# Curriculum vitae – Dr. Siegfried Beckus

## Contact details

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| Name | Dr. Siegfried Beckus |
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| Homepage | `www.math.uni-potsdam.de/professuren/graphentheorie/team/dr-siegfried-beckus/` |

## Personal details

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

## Academic career

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|---|---|
| since 10/2020 | **Research collaborator** (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

[17] *Spectral estimates of dynamically-defined and amenable operator families*, (with Alberto Takase), Preprint, arXiv:2110.05763 (2021)

[16] *Symbolic substitution systems beyond abelian groups*, (with Tobias Hartnick, Felix Pogorzelski), Preprint, arXiv:2109.15210 (2021)

[15] *Linear repetivity beyond Abelian groups*, (with Tobias Hartnick, Felix Pogorzelski), Preprint, arXiv:2001.10725 (2020)

### Publications in Peer-Reviewed Journals

[14] *Growth of Eigenfunctions and R-limits on Graphs*, (with Latif Eliaz), appears in J. of Spectr. Theory, arXiv:2006.09086 (2021)

[13] *Spectral continuity for aperiodic quantum systems, II. Periodic Approximations in 1D*, (with Jean Bellissard, Giuseppe de Nittis), appears in J. Math. Phys., arXiv:1803.03099 (2020)

[12] *Generalized eigenfunctions and eigenvalues: a unifying framework for Shnol-type theorems*, (with Baptiste Devyver), appears in J. Anal. Math, arXiv:1904.07176 (2020)

[11] *Shnol-type theorem for the Agmon ground state*, (with Yehuda Pinchover), J. of Spectr. Theory, **10**, no. 2, 355 – 377 (2020)

[10] *Delone dynamical systems and spectral convergence*, (mit Felix Pogorzelski), Ergodic Theory Dynam. Systems, **40** (2020), no. 6, 1510 – 1544

[9] *Hölder Continuity of the Spectra for Aperiodic Hamiltonians*, (with Jean Bellissard, Horia Cornean), Ann. Henri Poincaré, **20** (2019), no. 11, 3603 – 3631

[8] *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

[7] *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

[6] *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

[5] *Continuity of the spectrum of a field of self-adjoint operators*, (with Jean Bellissard), Ann. Henri Poincaré, **17** (2016), no. 12, 3425 – 3442

[4] *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

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

### Reports

[2] *Primitive substitutions beyond abelian groups: The Heisenberg group*, Oberwolfach Report 2/2021

[1] *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

## 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 - **Funding for the PhD seminar**
09/2016 "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
**Teaching assistant**, Universität Potsdam
Tutorials in Mathematics for Computer Science Informatiker I, Mathematics for Economists and Computer Scientists, $C^*$-algebras

09/2017 **Minicourse on "K-theory and its relation to the Gap-labeling theorem"**, Technion, Israel

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| 10/2010 –<br>09/2016 | **Teaching assistant**, Friedrich-Schiller-Universität Jena,<br>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

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| 01/2021 | **MFO reporter**<br>for the workshop *Geometry, Dynamics and Spectrum of Operators on Discrete Spaces* at the MFO Oberwolfach, Deutschland |
| since 2019 | **Euler-Lecture**,<br>Universität Potsdam, Germany |
| 03/2013 –<br>09/2016 | **PhD seminar**,<br>Friedrich-Schiller-Universität Jena |
| 2013 – 2015 | **Colloquium: "Job opportunities for mathematicians"**,<br>Friedrich-Schiller-Universität Jena |
| 02/2013 | **PhD symposium at the TU Chemnitz**,<br>within the Fall school *Dirichlet forms, operator theory and mathematical physics* |

## Co-supervision

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| since 2020 | **Lior Tenenbaum** (PhD thesis) jointly supervised with Prof. Ram Band |
| since 2020 | **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

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| 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 Catolica 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

04/2022   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 (Danemark): *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*

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| 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

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