant professor (*Ricercatrice RTDB* in Geometria) at Università degli Studi di Bari, Dipartimento di Matematica.

Previous employment

Apr 2021–Mar 2022 Teaching assistant (*Mitarbeiterin*) at the University of Greifswald, Institute of Mathematics and Informatics.

Oct 2019–Mar 2021 Deputy professor (*Vertretungsprofessorin W2*) at the University of Hamburg, Institute of Mathematics.

Oct 2017–Sept 2019 Temporary Position for Principal Investigator (*Eigene Stelle*) at Institut für Mathematik, Universität Potsdam, for the project *Secondary invariants for foliations* funded by the DFG (Deutsche Forschungsgemeinschaft) Priority Programme *Geometry at Infinity*.

Apr 2014–Sept 2017 Postdoctoral research and teaching assistant, *Institut für Mathematik, Universität Potsdam (Wissenschaftliche Mitarbeiterin)* at the *Institut für Mathematik, Universität Potsdam* in the research group of Prof. Sylvie Paycha.

Feb 2012–Jan 2014 Postdoc (*INdAM Fellow in Mathematics for Experienced Researchers cofunded by Marie Curie*).
Host institutions: 18 months at *Institut de Mathématiques, Université Paris Diderot*; 6 months at *Dipartimento di Matematica, Sapienza Università di Roma*.

Sept 2008–Feb 2011 & Jun –Sept 2011 Postdoc and teaching assistant, *Mathematisches Institut Georg-August-Universität Göttingen* (Germany) in the research group of Prof. Thomas Schick.

Sept 2007–Aug 2008 Postdoc CNRS, *Laboratoire de Mathématiques et Applications de Metz* (France).

Education

10 July 2007 Doctorate in Mathematics (PhD), *Sapienza Università di Roma*, (Italy)
Thesis: *Two spectral invariants of type Rho*; Advisor: Prof. Paolo Piazza.

Nov 2002–Oct 2006 Doctorate studies in mathematics at *Sapienza Università di Roma*.

12 March 2002 Laurea in Matematica (Master degree in Mathematics), *Università degli Studi di Parma* (Italy) with degree 110 cum laude; thesis: *Metodi geometrici per la minimizzazione dell'area*; Supervisor: Prof. Claudio Arezzo.

Sept 1995–Aug 2001 Undergraduate student in Mathematics at *Università degli Studi di Parma* (Italy).

Third-Party Funding

2017–2019 Grant of the DFG (Deutsche Forschungsgemeinschaft), *Principal Investigator* for the project *Secondary invariants for foliations* in the Priority Programme *Geometry at infinity*, <https://www.spp2026.de/>, Grant Value: 176k euro.

Qualifications

2022 Abilitazione Scientifica Nazionale, II Fascia, Settore 01/A2 Geometria e Algebra (01/02/2022 – 01/02/2031)

2011, 2015 Qualification(s) aux fonctions de Maître de conférences, Section 25

Scientific Interests

Differential geometry, global analysis, operator algebras, noncommutative geometry.

Publications

Papers published in scientific journals with referee

1. K-homology and K-theory of pure Braid groups (with Sarah L. Browne, Maria P. Gomez Aparicio, Lauren C. Ruth, Hang Wang), *New York J. Math.* **28** (2022), 1256–1294.
2. The Baum–Connes conjecture localised at the unit element of a discrete group (with Paolo Antonini and Georges Skandalis), *Compositio Mathematica* **156** (2020), 2536–2559.
3. Spectral ζ -invariants lifted to coverings (with Sylvie Paycha)
Transactions of the American Mathematical Society **373** 9 (2020), 6185–6226
4. Two-cocycle twists and Atiyah–Patodi–Singer index theory, (with Charlotte Wahl)
Mathematical Proceedings of the Cambridge Philosophical Society, **167** 3 (2019) 437–487,
5. Bivariant K -theory with \mathbb{R}/\mathbb{Z} -coefficients and rho classes of unitary representations (with Paolo Antonini and Georges Skandalis)
Journal of Functional Analysis **270** 1, January 2016, 447–481.
6. Large time limit and local L^2 -index theorems for families (with Sebastian Goette and Thomas Schick)
Journal of Noncommutative Geometry, **9** (2015), no. 2, 621–664.
7. Traces of holomorphic families of operators on the noncommutative torus and on Hilbert modules (with Cyril Lévy, Carolina Neira and Sylvie Paycha), in “Geometric Methods in Physics”, *Trends in Mathematics*, Birkäuser 2015, 3–38.
8. Flat bundles, von Neumann algebras, and K -theory with \mathbb{R}/\mathbb{Z} -coefficients (with Paolo Antonini and Georges Skandalis), *Journal of K-theory* **13**, 2 (2014), 275–303.
9. Spectral flow, index and the signature operator (with Charlotte Wahl),
Journal of Topology and Analysis **3** (2011) 37–67.
10. L^2 Rho form for normal coverings of fibre bundles,
International Journal of Mathematics **22** (2011) 1139–1161.

