PROMOTION RECOMMENDATION
The University of Michigan
College of Literature, Science, and the Arts

Lydia R. Bieri, associate professor of mathematics, with tenure, College of Literature, Science, and the Arts, is recommended for promotion to professor of mathematics, with tenure, College of Literature, Science, and the Arts.

Academic Degrees:
Ph.D.	2007	Eidgenössuscge Technische Hochschule Zürich
M.A.	2001	Eidgenössuscge Technische Hochschule Zürich
B.A.	1998	Eidgenössuscge Technische Hochschule Zürich

Professional Record:
2019–present	Director, Michigan Center for Applied and Interdisciplinary Mathematics, University of Michigan
2015–present	Associate Professor, Department of Mathematics, University of Michigan
2010–2015	Assistant Professor, Department of Mathematics, University of Michigan
2007–2010	Benjamin Peirce Lecturer, Department of Mathematics, Harvard University

Summary of Evaluation:

Teaching: Since her last promotion, Professor Bieri has taught courses ranging from a sophomore linear algebra class to graduate courses on differential equations. The evaluations of her teaching by her students have been very good, all but one being 4.5 or higher on a scale of 1 to 5. In addition to her classroom teaching, Professor Bieri currently mentors three post-doctoral researchers and a Ph.D. student. Her two former post-doctoral researchers since her last promotion have gone on to tenure-track or tenured positions. Professor Bieri has also done considerable teaching for general audiences, especially in the wake of the experimental discovery of gravitational waves; this included a popular exhibit at the UM Museum of Natural History.

Research: Professor Bieri has established herself as a leader in the theory of general relativity. Among her recent achievements are several results about the "memory effect," whereby some effects of gravitational waves persist even after the wave has passed. Her work was essential for the interpretation of the data in the detection of gravitational waves. Other aspects of her research range from the dynamics of self-gravitating fluids to the interior structure of black holes. These topics are regarded as very difficult, but Professor Bieri has made good progress on them. Reviewers were impressed by the way that her work, though highly technical mathematically, remains connected with the physics that inspired it.

Recent and Significant Publications:
Bieri, L. (2018). Answering the Parity Question for Gravitational Wave Memory. *Physical Review*, *98*(12), https://doi.org/10.1103/PhysRevD.98.124038.

Bieri, L. (2018). Black hole formation and stability: a mathematical investigation. *Bulletin of the American Mathematical Society*, *55,* 1-30.

Bieri, L., Miao, S., and Shahshahani, S. (2017). Asymptotic properties of solutions of the Maxwell Klein Gordon equation with small data. *Communications in Analysis and Geometry*, *25*(1), https://doi.org/10.4310/CAG.2017.v25.n1.a2.

Bieri, L., Garfinkle, D, and Yau, S. (2016). Gravitational wave memory in de Sitter spacetime. *Physical Review*, *94*(6), https://doi.org/10.1103/PhysRevD.94.064040.

Service: Since 2019, Professor Bieri has been the director of the Michigan Center for Applied and Interdisciplinary Mathematics (MCAIM). In this role, she has introduced the MCAIM colloquium and has developed connections with applied mathematics institutes at several other universities. She served on the committee that prepared for the department's external review, and she has also served on the department's personnel committee continuously since her previous promotion, except for her sabbatical year. She has organized or co-organized numerous conferences (seven since her previous promotion) and refereed papers for numerous publications. She also serves on the editorial board of the *Journal of Nonlinear Science*.

External Reviewers:
Reviewer (A): "To summarize, Lydia Bieri has made excellent contributions to PDE theory and mathematical relativity. In my opinion, she is a very impressive mathematician."

Reviewer (B): "Lydia Bieri is an excellent mathematical scientist working in a most exciting and vigorous field of research connecting mathematics to physics and astronomy … She has amply demonstrated that she can conduct and lead front line research in her field. In the fields of geometric analysis and p.d.e. one can find a few individuals [of her generation] with stronger research records, but there is no one who can compare with her in terms of the impact of her work …"

Reviewer (C): "Lydia has produced an impressive amount of high quality results on her field and has established herself as a leader in the field of gravitational memory effects. She has a deep understanding of the physical, differential geometric, and geometric analysis (PDE) aspects of her field which very few researchers combine."
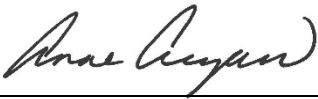
Reviewer (D): "She is a world specialist in the study of memory effects in gravitational radiation … She was also able to point out an electromagnetic analogue of Christodoulou's memory effect."

Reviewer (E): "I have learned a lot from her in our conversations, and found her insightful and having an original point of view; her work displays clear technical strength, as well as an important perspective about the mathematical modeling of relativistic phenomena … It is hard to think of anyone with a comparable range of interests and contributions within relativity as Bieri…"

Reviewer (F): "Bieri is a researcher at the highest level in the field; who has a unique focus with a strong impact outside the field of mathematics; who gives substantial and important service contributions; and who, through recent and upcoming projects, also holds considerable promise for the future."

Summary of Recommendation:
Professor Bieri has established herself as a leader in the field of general relativity through her outstanding research. She is a talented, committed teacher and also a major contributor to our department's outreach efforts. Her work as the director of MCAIM has affected not only the mathematics available in the department but also the general climate, by showcasing the work of women mathematicians. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Associate Professor Lydia R. Bieri be promoted to the rank of professor of mathematics, with tenure, College of Literature, Science, and the Arts.

Anne Curzan, Dean
Geneva Smitherman Collegiate Professor of
English Language and Literature, Linguistics,
and Education
Arthur F. Thurnau Professor
College of Literature, Science, and the Arts

May 2021