

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

Zaher Hani, 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. 2011 University of California, Los Angeles  
M.A. 2008 University of California, Los Angeles

Professional Record:

2018–present Associate Professor, Department of Mathematics, University of Michigan  
2014–2018 Assistant Professor, Department of Mathematics, Georgia Institute of  
Technology  
2011–2014 Simons Post-doctoral Fellow, Courant Institute of Mathematical Sciences,  
New York University

Summary of Evaluation:

Teaching: Professor Hani's fields of expertise, analysis in general and partial differential equations in particular, are currently underrepresented in our department. As a result, he has taught classes ranging from a sophomore honors sequence to advanced graduate courses. His teaching evaluations are impressive, with medians ranging from 4.2 to a perfect 5.0 on the "excellent instructor" question of the end-of-term student questionnaires. Professor Hani's teaching activities extend beyond his classes. He is also the thesis adviser of three doctoral students, and he has conducted several directed reading courses. Outside the university, he has given several invited mini-courses and seminar series.

Research: Professor Hani is an analyst of the highest caliber whose most recent works show a dramatic expansion of a long-standing research program in wave turbulence theory. Professor Hani has established himself as a top expert on nonlinear dispersive partial differential equations, and he has also made significant contributions to other topics in analysis. His work is connected to the needs of application areas, but it exhibits the highest standards of mathematical rigor. His recent work has had a major impact on the research of others, and it includes connections with very different parts of mathematics. These works will no doubt be cited for years to come and show a remarkable level of scholarship and research prowess. There is every indication that he will continue to make fundamental progress.

Research and Significant Publication:

Deng, Y. & Hani, Z. (2021). On the derivation of the wave kinetic equation for NLS. *Forum of Mathematics, Pi*, 9, 1-37.  
Buckmaster, T, Germain, P., Hani, Z., & Shatah, J. (2021). Onset of the wave turbulence description of the longtime behavior of the nonlinear Schrödinger equation. *Inventiones Mathematicae*, 1-69.

Guardia, M., Hani, Z., Haus, E., Maspero, A., & Procesi, M. (2019). A note on growth of Sobolev norms near quasiperiodic finite-gap tori for the 2D cubic NLS equation, *Rendiconti Lincei Matematica e Applicazioni*, Volume 30, Issue 4,, pp. 865-880.

Guo, Z., Hani, Z., & Nakanishi, K. (2018). Scattering for the 3D Gross-Pitaevskii equation, *Communications in Mathematical Physics*, volume 359, pages 265-295.

Service: Professor Hani served for two years on the Department of Mathematics' elected Executive Committee. He currently serves on the department's Personnel Committee and the Applied and Interdisciplinary Mathematics Program's Graduate Committee. He has also been active in undergraduate advising, in organizing conferences, and in refereeing and reviewing papers and grant proposals. Since joining our department in 2018, he has organized two conferences at the Banff International Research Station, and he was on the scientific organizing committees of two other international conferences. He has served on three review panels for the National Science Foundation, and he has refereed papers for a large number of journals, including *Inventiones Mathematicae* and the *Journal of the American Mathematical Society*, two of the very top journals in mathematics. It should be noted that these external service contributions, as well as his invited mini-courses, also indicate the esteem of his colleagues for his research work.

External Reviewers:

Reviewer (A): "...I consider that Zaher Hani's contributions are first rate achievements...Hani can definitely be considered as one of the world experts of weak turbulence theory for the cubic nonlinear Schrödinger equation...Summing up, I consider that the research accomplishments by Zaher Hani had a fundamental impact for the theory of Hamiltonian PDEs, and represent quite a fruitful line of research for the future."

Reviewer (B): "A rising star in the area of Applied PDE, Zaher has made a number of impressive and important contributions to the study of dispersive PDE...in his joint work, Zaher is able to finally settle this major open question...This is clearly a major breakthrough in the mathematical study of the wave turbulence theory...In summary, through his important contributions, Zaher has demonstrated a rare combination of originality, persistence and analytical power."

Reviewer (C): "Hani is one of the top analysts in his generation (Ph.D. between 2010 and 2013), working in the general area of PDE's. Overall, I think he is comparable to several other top people in the field, who work in the US and Canada...Dr. Hani is a strong and productive researcher. He has broad interests and has done quality work on the regularity theory and the asymptotic behavior of several evolution equations."


Reviewer (D): "He is definitely one of the best researchers in the area of PDEs...In a breakthrough result in collaboration with Y. Deng, Zaher is able to give a completely rigorous derivation of the wave kinetic equation from the cubic nonlinear Schrödinger (NLS) equation at the kinetic timescale...In conclusion, I think Zaher Hani is an excellent researcher in PDEs. He got excellent results."

Reviewer (E): “He is a researcher of great breadth, depth and versatility who has conceived and developed by himself fascinating new and original avenues of research in a multifaceted program with great success. Dr. Hani has been tackling problems and making great progress in areas that have proved elusive to other researchers for many years.”

Reviewer (F): “[Professor Hani] is the strongest mathematician in his generation working on dispersive equations. He is already a leader in the field... His work is accompanied by some spectacular results. What makes these results of [Professor Hani] stand out are the same attributes that sets [him] apart from most of his peers in the field. He uses, and extends, nontrivial results from different areas of mathematics to solve very difficult problems...He is a star in the field. I believe the only problem you will have in the future is holding on to him as a member of the department.”

Summary of Recommendation:

Professor Hani is known for reaching far beyond the most essential techniques available to design completely new methods and invent new models in his research. His research works are highly regarded, and there has been a notable acceleration of his research program in just the last few years that has led to some stunning recent results. Based on his teaching evaluations, he is regarded very well by his students. He is the thesis advisor for three doctoral students. He performs considerable service work both inside the department and out. He has served on the department’s elected Executive Committee, and currently serves on the department’s Personnel Committee (hiring). Externally, he serves on many review panels, and referees papers for a large number of national and international journals. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Associate Professor Zaher Hani be promoted to the rank of professor of mathematics, with tenure, College of Literature, Science, and the Arts.



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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

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