

Curriculum vitae – Dr. Siegfried Beckus

Contact details

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Personal details

Date of birth 11th of April, 1988 in Erfurt, Germany
Marital status Married
Citizenship German

Academic career

since 10/2020 **Senior Lecturer and researcher** (permanent), Universität Potsdam, Potsdam (Germany),
with Prof. Dr. Matthias Keller

10/2018-09/2020 **Research collaborator**, Universität Potsdam, Potsdam (Germany),
with Prof. Dr. Matthias Keller

10/2016 – 09/2018 **Postdoctoral fellow**, Israel Institute of Technology (Technion), Haifa (Israel),
with Prof. Dr. Yehuda Pinchover and Assoc.-Prof. Dr. Ram Band

02/2014 – 04/2014 **Research collaborator (Student internship J1)**
Georgia Institute of Technology, Atlanta, USA,
funded by a grant of the National Science Foundation, DMS 1160962
with Prof. Dr. Jean Bellissard

03/2012 – 10/2016 **PhD in Mathematics**, Friedrich-Schiller-Universität Jena, Germany,
Spectral approximation of aperiodic Schrödinger operators,
Prof. Dr. Daniel Lenz

10/2006 – 02/2012 **Diploma in Mathematics**, Friedrich-Schiller-Universität Jena, Germany,
Generalized Bloch Theory for Quasicrystals,
Prof. Dr. Daniel Lenz

08/2009 – 12/2009 **Exchange semester**
Faculty of science, University of Joensuu, Finland

Research interest

Spectral theory of aperiodic random Schrödinger operators on graphs, partial differential equations, approximation theory, dynamical systems, Delone sets, operator algebras, graph theory

Grants

- 03/2022 **Maria-Weber-Grant**, *Aperiodic order: Decoding hidden structures* (PhD position for 1 Jahr)
- 11/2018 **German Science Foundation Research Grant**, *Periodic approximations of Schrödinger operators associated with quasicrystals* (PostDoc position for 2 years and travel funds)

Publications

Manuscripts

- [16] *The Dry Ten Martini Problem for Sturmian Hamiltonians*, (with Ram Band and Raphael Loewy), Preprint, arXiv:2402.16703 (2024)
- [15] *Spectral estimates of dynamically-defined and amenable operator families*, (with Alberto Takase), Preprint, arXiv:2110.05763 (2021)
- [14] *Symbolic substitution systems beyond abelian groups*, (with Tobias Hartnick, Felix Pogorzelski), Preprint, arXiv:2109.15210 (2021)

Publications in Peer-Reviewed Journals

- [13] *Linear repetitivity beyond Abelian groups*, (with Tobias Hartnick, Felix Pogorzelski), appears in *Ergodic Theory Dynam. Systems*, arXiv:2001.10725 (2024)
- [12] *Growth of Eigenfunctions and R -limits on Graphs*, (with Latif Eliaz), *J. Spectr. Theory* 11 (2021), no. 4, 1895–1933.
- [11] *Spectral continuity for aperiodic quantum systems: applications of a folklore theorem*, (with Jean Bellissard, Giuseppe de Nittis), *J. Math. Phys.* 61 (2020), no. 12, 123505, 19 pp.
- [10] *Generalized eigenfunctions and eigenvalues: a unifying framework for Shnol-type theorems*, (with Baptiste Devyver), *J. Anal. Math.* 146 (2022), no. 1, 165 – 203.
- [9] *Shnol-type theorem for the Agmon ground state*, (with Yehuda Pinchover), *J. of Spectr. Theory*, **10**, no. 2, 355 – 377 (2020).
- [8] *Delone dynamical systems and spectral convergence*, (mit Felix Pogorzelski), *Ergodic Theory Dynam. Systems*, **40** (2020), no. 6, 1510 – 1544.
- [7] *Hölder Continuity of the Spectra for Aperiodic Hamiltonians*, (with Jean Bellissard, Horia Cornean), *Ann. Henri Poincaré*, **20** (2019), no. 11, 3603 – 3631.
- [6] *Corrigendum to: "Spectral continuity for aperiodic quantum systems I. General Theory"*, (mit Jean Bellissard, Giuseppe de Nittis), *J. of Funct. Anal.*, **277** (2019), no. 9, 2251 – 2252.
- [5] *Spectral continuity for aperiodic quantum systems, I. General theory*, (with Jean Bellissard, Giuseppe de Nittis), *J. of Funct. Anal.*, **275** (2018), no.11, 2917 – 2977.
- [4] *On the spectrum of operator families on discrete groups over minimal dynamical Systems*, (with Daniel Lenz, Marko Lindner, Christian Seifert), *Math. Z.*, **287** (2017), 993 – 1007.
- [3] *Continuity of the spectrum of a field of self-adjoint operators*, (with Jean Bellissard), *Ann. Henri Poincaré*, **17** (2016), no. 12, 3425 – 3442.
- [2] *Note on spectra of non-selfadjoint operators over dynamical system*, (with Daniel Lenz, Marko Lindner, Christian Seifert), *Proc. Edinburgh Math. Soc.*, **61** (2018), no. 2, 371 – 386.

