

PROMOTION RECOMMENDATION
THE UNIVERSITY OF MICHIGAN
COLLEGE OF LITERATURE, SCIENCE, AND THE ARTS

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

Academic Degrees:

Ph.D.	2007	Eidgenössische Technische Hochschule, Zürich
Diplom	2001	Eidgenössische Technische Hochschule, Zürich
Vordiplom	1998	Eidgenössische Technische Hochschule, Zürich

Professional Record:

2010 – present	Assistant Professor, Department of Mathematics, University of Michigan
2007 – 2010	Benjamin Peirce Lecturer, Mathematics Department, Harvard University

Summary of Evaluation:

Teaching – Professor Bieri has developed into an excellent classroom instructor, receiving high student evaluations in her recent course offerings that range from second-year undergraduate to advanced graduate. She has developed a new course on the mathematics of general relativity theory, and she has a project to produce an educational exhibit relating mathematics and astrophysics for the university’s Museum of Natural History. She has supervised several post-doctoral researchers.

Research – Professor Bieri has established herself as one of the leading researchers in the mathematics of general relativity. Her advances exhibit not only a deep mathematical contribution but also relevance to astrophysical issues, ranging from gravitational radiation to neutron-star mergers. Her discoveries include improvements in the mathematics of asymptotic flatness of space-time as well as several surprising discoveries about the gravitational-wave memory effect. The National Science Foundation has awarded her several grants, culminating in a CAREER award. In addition to the work already published, she has several papers submitted or in preparation, and she has promising plans for future research projects. One of Professor Bieri’s papers on the memory effect was selected by the editorial board of *Classical and Quantum Gravity* as one of the highlights of 2012-2013. She also co-authored a book, Discovering the Expanding Universe (Cambridge University Press, 2nd printing 2010), that is aimed at a general audience.

Recent and Significant Publications:

- “Perturbative and gauge invariant treatment of gravitational wave memory,” with D. Garfinkle, *Physical Review D*, 89, 2014, Article 084039.
- “An electromagnetic analog of gravitational wave memory,” with D. Garfinkle, *Classical and Quantum Gravity*, 30, 2013, Article 195009.
- “The electromagnetic Christodoulou memory effect and its application to neutron star binary mergers,” with P. Chen and S.-T. Yau, *Classical and Quantum Gravity*, 29, 2012, article 215003.

“Null asymptotics of solutions of the Einstein-Maxwell equations in general relativity and gravitational radiation,” with P. Chen and S.-T. Yau, *Advances in Theoretical and Mathematical Physics*, 15, 2011, pp. 1085–1113.

Service – Professor Bieri has performed service above her rank, including a year on the departmental Executive Committee and several years on the Graduate Admissions and Fellowships Committee. She has been active as an organizer of conferences, and is co-editor of a jubilee volume being assembled for the 100th anniversary of Einstein’s discovery of general relativity theory.

External Reviewers:

Reviewer (A)

“Lydia has done important work on the Einstein equations of general relativity, an area of great mathematical as well as physical interest. ...[she] is a very promising mathematician [of her cohort] working in a very exciting field of research connecting mathematics to physics and astronomy. ...her promotion to associate professorship with tenure is fully deserved at this point. She has amply demonstrated that she can conduct and lead front line research in her field.”

Reviewer (B)

“In recent years, Lydia has pioneered the study of this [memory] effect, both from the point of view of purely mathematical issues...but also, teaming up with physicists...and reinterpreting the effect in ways accessible to the broader physics community.”

Reviewer (C)

“From the physical side, Dr. Bieri has a profound knowledge and deep understanding of Einstein’s theory of general relativity and cosmology. From the mathematical side, Dr. Bieri uses highly advanced methods from Lorentzian geometry, geometric analysis and nonlinear partial differential equations.”

Reviewer (D)

“I am very impressed with both her mastery of a wide range of very effective analytic tools, and her comprehensive view of what is important and worth investigating mathematically in cosmological/astrophysical systems. I am also very impressed with her willingness to take on a leadership role in the mathematical relativity community.”

Reviewer (E)

“Her work and her intuition are deeply informed by physical intuition, she remains aware of experimental evidence, and she clearly talks to physicists, yet at the same time she is up on the deeper mathematical advances, and understands and is contributing to the technical progress in this field. She projects boundless enthusiasm for her subject and has emerged as a definite authority in this area.”

Reviewer (F)

“She...introduced new ideas which have proved to be very important. ...based on her very strong technical abilities, mathematical ideas, and choice of research projects, I recommend very strongly her promotion to associate professor with tenure.”

Reviewer (G)

“Lydia already has an international reputation as one of the leaders in the mathematical theory of general relativity... She is currently the world’s expert on what I believe is at the top among most important and deep aspects of this subject, namely the memory effect of Christodoulou.”

Reviewer (H)

“...Bieri has positioned herself as one of the very few frontier researchers [of her generation].”

Summary of Recommendation:

Professor Bieri has established herself as a leading researcher in her field. She has contributed to the university’s teaching mission and carried service beyond her rank. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Assistant Professor Lydia Bieri be promoted to the rank of associate professor of mathematics, with tenure, College of Literature, Science, and the Arts.



Andrew D. Martin
Dean, and Professor of Political Science,
College of Literature, Science, and the Arts

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