

Curriculum Vitae

Sara Azzali

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Current position

Apr 2022– Assistant professor (*Ricercatore 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. 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.
2. Spectral ζ -invariants lifted to coverings (with Sylvie Paycha)
Transactions of the American Mathematical Society **373** 9 (2020), 6185–6226
3. Two-cocycle twists and Atiyah–Patodi–Singer index theory, (with Charlotte Wahl)
Mathematical Proceedings of the Cambridge Philosophical Society, **167** 3 (2019) 437–487,
4. 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.
5. 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.
6. 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.
7. 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.
8. Spectral flow, index and the signature operator (with Charlotte Wahl),
Journal of Topology and Analysis **3** (2011) 37–67.
9. L^2 Rho form for normal coverings of fibre bundles,
International Journal of Mathematics **22** (2011) 1139–1161.

Preprints

10. K -homology and K -theory of pure Braid groups (with Sarah L. Browne, Maria P. Gomez Aparicio, Lauren C. Ruth, Hang Wang), preprint Mai 2021, <https://arxiv.org/abs/2105.07848>, to appear on *New York J. Math.*

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

- 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)

- 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.

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- 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

- 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](#)

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- 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)

- 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)

October 2021	<i>The Baum–Connes correspondence for the pure braid group</i> , GAPT Seminar, University of Cardiff (online)
June 2020	<i>KK-theory with real coefficients, traces, and discrete group actions</i> , NYC, St Johns University noncommutative geometry seminar, (online)
Novembre 2019	Colloquium talk <i>Discrete groups, traces and the Baum–Connes conjecture</i> , Colloquium of pure mathematics, Fachbereich Mathematik, Universität Hamburg.
February 2019	<i>KK-theory with real coefficients, traces, and discrete group actions</i> , Analysis Seminar, School of Mathematics & Statistics, University of Glasgow
January 2018	<i>Kasparov theory with real coefficients and secondary invariants</i> Séminaire d’Algèbres d’Opérateurs, IMJ-PRG Université Paris Diderot, Paris (France)
October 2017	<i>Flat bundles, \mathbb{R}/\mathbb{Z}-K-theory and rho invariants</i> “Forschungsseminar Differentialgeometrie” Mathematisches Institut, Universität Freiburg, Germany.
March 2017	<i>The class of a flat vector bundle and a noncommutative generalisation</i> , Séminaire Physique mathématique Institut Camille Jourdan, Université Lyon 1 (France).
March 2017	<i>Introduction to index theory</i> Séminaire de Mathématiques accessibles, Université Jean Monnet, Saint-Étienne (France).
December 2015	<i>Spectral invariants eta and rho of Dirac operators</i> Forschungsseminar Analysis Universität Duisburg–Essen, Essen (Germany).
July 2015	<i>Flat bundles and K-theory with \mathbb{R}/\mathbb{Z}-coefficients</i> , Universität Regensburg
February 2015	<i>Large time limit and L^2-index theorems for families</i> , Seminar “Geometrische Analysis und Spektraltheorie”, Humboldt Universität zu Berlin (Germany)

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

December 2021	<i>Superstarrheit in auflösbaren Liegruppen</i> , Arbeitsgruppe Differentialgeometrie, Universität Greifswald.
Mai 2021	<i>Vollständigkeitsergebnisse über links-invariante pseudo-riemannsche Metriken</i> , Arbeitsgruppe Differentialgeometrie, Universität Greifswald.
December 2019	<i>Geometrically finite Fuchsian groups</i> , Seminar <i>Fuchsian Groups</i> , Group of differential geometry, University of Hamburg.
July 2018	<i>Der Primzahlsatz für kompakte riemannsche Flächen II</i> Blockseminar <i>Selberg trace formula</i> , Havelland, Brandenburg.
July 2016	<i>The combinatorial parametrix</i> Blockseminar <i>Torsion in Geometrie und Topologie</i> , Schloss Gollwitz, Brandenburg.
December 2015	<i>Introductory talks to index theory</i> Working seminar of the Analysis group, Institut für Mathematik, Potsdam.

Other talks

October 2017	<i>Interviewing women mathematicians</i> , 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	<i>Interviews mit Mathematikerinnen</i> , TU Dresden, Dresden, Germany