- [1] *Spectrum of Lebesgue measure zero for Jacobi operators of quasicrystals*, (with Felix Pogorzelski), *Math. Phys. Anal. Geom.* **16** (2013), no. 3, 289 – 308.

Reports

- [c] *The Dry Ten Martini problem for Sturmian dynamical systems*, Oberwolfach Report 8/2023
- [b] *Primitive substitutions beyond abelian groups: The Heisenberg group*, Oberwolfach Report 2/2021
- [a] *Spectral stability of Schrödinger operators in the Hausdorff metric*, Oberwolfach Report 46/2017

Qualification theses

- [Q2] *Spectral approximation of aperiodic Schrödinger operators*, Dissertation, Friedrich-Schiller-Universität Jena, Germany, 2016
- [Q1] *Generalized Bloch Theory for Quasicrystals*, Diploma thesis, Friedrich-Schiller-Universität Jena, Germany, 2012

Refereeing activities

Journal of Mathematical Reports, Annales Henri Poincaré, Journal of Spectral Theory, Journal of Mathematical Physics, Advances in Mathematics, Linear Algebra and its Applications, Journal d'Analyse Mathématique, Z. Anal. Anwend.

Scholarship/Funding

- 07/2020 **ZiF Summer Camp 2020**, Research stay at the Center of Interdisciplinary Research at the university of Bielefeld, Bielefeld, Germany
- 07/2019 **Scholarship of the DAAD**, Program to participate at congresses, International Workshop on Operator Theory and its Applications 2019, Lissabon, Portugal
- 01/2018 **Scholarship for "Research in Pairs"** at the Mathematisches Forschungsinstitut Oberwolfach, Germany
- 10/2016 **Israel Institute of Technology (Technion)**, Haifa, Israel, Postdoctoral Fellowship
- 07/2015 **Scholarship of the DAAD**, Program to participate at congresses, XVIII International Congress on Mathematical Physics, Santiago de Chile, Chile
- 03/2013 - 09/2016 **Funding for the PhD seminar** "Förderung von interdisziplinären Arbeitsgruppen und Nachwuchsnetzwerken" funded by the Graduierten-Akademie in Jena, Germany

Co-organized program

- 2015 **PhD program - Frege-Kolleg** in cooperation with the Faculty of mathematics and computer science at the Friedrich-Schiller-Universität Jena: it provides the frame for young researchers to improve their skills, broaden their mathematical horizon and organize own projects (www.frege-kolleg.uni-jena.de)