Expository papers and proceedings (without referee)

11. Discrete group actions and a weak form of the Baum–Connes conjecture, *Oberwolfach Rep.* **32** (2018).
12. Large time limit and the L^2 local index theorem, *Oberwolfach Rep.* **28** (2010) 10.4171.
13. Two spectral invariants of type Rho, *Oberwolfach Rep.* **4** (2007) 41/2007.

Other publications

14. Editor of the book *Women of mathematics throughout Europe: a gallery of portraits containing the interviews to 13 women mathematicians from european countries*. The book can be downloaded at https://s3.eu-central-1.amazonaws.com/imaginaryexhibits/women-of-mathematics/women_of_mathematics_catalogue_en.pdf

Teaching activities

Università di Bari

- Spring 2024 *Geometria 4*, teaching assistant,
Study program: Mathematics
- Fall 2023 • **Lecture** *Matematica Discreta*,
Study program: Computer Science
- Spring 2023 • *Geometria 4*, teaching assistant,
Study program: Mathematics
• **PhD course** *Dirac operators*
Study program: PhD program in Computer Science and Mathematics
- Fall 2022 • **Lecture** *Matematica Discreta*,
Study program: Computer Science
- Spring 2022 • *Istituzioni di Geometria Superiore*, teaching assistant.
Study program: Mathematics
• *Geometria 4*, teaching assistant.
Study program: Mathematics

Universität Greifswald

(language: german; 8 SWS - semester hours per week)

- Spring 2021 • **Lecture** *Lineare algebra und analytische Geometrie*
• Übung *Lineare algebra und analytische Geometrie*,
Study program: Mathematik für das Lehramt an Gymnasien

Universität Hamburg

(language: english for the master program, german for the tutorial; 9 SWS - semester hours per week)

- Fall 2020 • **Lecture** *Riemannian Geometry*,
Study program: Mathematics
• **Seminar** *Topology* for the master program
Study program: Mathematics
- Spring 2020 • **Lecture** *Algebraic Topology*,
Study program: Mathematics
• Exercises for *Algebraic Topology*,
Study program: Mathematics
- Fall 2019 • **Lecture** *Prep course for mathematical master programs*,
Study program: Mathematics,
• **Lecture** *Elliptic Operators and Topology*,
Study program: Mathematics
• Tutorium and teaching assistant for *Analysis 1*
Study program: Mathematics

Universität Potsdam

(language: german in the bachelor courses, english in the master program; 4 SWS - semester hours per week)

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- Spring 2017
- *Mathematik für Physik IV*, teaching assistant.
 - *Regularised determinants in geometry and quantum field theory*, teaching assistant.
- Fall 2016
- *Mathematik für Physik III*, teaching assistant.
 - *Distributionentheorie*, teaching assistant.
- Spring 2016
- Blockseminar *Mathematik für Physik II*, **lecturer**.
 - *Mathematik für Physik II*, teaching assistant.
- Fall 2015
- *Mathematik für Physik I*, teaching assistant.
 - Seminar *Mathematische Methode*, **lecturer**.
- Spring 2015
- *Mathematik für Physik IV*, teaching assistant.
 - *Global pseudodifferential operators*, teaching assistant.
- Fall 2014
- *Mathematik für Physik III*, teaching assistant.
 - *Mathematik für Physik I*, teaching assistant.
- Spring 2014
- Master course *Regularized determinants and Spectral invariants in Physics and Geometry*, **lectured** in combination with Prof. Sylvie Paycha.
 - *Mathematik für Physik II*, teaching assistant.

Georg-August-Universität Göttingen, Germany.

(language: german; 2 SWS - semester hours per week)

- Spring 2011
- *Differenzial- und Integralrechnung II (Analysis II)*, teaching assistant.
- Fall 2010
- *Differenzial- und Integralrechnung I (Analysis I)*, teaching assistant.
- Fall 2009
- *Bio- und Geomathematik (Mathematics for Bio- and Geology)*, teaching assistant.

Università di Roma La Sapienza, Italy

- Spring 2007
- *Analisi II (Analysis II)*, teaching assistant for engineers.
- Fall 2006
- *Matematica II (Course on ODE)*, undergraduate course for majors in Statistics, **lecturer**.
- Spring 2006
- *Istituzioni di Matematica (Mathematics)*, teaching assistant for majors in Geology.
- Fall 2005
- *Mathematics II*, teaching assistant for majors in Statistics.
- Spring 2004
- *Calcolo e Biostatistica (Calculus and biostatistics)*, tutor.

