Dale Frymark

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Citizenship: USA

Languages: English (native), Swedish (B2) and German (A1)

Research Interests: Operator theory, functional analysis, spectral theory; differential operators, perturbation theory, Sturm–Liouville operators, Dirac operators, orthogonal polynomials, self-adjoint extension theory.

Employment

Technical University Graz (Graz, Austria)

- Postdoctoral Researcher (September 2022-Present)
  - Position in Institute for Applied Mathematics funded by the Austrian Science Fund (FWF) Project "Approximation problems for Dirac and Schrödinger operators."
    - Mentor: Jussi Behrndt

Nuclear Physics Institute, Czech Academy of Sciences (Řež, Czech Republic)

- Postdoctoral Researcher (October 2020-September 2022)
  - Member of the Mathematical Physics Group within the Department of Theoretical Physics and the Doppler Institute.
    - Mentor: Vladimir Lotoreichik

Stockholm University (Stockholm, Sweden)

- Postdoctoral Fellow in Analysis (October 2018-October 2020)
  - Position partially funded by the Swedish Foundation for Strategic Research (SSF) Project "Complex Analysis and Convex Optimization for EM Design."
    - Mentor: Annemarie Luger

Education

Baylor University (Waco, Texas USA)

- Doctor of Philosophy, Mathematics (August 2018)
  - Dissertation: *Boundary Conditions associated with Left-Definite Theory and the Spectral Analysis of Iterated Rank-One Perturbations*
    - Advisor: Constanze Liaw

Washington College (Chestertown, Maryland USA)

- Bachelor of Arts, Mathematics (May 2013)
  - Thesis: *Themes and Explorations of Chaotic Dynamical Systems*
    - Advisor: Eugene Hamilton

Publications

1. M. Fleeman, D. Frymark, C. Liaw, *Boundary Conditions associated with the General Left-Definite Theory for Differential Operators*, J. Approx. Theory **239** (2019), 1–28.
2. D. Frymark, C. Liaw, *Spectral Analysis, Model Theory and Applications of Finite-Rank Perturbations*, invited contribution in "Operator Theory, Operator Algebras and their Interactions with Geometry and Topology" (Ronald G. Douglas Memorial Volume), Operator Theory: Advances and Applications **278**, Birkhäuser Verlag.
3. D. Frymark, C. Liaw, *The Spectral Analysis of Iterated Rank–One Perturbations*, Submitted, `arXiv:1902.02448`.
4. D. Frymark, C. Liaw, *Properties and Decompositions of Domains for Powers of the Jacobi Differential Operator*, J. Math. Anal. Appl. **489** (2020), 124–155.
5. D. Frymark, *Boundary Triples and Weyl m-functions for Powers of the Jacobi Differential Operator*, J. Differential Equations **269** (2020), 7931–7974.
6. M. Bush, D. Frymark, C. Liaw, *Singular boundary conditions for Sturm–Liouville operators via perturbation theory*, to appear in Canad. J. Math. (2022), 1–37.
7. D. Frymark, C. Liaw, *Perspectives on General Left-Definite Theory*, invited contribution in "From Operator Theory to Orthogonal Polynomials, Combinatorics, and Number Theory" (Lance L. Littlejohn 70th Birthday Volume), Operator Theory: Advances and Applications **285**, Birkhäuser Verlag.
8. D. Frymark, V. Lotoreichik, *Self-adjointness of the 2D Dirac operator with singular interactions supported on star-graphs*, to appear in Ann. Henri Poincaré (2022), 1–43.
9. D. Frymark, J. Stewart Kelly, *The Spectrum of Self-Adjoint Extensions associated with Exceptional Laguerre Differential Expressions*, Submitted, `arXiv:2208.09459`

Teaching Experience

Fall 2014/Spring 2015	Teacher of Record	Precalculus
Fall 2015/Spring 2016/Fall 2016	Teacher of Record	Business Calculus
Spring 2017/Fall 2017	Teacher of Record	Calculus II
Spring 2018	Teacher of Record	Calculus III
Fall 2018/Fall 2019	Teaching Assistant	Advanced Real Analysis (Master's Course)

Teachers of Record are responsible for their own class. Responsibilities include:

- Teach a 3 credit hour course and hold office hours.
- Handle all student interactions, and assign all grades.
- Prepare syllabus, homework, exams and all lecture materials.

Teaching Assistants held two-hour seminars once a week to discuss problems related to the lectures and introduce supplementary material.

Student Evaluations are available upon request.

Teaching Credentials

- Trained in inquiry-based learning techniques by the Academy for IBL, as an alternative to lecturing.
- Completed a year-long Teaching Capstone in Higher Education (TeaCHE) which included attending 12 Seminars for Excellence in Teaching, preparing teaching documents, and several classroom observations.

– Graded for Introduction to Analysis and Calculus III at Baylor. Tutored a wide variety of courses in the Math Lab.

