

Luke Edholm

Curriculum Vitæ

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Education

2016 **Ph.D.**, *The Ohio State University*, Columbus, Ohio, USA.

Advisor: Jeff McNeal

2009 **B.A.**, *University of St. Thomas*, St. Paul, Minnesota, USA.

Employment

03.2021– **Postdoctoral Researcher**, *University of Vienna*.

present Mentor: Bernhard Lamel, Friedrich Haslinger

09.2016– **Postdoctoral Assistant Professor**, *University of Michigan*.

05.2020 Mentor: David Barrett

2014–2016 **Graduate Research Associate**, *The Ohio State University*.

2010–2014 **Graduate Teaching Associate**, *The Ohio State University*.

Career break

06.2020– **COVID-19**, *The pandemic and subsequent travel restrictions delayed my Austrian worker's*

02.2021 *visa by several months.*

Research interests

Several Complex Variables; Bergman Kernels, Projections and Spaces; Szegő Projections and Hardy Spaces; Harmonic Analysis; CR Geometry; Kähler Geometry; Projective Geometry; the Leray Transform and other Cauchy-Fantappiè Integrals. One of my main contributions to date has been the study of the regularity of holomorphic projections in L^p spaces associated to domains with boundary singularities. According to Math Sci Net, my publications have been cited 170 times and continue to generate significant community interest.

Selected conference talks

1. *The projectively invariant osculation functions and the Leray transform at high frequencies*; Masaryk University SCV workshop; Brno, Czech Republic; July 2024
2. *The projectively invariant osculation functions and the Leray transform at high frequencies*; Joint Mathematics Meeting; San Francisco, California; January 2024

3. *The monomial basis projection onto A^p spaces on Reinhardt domains*; Fifth Central European Complex Analysis Meeting; Drnholec, Czech Republic; November 2022
4. *The monomial basis projection onto A^p spaces on Reinhardt domains*; Complex Analysis, Geometry, and Dynamics; Portorož, Slovenia; June 2022.
5. *The monomial basis projection onto A^p spaces on Reinhardt domains*; CR Geometry and PDEs IX; Levico-Terne, Italy; May 2022.
6. *Spectral theory of the Leray transform on unbounded hypersurfaces*; Midwest Several Complex Variables Conference at University of Michigan-Dearborn; Dearborn, Michigan; October 2019.
7. *Spectral theory of the Leray transform on families of unbounded hypersurfaces*; NEAM conference at Syracuse University; Syracuse, New York; October 2019.
8. *Duality and Approximation of Bergman Spaces*; International Conference in Several Complex Variables and Partial Differential Equations; Doha, Qatar; January 2019.
9. *Duality and Approximation of Bergman Spaces*; Workshop in Analysis and CR Geometry at the Erwin Schrödinger Institute; Vienna, Austria; December 2018.
10. *The Leray transform: factorization, dual CR structures and model hypersurfaces in $\mathbb{C}\mathbb{P}^2$* ; AMS Sectional Meeting at University of Michigan; Ann Arbor, Michigan; October 2018.
11. *Bergman Spaces on Reinhardt Domains*; Workshop on the $\bar{\partial}$ -problem in the 21st century at the MSRI; Berkeley, California; June 2018.
12. *The Leray Operator on Two Dimensional Model Domains*; AMS Sectional Meeting at Ohio State University; Columbus, Ohio; March 2018.
13. *Constructing A^p functions from L^p data*; Midwest Several Complex Variables Conference at Brown University; Providence, Rhode Island; June 2017.
14. *The Bergman projection on generalized Hartogs triangles*; Tsinghua Sanya International Mathematics Forum (TSIMF); Sanya, China; January 2016.
15. *The Bergman theory of generalized Hartogs triangles: L^p -Sobolev boundedness*; Joint Math Meetings; Seattle, Washington; January 2016.

Selected invited seminar and colloquium talks

1. *Projective invariants and the Cauchy-Leray transform*; Mathematics Colloquium; Trinity College Dublin; Dublin, Ireland; 9 Nov 2023
2. *A new projection operator onto L^p Bergman spaces of Reinhardt domains*; Complex Analysis Seminar; University of Ljubljana; Ljubljana, Slovenia; 4 Apr 2023
3. *A new projection operator onto L^p Bergman spaces of Reinhardt domains*; Seminar on Complex Analysis; Jagiellonian University; Krakow, Poland; 20 Mar 2023
4. *Visualizing Complex Functions with Phase Plots*, Hampden-Sydney College, Virginia, March 2020
5. *Irregularities of the Bergman projection and substitute operators*; Mathematics Colloquium, United States Naval Academy; Annapolis, Maryland; February 2020.
6. *Irregularities of the Bergman projection and substitute operators*; Analysis Seminar, Washington University

in Saint Louis; Saint Louis, Missouri; November 2019.

7. *Derivatives of integral operators and mapping properties*; Analysis Seminar, Central Michigan University; Mount Pleasant, Michigan; March 2019.
8. *Irregularities of the Bergman projection and substitute operators*; Mathematics Colloquium, Oklahoma State University; Stillwater, Oklahoma; February 2019.
9. *The Leray transform: model hypersurfaces and dual CR structures in $\mathbb{C}P^2$* ; Analysis Seminar, University of Western Ontario; London, Ontario, Canada; February 2019.
10. *The Bergman theory of generalized Hartogs triangles: L^p -Sobolev boundedness*; Complex Variables Seminar, University of Michigan; Ann Arbor, Michigan; March 2016.
11. *The Bergman theory of generalized Hartogs triangles: L^p -Sobolev boundedness*; Several Complex Variables Seminar, Texas A&M; College Station, Texas; March 2016.
12. *The Bergman projection on generalized Hartogs triangles*; SCV and CR Geometry seminar, University of Illinois Urbana-Champaign; Champaign, Illinois; November 2015.