Student supervision

- 2021
- Supervision of the master thesis of Ada Masters, University of Hamburg.
- May-June 2019
- Co-supervision of the bachelor internship of Nathanaël Boutillon, student from the *ENS Lyon*, at the University of Potsdam. Title of the internship: *The noncommutative torus*.
- Spring 2017
- Supervision of the internship at the University of Potsdam of Giada Serafini, a student from the University of Camerino - Italy
- Spring 2015
- Co-supervision of the bachelor thesis *Yang-Mills theory*, by Paul Balas and Simon Jubert from University of Toulouse/ University of Potsdam.

Administrative, organisation

- Since January 2023 Co-organiser of the monthly seminar in geometry and algebra, *Seminario di Algebra e Geometria UniBa-PoliBa*, jointly hosted by Università di Bari and Politecnico di Bari (with Amedeo Altavilla and Francesco Pavese 1/2023–1/2024; with Lucio Centrone and Francesco Pavese since 1/2024), <https://sites.google.com/view/sga-poliuniba>
- Since 2024 Tutoring activities coordinator, Dipartimento di Matematica, Università di Bari.
- Since 2023 Member of the committee *Commissione pre-admission e admission in Computer Science*, Dipartimento di Informatica, Università di Bari
- March 2019 Co-organiser of the conference *Microlocal and global analysis, interaction with geometry* Universität Potsdam, <https://http://personal.psu.edu/~tuk14/Potsdam2019/>
- Feb 2018 Co-organiser of the conference *Geometric and singular analysis 2018* Universität Potsdam, [Link](#)
- Feb 2017 Co-organiser of the conference *Geometric and singular analysis 2017* Universität Potsdam, [Link](#)
- 2015–2016 Co-organization and realization with Prof. Sylvie Paycha and Noel Matoff (Photographer, Berlin) of the touring exhibition *Women mathematicians around Europe: a gallery of portraits*. (Interviews and photo portraits of women mathematicians). Opening at the 7th ECM in Berlin 2016, website: <http://womeninmath.net>
The exhibition is now available online at: <https://imaginary.org/exhibition/women-of-mathematics-throughout-europe>
- July 2016 Co-organiser of the Workshop *Mathematics under construction* Universität Potsdam, [Link](#)
- 2009–2011 Member of the Committee for the admission to the Master in Mathematics, Georg-August-Universität Göttingen

Long research visits

- March 2017 *Maître de conférence invitée*, one month at *Université Jean Monnet*, Saint-Étienne (France).
- Feb 2014–Mar 2014 Postdoctoral Visiting Fellow, *Max Planck Institute for Mathematics*, Bonn (Germany).
- Mar 2011–May 2011 Fellowship of the European Network *Noncommutative geometry*, spent at Équipe “Algèbres d’opérateurs”, *Institut de Mathématiques de Jussieu*, Paris (France).

Recent invited talks to conferences (after 2015)

- Aprile 2024 *Traces, KK-theory, and the Godbillon-Vey invariant*, Conference Group operator algebras and Non commutative geometry, CIRM, Luminy (Francia)
- Dicembre 2023 Minicourse *Index theory and some geometric applications*, french-german meeting in noncommutative geometry ”Arbre de Noël Franco-Allemand”, Metz (Francia)
- Maggio 2023 *Traces, KK-theory with real coefficients, and the Godbillon-Vey invariant*, NSeaG2023 Workshop: ”Noncommutative Geometry and Operator Algebras” at the Hausdorff Centre of Mathematics, Bonn (Germania)
- Dicembre 2022 *The Godbillon-Vey invariant in KK-theory with real coefficients*, Conference ”Arbre de Noël du GDR Géométrie non-commutative”, IHES and Université Paris-Saclay (Francia)