Teaching experiences & professional training

- since 10/2018 **Lecture**, Universität Potsdam
Ergodic theory, Schrödinger operators over dynamical systems I & II, Functional Analysis I & 2, C^* -algebras, Aperiodic Order, Erweitertes Fachwissen für den schulischen Kontext in Mathematik
- Teaching assistant**, Universität Potsdam
Tutorials in Mathematics for Computer Science Informatiker I, Mathematics for physicists, Mathematics for Economists and Computer Scientists, C^* -algebras
- 09/2017 **Minicourse on "K-theory and its relation to the Gap-labeling theorem"**, Technion, Israel
- 10/2010 – 09/2016 **Teaching assistant**, Friedrich-Schiller-Universität Jena,
Tutorials in Analysis 1-3, Linear Algebra and Geometry 1-2, Ordinary Differential Equations, Functional Analysis 1
- 04 – 12/2015 **Education in teaching**, Basic course
- 2015 **Education in teaching**, Courses: "Methods in higher education", "Reducing and structuring the content", "How to activate and motivate the students"

Co-organization of scientific meetings and reports

- 08/2023 **Summer school on "Spectral theory and geometry of ergodic Schrödinger operators"**
University of Potsdam, Deutschland
- 09/2022 **Workshop on "Functional Analysis, Operator Theory and Dynamical Systems"**
University of Potsdam, Deutschland
- 01/2021 **MFO reporter**
for the workshop *Geometry, Dynamics and Spectrum of Operators on Discrete Spaces* at the MFO Oberwolfach, Deutschland
- since 2019 **Euler-Lecture**,
Universität Potsdam, Germany
- 03/2013 – 09/2016 **PhD seminar**,
Friedrich-Schiller-Universität Jena
- 2013 – 2015 **Colloquium: "Job opportunities for mathematicians"**,
Friedrich-Schiller-Universität Jena
- 02/2013 **PhD symposium at the TU Chemnitz**,
within the Fall school *Dirichlet forms, operator theory and mathematical physics*

Co-supervision

- since 2023 **Yannik Thomas** (PhD thesis)
- 2023 **Yannik Thomas** (MSc thesis)
- since 2020 **Lior Tenenbaum** (PhD thesis) jointly supervised with Prof. Ram Band
- 2020-2022 **Alberto Takase** (PhD thesis) jointly supervised with Prof. Anton Gorodetski
- 2020 **Matti Richter** (Bachelorarbeit), *Harmonic Functions on Graphs with Group Actions* (betreut mit Prof. Dr. Matthias Keller)
- 2016 **Franziska Sieron** (Master thesis), *The density of periodic configurations in strongly irreducible subshifts of finite type* (joint with Prof. Dr. Daniel Lenz)

- 2015 **Daniel Sell** (Master thesis), *Topological groupoids and Matuis spatial realization theorem* (joint with Prof. Dr. Daniel Lenz)
- 2014 **Franziska Sieron** (Bachelor thesis), *The balanced property of primitive substitutions* (joint with Prof. Dr. Daniel Lenz)