Recent teaching experience

1. Winter 2023: *250091 SE – Kähler Geometry*, University of Vienna.
2. Winter 2020: *Math 454 – Partial Differential Equations*, University of Michigan.
3. Autumn 2019: *Math 214 – Applied Linear Algebra*, University of Michigan.
4. Winter 2019: *Math 454 – Partial Differential Equations*, University of Michigan.
5. Autumn 2018: *Math 454 – Partial Differential Equations*, University of Michigan.
6. Summer 2018: *Lead T.A. – Graduate summer school on the $\bar{\partial}$ -problem in the 21st century*, MSRI.

Seminars organized

1. Spring Semester 2024: *Student Analysis Seminar*, University of Vienna.
2. Spring Semester 2024: *Complex Analysis Research Seminar*, University of Vienna.
3. Fall Semester 2023: *Complex Analysis Research Seminar*, University of Vienna.
4. Spring Semester 2023: *Complex Analysis Research Seminar*, University of Vienna.
5. Fall Semester 2022: *Complex Analysis Research Seminar*, University of Vienna.

Awards

1. 2019: *Allen Lowell Shields Teaching Award* – University of Michigan, mathematics department.

Mentoring experience

1. August 2021: *Second reader on the PhD thesis committee for Yonatan Shelah* (committee chaired by David Barrett); University of Michigan.
2. 2019–20 School Year: *The Bergman kernel and Lu-Qi Keng conjecture*, undergraduate independent research course; University of Michigan. **Student: Vikram Mathew.**
3. 2018–19 School Year: *Visual Complex Analysis*, Laboratory of Geometry at Michigan; University of Michigan. **Students: Yuxuan Bao, Justin Vorhees and Yucheng Shi;**

<https://sites.lsa.umich.edu/logm/projects/fall-2018-projects/#visual>.

- 2017–18 School Year: *Visual Complex Analysis*, undergraduate independent research course; University of Michigan. **Students: Vinayak Ahluwalia and Jenna Schwartz**

Service and volunteering

- 2018 – 2020: Volunteer instructor at *Math Mondays*, Ypsilanti Middle School; Ypsilanti, Michigan.

Conferences co-organized

- 2023 Midwest Several Complex Variables Conference; The Ohio State University; Columbus, Ohio; April 28-30, 2023; <https://sites.google.com/view/mwscv-2023/home>
- Indam Workshop on Bergman projections and related topics; 3-6 Jun 2021; <https://www.altamatematica.it/bergmanworkshop2021/en/>

External Funding

- OEAD-WTZ Grant Scientific & Technological Cooperation: University of Vienna - University of Montenegro, **Modern Topics of Complex Analysis**, July 2024–June 2026, **10,000 €**

Publications

Link to all publications: <https://complex.univie.ac.at/people/luke-edholm/>

- Barrett, D. E.; Edholm, L. D.; Cauchy transforms and Szegő projections in dual Hardy spaces: inequalities and Möbius invariance. *Submitted* (2024) <https://arxiv.org/abs/2407.13033>
- Edholm, L.D.; Shelah, Y; The Leray transform: distinguished measures, symmetries and polygamma inequalities. *Submitted* (2024) <https://arxiv.org/abs/2401.17490>
- Chakrabarti, D.; Edholm, L. D.; Projections onto L^p -Bergman spaces of Reinhardt domains. *Adv. Math.* 451 (2024), 109790. <https://doi.org/10.1016/j.aim.2024.109790>
- Barrett, D. E.; Edholm, L. D.; High frequency behavior of the Leray transform: model hypersurfaces and projective duality. *To appear: Indiana Univ. Math J.* (2023) <https://arxiv.org/abs/2111.13954>
- Bender, Chase; Chakrabarti, Debraj; Edholm, Luke; Mainkar, Meera; L^p -regularity of the Bergman projection on quotient domains. *Canad. J. Math.* 74 (2022), no. 3, 732-772. <https://doi.org/10.4153/S0008414X21000079>
- Edholm, L. D.; McNeal, J. D.; Sobolev Mapping of Some Holomorphic Projections. *J. Geom. Anal.* 30 (2020), no. 2, 1293-1311. <https://doi.org/10.1007/s12220-019-00345-6>
- Barrett, D. E.; and Edholm, L. D.; The Leray transform: Factorization, dual CR structures, and model hypersurfaces in $\mathbb{C}P^2$. *Adv. Math.* 364 (2020), 107012. <https://doi.org/10.1016/j.aim.2020.107012>
- Chakrabarti, D.; Edholm, L. D.; McNeal, J. D.; Duality and Approximation of Bergman Spaces. *Adv. Math.* 341 (2019), 616-656. <https://doi.org/10.1016/j.aim.2018.10.041>
- Edholm, L. D.; McNeal, J. D.; Bergman subspaces and subkernels: degenerate L^p Mapping and Zeroes. *J. Geom. Anal.* 27 (2017), no. 4, 2658-2683. <https://doi.org/10.1007/s12220-017-9777-4>
- Edholm, Luke D.; Bergman theory on certain generalized Hartogs triangles. *Pacific J. Math.* 284 (2016),

no. 2, 327-342. <http://dx.doi.org/10.2140/pjm.2016.284.327>

11. Edholm, L. D.; McNeal, J. D.; The Bergman projection on fat Hartogs triangles: L^p mapping, *Proc. Amer. Math. Soc.* 144 (2016), 2185-2196. <https://doi.org/10.1090/proc/12878>