

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

Xiaoming Mao, assistant professor of physics, College of Literature, Science, and the Arts, is recommended for promotion to associate professor of physics, with tenure, College of Literature, Science, and the Arts.

Academic Degrees:

Ph.D.	2008	University of Illinois, Urbana-Champaign
B.S.	2002	Peking University
B.A.	2002	Peking University

Professional Record:

2012 – present	Assistant Professor, Department of Physics, University of Michigan
2008 – 2012	Post-doctoral Fellow, Departments of Physics and Astronomy, University of Pennsylvania

Summary of Evaluation:

Teaching – Professor Mao’s teaching statement reflects a committed teacher eager to instill an enthusiasm for science in her students, to prepare her students for their future careers by nurturing critical thinking faculties, and to prepare future scientists to “push the frontiers of our knowledge.” While at Michigan, she has taught four different courses at the 400- and 500-level in the areas of statistical and condensed matter physics. She has introduced innovative project-based learning elements in three of these courses. Because of the conceptual subtleties and the non-mechanistic approaches these courses require, they are some of the most challenging for students in the physics curriculum. Professor Mao has been successful in her teaching, as shown by her quantitative evaluation scores and the written feedback from students on course evaluations. Additionally, Professor Mao mentors an active and successful research group.

Research – Professor Mao’s research program focuses on theoretical soft condensed matter physics, and in particular on rigidity and rigidity transitions in gels, colloids, biopolymers, and on mechanical metamaterials. Since her appointment as an assistant professor in 2012, she has established an active research program and published extensively, with 23 papers in high-quality peer-reviewed journals. Her work has attracted considerable attention as measured by citation indices, and a number of her publications were highlighted by the external reviewers, including her work on self-assembly in colloids and her recent work on topologically protected states in metamaterials. One of her doctoral students and one post-doctoral student graduated from her research group to excellent positions elsewhere. Professor Mao is currently advising two doctoral students and a post-doctoral student. Her funding is very strong and includes a single-investigator grant from the National Science Foundation and a \$2 million National Science Foundation EFRI grant shared with two other investigators.

Recent and Significant Publications:

“Topological edge floppy modes in disordered fiber networks,” with D. Zhou and L. Zhang, *Physical Review Letters*, 120, 2018, p. 068003.

“Maxwell lattices and topological mechanics,” with T. C. Lubensky, *Annual Review of Condensed Matter Physics*, 9, 2018, p. 413.

“Transformable topological mechanical metamaterials,” with D. Z. Rocklin, et al, *Nature Communications*, 8, 2017, p. 14201.

“Fiber networks below the isostatic point: fracture without stress concentration,” with L. Zhang, et al, *Physical Review Materials*, 1, 2017, p. 052602.

Service – Professor Mao has made substantive service contributions in the department, university, and at the national levels reflecting her commitment to undergraduate and graduate education and to the leadership role she plays in her research area. She served on the departmental Faculty Search Committee, the Colloquium Committee, and the Graduate Admissions Committee. She has taken an active role in support of women in physics serving as a faculty advisor to the Society for Women in Physics and co-organizing the 2015 Conference for Undergraduate Women in Physics.

External Reviews:

Reviewer (A)

“She is one of the leading experts in the field concerned with the question of how rigidity develops when constituents of matter are being packed in an ever-denser setup. ... Compared to other researchers in the field, Prof. Mao is certainly amongst the highest regarded. It is unthinkable to organize a workshop or conference in our field without inviting Xiaoming.”

Reviewer (B)

“...Xiaoming has established herself as one of the strongest and most exciting...theorists [in her cohort] in the field of soft matter. ...[her] work at Michigan involves a very healthy mixture of work within her group and work with theoretical, computational, and experimental colleagues... Her open attitude towards collaboration, as well as the high quality of the resulting work, is a strong asset to the university. ... There is no question at all that she should be promoted.”

Reviewer (C)

“Xiaoming’s most recent published and unpublished papers on the arXiv...cover an impressive array of a topics clearly bespeaking a maturing scientist with great prospects for the future. ... She has reached all of the milestones that are a prelude to tenure at a prestigious institution like the University of Michigan.”

Reviewer (D)

“...[Mao’s] work is impressive in both volume and depth of fundamental insight. ... She has...established herself as one of the leading figures in the theory of rigidity and mechanical phase transitions in soft matter systems. ... If she were to come up for a similar promotion [at my institution], I am fully confident that she would be promoted. ...I am also confident of her promotion [at Michigan].”

Reviewer (E)

“Dr. Mao has established a strong funding position, having secured a single-PI NSF grant...and more recently, having obtained an Emerging Frontiers in Research and Innovation (EFRI) multi-

investigator NSF grant for \$2,000,000 with herself as the lead investigator. It's significant that she has been able to assemble a multidisciplinary team involving both theory and experiment."

Reviewer (F)

"...I strongly recommend Prof. Mao for promotion and tenure. ...[her] excellent publication record, her recent high profile funded projects, along with the extensive network of high caliber researchers she collaborates with place her among the leaders in her fields of study. ...I believe that her work has had significant impact to the community at large, and I believe that some of her papers are now considered as seminal contributions."

Reviewer (G)

"I am writing in strong support for Xiaoming Mao's promotion to tenure at the University of Michigan. Mao is a leader in...the most exciting fields of soft matter theory. Her work on fracture is the only complete scaling theory for a brittle-ductile type transition, a longstanding dream of a large materials community. ... She has a bright future."

Summary of Recommendation:

Professor Mao has established a high-quality, well-funded and productive research program at UM, and demonstrated her effectiveness as a teacher and mentor. She has made significant service contributions to her department, the university, and the scientific community. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Assistant Professor Xiaoming Mao be promoted to associate professor of physics, with tenure, College of Literature, Science, and the Arts.



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Elizabeth R. Cole, Interim Dean  
Professor of Women's Studies, Psychology,  
and Afroamerican and African Studies  
College of Literature, Science, and the Arts

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