Selected talks at international conferences

- 07/2024 XXI International Congress on Mathematical Physics, Strasbourg (France): *The Dry Ten Martini Problem for Sturmian Schrödinger Operators*
- 05/2024 Workshop "Point sets: Dynamics, Sampling, and Operator Algebras", University of Oslo (Norway): *Spectral convergence rates and the underlying dynamics*
- 08/2023 Workshop "Aspects of Aperiodic Order", MFO Oberwolfach (Germany): *The Dry Ten Martini problem for Sturmian dynamical systems*
- 06/2022 Workshop "Ergodic Operators and Quantum Graphs", Simons Center for Geometry and Physics (USA): *Spectral approximations beyond dimension one*
- 04/2022 Workshop "Almost-Periodic Spectral Problems", Banff International Research Station (Canada): *The table and the chair: Spectral approximations beyond dimension one*
- 01/2021 Workshop "Geometry, Dynamics and Spectrum of Operators on Discrete Spaces", MFO Oberwolfach (Deutschland): *Primitive substitutions beyond abelian groups: The Heisenberg group*
- 07/2019 International Workshop on Operator Theory and its Applications (IWOTA 2019), Instituto Superior Técnico, Lisbon (Portugal): *Hunting the spectra via the underlying dynamics*
- 05/2019 8th Miniworkshop on Operator Theoretic Aspects of Ergodic Theory, Leipzig (Germany): *Hunting the spectra via the underlying dynamics*
- 01/2018 Hardy-type inequalities and elliptic PDEs, Midreshet Sde Boker (Israel), Poster: *Spectral Approximation of Schrödinger Operators*
- 10/2017 Workshop "Spectral Structures and Topological Methods in Mathematical Quasicrystals", MFO Oberwolfach (Germany): *Spectral stability of Schrödinger operators in the Hausdorff metric*
- 07/2017 Analysis and Geometry on Graphs and Manifolds, Universität-Potsdam (Germany): *Shnol type Theorem for the Agmon ground state*
- 05/2017 Israel Mathematical Union 2017, Acre (Israel): *The space of Delone dynamical systems and related objects*
- 01/2017 Workshop on Mathematical Physics, Weizmann Institute of Science, Rehovot (Israel), Poster: *Spectral Approximation of Schrödinger Operators*
- 06/2016 Thematic School "Transversal Aspects of Tilings", Oleron (France): *Continuity of the spectra associated with Schrödinger operators*
- 09/2015 CMO-BIRS, Workshop on "Spectral properties of quasicrystals via analysis, dynamics and geometric measure theory", Oaxaca (Mexiko): *Spectral approximation of Schrödinger operators: continuity of the spectrum*
- 07/2015 Young researcher symposium, Pontificia Universidad Católica de Chile, Santiago de Chile (Chile): *Spectral study of Schrödinger operators with aperiodic ordered potential in one-dimensional systems*
- 06/2015 Workshop on "Time-frequency analysis and aperiodic order", Norwegian University of Science and Technology, Trondheim (Norway): *An approximation theorem for the spectrum of Schrödinger operators related to quasicrystals*

Selected talks in seminars and colloquia

- 04/2023 Universität Münster (Germany): *Dry Ten Martini Problem for Sturmian Dynamical Systems*
- 03/2023 Institute Fourier - Grenoble (France): *Dry Ten Martini Problem for Sturmian Dynamical Systems*
- 02/2023 University of Potsdam (Germany) - Maria-Weber lecture *Dry Ten Martini Problem for Sturmian Dynamical Systems*
- 04/2022 University of California - Irvine (USA): *Sturmian dynamical systems and the Kohmoto butterfly*
- 01/2020 Universität Leipzig (Deutschland): *When do the spectra of self-adjoint operators converge?*
- 05/2019 Justus-Liebig-Universität Gießen (Germany): *Hunting the spectra via the underlying dynamics*
- 07/2018 Technische Universität München (Germany): *When do the spectra of self-adjoint operators converge?*
- 10/2017 Pontificia Universidad Catolica de Chile, Santiago (Chile): *Shnol type Theorem for the Agmon ground state*
- 10/2017 Hebrew University of Jerusalem (Israel): *When do the spectra of self-adjoint operators converge?*
- 08/2017 University of Oslo (Norway): *Spectral approximation via an approach from C^* -algebras*
- 07/2017 Friedrich-Alexander Universität Erlangen-Nürnberg (Germany): *The space of Delone dynamical systems and its application*
- 07/2017 RWTH Aachen (Germany): *Shnol type Theorem for the Agmon ground state*
- 09/2016 Aalborg University (Denemark): *Continuous variation of the spectra: A characterization and a tool*
- 07/2016 Universität Bielefeld (Germany): *Hölder-continuous behavior of the spectra associated with self-adjoint operators*
- 05/2015 Technische Universität Chemnitz (Germany): *Schrödinger operators on quasicrystals*
- 04/2015 Israel Institute of Technology (Technion), Haifa (Israel): *The role of Gähler-Anderson-Putnam graphs in the view of Schrödinger operators*
- 04/2014 University of Alabama at Birmingham (USA): *Gähler-Anderson-Putnam graphs of 1-dimensional Delone sets of finite local complexity*
- 01/2014 Technische Universität Hamburg-Harburg (Germany): *Wannier transformation for Schrödinger operators with aperiodic potential*

Language skills

- German (mother tongue)
- Englisch (fluent)
- Hebrew (basics)