– Tutored 6^{th} and 7^{th} grade students in math at Indian Springs Middle School during a summer school for the Waco Independent School District. (Summer 2014)

Invited Presentations

1. *Iterated Rank-One Perturbations*; Analysis Seminar, Baylor University; Waco, Texas (December 2015).
2. *Iterated Rank-One Perturbations and Absence of Extended States*; AMS Special Session on Operator Theory, Function Theory, and Models, Joint Mathematics Meeting; Seattle, Washington (January 2016).
3. *Iterated Rank-One Perturbations and Absence of Extended States*; Math Physics and Harmonic Analysis Seminar, Texas A&M; College Station, Texas (February 2016).
4. *Boundary Conditions associated with the Left-Definite Theory for Differential Operators*; AMS Student Chapter Mini-Symposium, Baylor University; Waco, Texas (November 2016).
5. *Boundary Conditions associated with the Left-Definite Theory for Differential Operators*; AMS Contributed Paper Session on Operator Theory, Joint Mathematics Meeting; Atlanta, Georgia (January 2017).
6. *Boundary Conditions associated with the Left-Definite Theory for Differential Operators*; Analysis Seminar, Baylor University; Waco, Texas (March 2017).
7. *Boundary Conditions associated with the Left-Definite Theory for Differential Operators*; Brazos Analysis Seminar, Texas A&M; College Station, Texas (March 2017).
8. *Boundary Conditions associated with the Left-Definite Theory for Differential Operators*; International Workshop on Operator Theory and its Applications, Technische Universität; Chemnitz, Germany (August 2017).
9. *Spectral Properties of Sturm–Liouville Operators via Perturbation Theory*; AMS Special Session on Operators on Function Spaces in One and Several Variables, Joint Mathematics Meeting; San Diego, California (January 2018).
10. *Boundary Conditions associated with the Left-Definite Theory for Differential Operators*; SSF Workshop, KTH Royal Institute of Technology; Stockholm, Sweden (October 2018).
10. *Characterizations and Decompositions of Domains for Powers of Classical Sturm–Liouville Operators*; Inverse Problems and Analysis Seminar, University of Delaware; Newark, Delaware (February 2019).
11. *Boundary Triples and Weyl m-functions for Powers of Classical Operators*; SSF Workshop, Lund University; Lund, Sweden (June 2019).
12. *Boundary Triples and Weyl m-functions for Powers of Some Classical Sturm–Liouville Operators*; International Workshop on Operator Theory and its Applications, Instituto Superior Técnico; Portugal, Lisbon (July 2019).
13. *Boundary Triples and Weyl m-functions for Powers of Some Classical Sturm–Liouville Operators*; The Sixth Najman Conference on Spectral Theory and Differential Equations; Sveti Martin na Muri, Croatia (September 2019).
14. *Boundary Triples and Weyl m-functions for Powers of the Jacobi Differential Operator*; AMS Contributed Paper Session on Ordinary Differential Equations,

Applications and Related Topics, Joint Mathematics Meeting; Denver, Colorado (January 2020).

15. *Connections Between Boundary Triples and Self-Adjoint Perturbation Theory*; 2TART Presents: Operator Theory with its Applications; Zoom (August 2020).
16. *Singular Boundary Conditions of Sturm–Liouville Operators via Perturbation Theory*; Quantum Circle Seminar, Doppler Institute; Zoom (November 2020).
17. *Singular Boundary Conditions of Sturm–Liouville Operators via Perturbation Theory*; Mathematical Physics Colloquium, TU Graz; Zoom (June 2021).
18. *Self-adjointness of the 2D Dirac operator with singular interactions supported on star-graphs*; Analytic and Algebraic Methods in Physics, Doppler Institute; Zoom (September 2021).
19. *Self-adjointness of the 2D Dirac operator with singular interactions supported on star-graphs*; Quantum Circle Seminar, Doppler Institute; Prague, Czech Republic (October 2021).
20. *Self-adjointness of the 2D Dirac operator with singular interactions supported on star-graphs*; Workshop of the GAMM Activity Group Applied Operator Theory; Stockholm University; Stockholm, Sweden (May 2022).
21. *The Spectrum of Self-Adjoint Extensions associated with Exceptional Laguerre Differential Expressions*; International Workshop on Operator Theory and its Applications; Krakow, Poland (September 2022).

Conferences and Workshops Attended

1. *Completeness problems, Carleson measures and Spaces of Analytic Functions*; Institut Mittag–Leffler; Stockholm, Sweden (July 2015).
2. *Joint Mathematics Meeting*; Seattle, Washington (January 2016).
3. *MSRI Summer Graduate Workshop on Harmonic Analysis and Elliptic Equations on real Euclidean Spaces and on Rough Sets*; Mathematical Sciences Research Institute; Berkeley, California (June 2016).
4. *Analysis and Probability Workshop, SUMIRFAS*; Texas A&M University; College Station, Texas (July 2017).
5. *Joint Mathematics Meeting*; Atlanta, Georgia (January 2017).
6. *Brazos Analysis Seminar*; Texas A&M University; College Station, Texas (March 2017).
7. *Academy for Inquiry-Based Learning Workshop*; Depaul University; Chicago, Illinois (June 2017).
8. *International Workshop on Operator Theory and its Applications*; Technische Universität; Chemnitz, Germany (August 2017).
9. *Joint Mathematics Meeting*; San Diego, California (January 2018).
10. *Brazos Analysis Seminar*; Baylor University; Waco, Texas (March 2018).
11. *Albeverio Fest*; Stockholm University; Stockholm, Sweden (October 2018).
12. *SSF Workshop*; KTH Royal Institute of Technology; Stockholm, Sweden (October 2018).
13. *International Spring School: Spectral Function Theory*; Chebyshev Laboratory; St. Petersburg, Russia (April 2019).
14. *Workshop on Reproducing Kernels in Function Spaces and Their Applications*; Euler International Mathematical Institute; St. Petersburg, Russia (June 2019).
15. *SSF Workshop*; Lund University; Lund, Sweden (June 2019).