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- December 2022 *The Godbillon-Vey invariant in KK-theory with real coefficients*, Conference "Arbre de Noël du GDR Géométrie non-commutative", IHES and Université Paris-Saclay
- October 2021 Two talks on *KK-theory with real coefficients and localised Baum–Connes conjecture*, Séminaire Kervaire 2021, Université de Neuchâtel, at Les Diableret (Switzerland)
- August 2020 Conference *Noncommutative Geometry Festival* to be held at Dartmouth College, Hanover (USA), link (*cancelled*)
- April 2019 *A Baum–Connes conjecture localised at the unit element of a discrete group*, Operator algebras conference in memory of Étienne Blanchard, Université Paris Diderot, Paris (France)
- November 2018 *Discrete group actions and a weak form of the Baum–Connes conjecture*, Barcelona Weekend in Operator algebras, CRM Barcelona (Spain)
- July 2018 *Discrete group actions and a weak form of the Baum–Connes conjecture* Workshop "Non-commutative Geometry, Index Theory and Mathematical Physics", MFO Oberwolfach (Germany).
- June 2018 *The "free and proper part" of K-theory* Conference "Secondary and delocalized index invariants 2018", University of Copenhagen, (Denmark).
- August 2017 *Flat bundles, \mathbb{R}/\mathbb{Z} -K-theory and rho invariants* Conference "Topology Ecuador 2017", San Cristobal (Ecuador).
- June 2017 *Secondary invariants for two-cocycle twists*, Meeting "Index Theory and Singular Structures", Toulouse (France), link
- February 2017 *KK-theory with \mathbb{R} -coefficients and discrete group actions on C^* -algebras* Workshop *Noncommutative Geometry and Applications* ICTP Trieste (Italy).
- October 2016 *Discrete group actions on C^* -algebras and rho classes of unitary representations*, Meeting *Noncommutative index theory*, Warsaw (Poland), organised by Paul Baum, Alan Carey, Piotr Hajac, Tomasz Maszczyk.
- September 2015 *Relative spectral invariants and operator algebraic point of view* Minisymposium "Symplectic Structures in Geometric Analysis" Jahrestagung der Deutschen Matimatiker-Vereinigung, Hamburg (Germany).

Recent invited talks to weekly seminars (after 2015)

- May 2023 *Traces sur les C^* -algebres et une conjecture de Baum–Connes simplifiée*, Le séminaire virtuel francophone Groupes et Géométrie, Univ. Grenoble et Université Côte D'Azur (online).
- October 2021 *The Baum–Connes correspondence for the pure braid group*, GAPT Seminar, University of Cardiff (online)
- June 2020 *KK-theory with real coefficients, traces, and discrete group actions*, NYC, St Johns University noncommutative geometry seminar, (online).
- Novembre 2019 Colloquium talk *Discrete groups, traces and the Baum–Connes conjecture*, Colloquium of pure mathematics, Fachbereich Mathematik, Universität Hamburg.
- February 2019 *KK-theory with real coefficients, traces, and discrete group actions*, Analysis Seminar, School of Mathematics & Statistics, University of Glasgow
- January 2018 *Kasparov theory with real coefficients and secondary invariants* Séminaire d'Algèbres d'Opérateurs, IMJ-PRG Université Paris Diderot, Paris (France)
- October 2017 *Flat bundles, \mathbb{R}/\mathbb{Z} -K-theory and rho invariants* "Forschungsseminar Differentialgeometrie" Mathematisches Institut, Universität Freiburg, Germany.
- March 2017 *The class of a flat vector bundle and a noncommutative generalisation*, Séminaire Physique mathématique Institut Camille Jourdan, Université Lyon 1 (France).
- March 2017 *Introduction to index theory* Séminaire de Mathématiques accessibles, Université Jean Monnet, Saint-Étienne (France).
- December 2015 *Spectral invariants eta and rho of Dirac operators* Forschungsseminar Analysis Universität Duisburg–Essen, Essen (Germany).
- July 2015 *Flat bundles and K-theory with \mathbb{R}/\mathbb{Z} -coefficients*, Universität Regensburg

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February 2015 *Large time limit and L^2 -index theorems for families*, Seminar “Geometrische Analysis und Spektraltheorie”, Humboldt Universität zu Berlin (Germany)

Talks as part of working/ research training groups (after 2015)

December 2023 Minicourse *Index theory and some geometric applications*, french–german meeting in noncommutative geometry ”Arbre de Noël Franco-Allemand”

December 2021 *Superstarrheit in auflösbaren Liegruppen*, Arbeitsgruppe Differentialgeometrie, Universität Greifswald.

Mai 2021 *Vollständigkeitsergebnisse über links-invariante pseudo-riemannsche Metriken*, Arbeitsgruppe Differentialgeometrie, Universität Greifswald.

December 2019 *Geometrically finite Fuchsian groups*, Seminar *Fuchsian Groups*, Group of differential geometry, University of Hamburg.

July 2018 *Der Primzahlsatz für kompakte riemannsche Flächen II* Blockseminar *Selberg trace formula*, Havelland, Brandenburg.

July 2016 *The combinatorial parametrix* Blockseminar *Torsion in Geometrie und Topologie*, Schloss Gollwitz, Brandenburg.

December 2015 *Introductory talks to index theory* Working seminar of the Analysis group, Institut für Mathematik, Potsdam.

Other talks

October 2017 *Interviewing women mathematicians*, talk about the project of exhibition and interviews of european women of mathematics, invited by “Konstanz Women in Mathematics”, University of Konstanz, Germany

April 2018 *Interviews mit Mathematikerinnen*, TU Dresden, Dresden, Germany