16. *International Workshop on Operator Theory and its Applications*; Instituto Superior Técnico; Portugal, Lisbon (July 2019).
17. *The Sixth Najman Conference on Spectral Theory and Differential Equations*; Sveti Martin na Muri, Croatia (September 2019).
18. *Herglotz-Nevanlinna Theory Applied to Passive, Causal and Active Systems*; Banff International Research Station; Banff, Alberta (October 2019).
19. *Joint Mathematics Meeting*; Denver, Colorado (January 2020).
20. *2TART Presents: Operator Theory with its Applications*; Zoom (August 2020).
21. *Southeastern Analysis Meeting 2021 by 2TART*; Zoom (March 2021).
22. *Analytic and Algebraic Methods in Physics*; Zoom (September 2021).
23. *Workshop of the GAMM Activity Group Applied Operator Theory*; Stockholm University; Stockholm, Sweden (May 2022).
24. *International Workshop on Operator Theory and its Applications*; Krakow, Poland (September 2022)

Honors and Awards

1. **The Duncan Miller Scholarship**, Washington College (2012)
   - Endowed scholarship distributed at the discretion of the Director of Student Financial Aid.
2. **The William Gover '30 Prize**, Washington College (2013)
   - Awarded annually to a graduating mathematics or computer science senior who shows great potential in academia or for advancements in their field.
3. **Graduate School Fellowship**, Baylor University (2013–2018)
   - Graduate student funding from the graduate school for outstanding students.

Grants and Funding

1. **Graduate School Travel Award**; Baylor University; *Iterated Rank-One Perturbations and Absence of Extended States*; January 2016.
   - This award helped to assist with travel and lodging for the Joint Mathematics Meetings in Seattle, Washington.
2. **Graduate School Travel Award**; Baylor University; *Boundary Conditions associated with the Left-Definite Theory for Differential Operators*; January 2017.
   - This award helped to assist with travel and lodging at the Joint Mathematics Meeting in Atlanta, Georgia. Traveled as both a presenter and a chair for a session.
3. **Graduate School Travel Award**; Baylor University; *Boundary Conditions associated with the Left-Definite Theory for Differential Operators*; August 2017.
   - This award helped to assist with travel and lodging at the International Workshop on Operator Theory and its Applications in Chemnitz, Germany.
4. **Graduate School Travel Award**; Baylor University; *Spectral Properties of Sturm–Liouville Operators via Perturbation Theory*; January 2018.
   - This award helped to assist with travel and lodging for the Joint Mathematics Meetings in San Diego, California.

5. **Stiftelsen GS Magnusons Fund Grant**; Royal Swedish Academy of Sciences Grant MG2019-0021 for 12,700 SEK (∼1,400 USD); *Participation in Analysis Conferences*; June-September 2019.

   – The grant pays for most of the expenses associated with the attendance of three analysis conferences between June and September 2019.

Academic Service

1. Grader for the Puzzle of the Week, a math competition for undergraduates at Baylor.
2. Association for Women in Mathematics Baylor Chapter Founding Treasurer and Member.
3. Moderator and organizer for panel on NSF Grants for graduate students and post-docs at Baylor (March 2015).
4. Baylor Graduate Student Association Department Representative:
   - Organized social and academic events to facilitate inter-disciplinary connections.
   - Helped organize sessions on how to improve the Department.
   - Organized and assisted the orientation for incoming math graduate students.
5. Member of the SIC'EM Proposal Selection Committee, which approves internal grants for groups of students at Baylor.
6. Mentor in the Graduate-Undergraduate Mentorship Program for three academic years at Baylor.
7. American Mathematical Society Baylor Chapter President:
   - Elected by Mathematics graduate students.
   - Hosted speakers at events and gave presentations to the department and graduate chairs.
   - Collaborated with other graduate student organizations to improve department cohesion.

Professional Service

– Referee for *Complex Analysis and Operator Theory* and *Electronic Journal of Differential Equations*.

– Reviewer for MathSciNet.

– Volunteer Organizer for the 50th Spring Topology and Dynamics Conference at Baylor University in Waco, Texas (March 2016).

– Chair for AMS Contributed Paper Session on Operator Theory at the Joint Mathematics Meeting in Atlanta, Georgia (January 2017).

– Guest speaker at a meeting of the University of Mary Hardin-Baylor Math Club in Belton, Texas (September 2017).

– Organizer for the Brazos Analysis Seminar at Baylor University in Waco, Texas (March 2018).