

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

Qiong Yang, assistant professor of biophysics, and assistant professor of physics, College of Literature, Science, and the Arts, is recommended for promotion to associate professor of biophysics, with tenure, and associate professor of physics, without tenure, College of Literature, Science, and the Arts.

Academic Degrees:

Ph.D. 2009 Massachusetts Institute of Technology (MIT)
B.S. 2003 University of Science and Technology of China (USTC)

Professional Record:

2014 - present Assistant Professor, Department of Biophysics and Assistant Professor, Department of Physics, University of Michigan, Ann Arbor, MI
2009 – 2013 Post-doctoral Fellow, Department of Chemical & Systems Biology, Stanford University, Stanford, CA (Research: Design principles of early embryonic cell cycles; Advisor: Prof. James E. Ferrell)

Summary of Evaluation:

Teaching: Professor Yang has taught four separate courses since joining the faculty at UM, with the majority of her time focused on two core undergraduate courses instructed in alternate semesters titled Biophysics 417 (Dynamical Processes in Biophysics), and Biophysics 450 (Laboratory Techniques in Biophysics). Her classroom teaching has been successful and appreciated by the students, and her student evaluations have demonstrated a clear upward trajectory, providing evidence for her continued growth as an instructor. Professor Yang leads an active research group with seven current graduate students, and has graduated two Ph.D. students who are pursuing careers in their field. She has mentored over 50 undergraduates from a variety of programs on campus, and with her group has participated in educational outreach activities with, among others, middle school students from Detroit.

Research: Professor Yang's research program bridges biophysics, engineering, bioinformatics, and synthetic biology and is focused on elucidating universal physical mechanisms underlying complex cellular and developmental processes governed by oscillatory spatiotemporal patterns from mechanical and biochemical signals. Her research combines mathematical modeling with experimental work to address fundamental questions regarding the design and behavior of biological oscillators. This work sits at the forefront of an evolving quantitative biology field for which Professor Yang is an emerging leader. Professor Yang's record of external funding is impressive and includes nearly \$4M in grants from the NSF and NIH among others. It is anticipated that Professor Yang will continue to grow her research reputation and maintain a vigorous and well-funded research program.

Recent and Significant Publications:

- Sun, M., Maryu, G., Wang, S., & Yang, Q. (2021). "Plug-in tubes removing oil and packing droplets for time-controlled droplet-based assays." *Biomicrofluidics* 15(2), 024108. <https://doi.org/10.1063/5.0047924>.
- Sun, M., Li, Z., Wang, S., Maryu, G., & Yang, Q. (2019). "Building dynamic cellular machineries in droplet-based artificial cells with single-droplet tracking and analysis." *Analytical Chemistry* 91(15), 9813-9818. <https://doi.org/10.1021/acs.analchem.9b01481>.
- Guan, Y., Li, Z., Wang, S., Barnes, P., Liu, X., Xu, H., Jin, M., Liu, A.P., & Yang, Q. (2018). "A robust and tunable mitotic oscillator in artificial cells." *eLife* 7, e33549. <http://doi.org/10.7554/eLife.33549>.
- Li, Z., Liu, S., & Yang, Q. (2017). "Incoherent inputs enhance the robustness of biological oscillators." *Cell Systems* 5(1), 72-81. <https://doi.org/10.1016/j.cels.2017.06.013>.

Service: Professor Yang has participated in meaningful service to the biophysics program through the seminar and graduate admissions committees. She has also taken a lead role in the NextProf science program. Outside of Biophysics, she participated in graduate admissions in the Cellular and Molecular Biology Program and helped administer the NIH microfluidics training program. Professor Yang's extramural service includes taking a leading role in organizing several scientific meetings and chairing subgroup meetings at the ASCB/EMBO annual meetings, a major international meeting in the broad area of cell biology. She is also a member of the q-Bio conference program committee, organizing prominent meetings in her sub-field of quantitative and synthetic biology. These efforts exemplify her service to the larger community and testify to her prominence in her field.

External Reviewers

Reviewer (A): "It is clear that [Professor Yang's] independent work has made inroads in two related areas, for which she has garnered respect and attention: the development of enabling technologies for creating and monitoring droplet-based artificial cells, and the computational analysis of cellular oscillations."

Reviewer (B): "In my opinion, Prof. Yang is uniquely placed in the field of systems and synthetic biology, owing to the methodological combination above, which is very rare: Some groups can do cell-free biochemistry well, others excel in live microscopy, and theorists a dime a dozen. But someone who does all of those well is hard to find."

Reviewer (C): "Dr. Yang's scholarly work stands out among her peers in that she is tackling biochemical signaling problems by combining in most of her studies high quality quantitative experimental studies with cutting edge modeling. I could not name a peer of Dr. Yang who is taking this challenging strategy and is equally innovative. I believe that to understand the logic of regulatory processes, which is the goal of her research, experiments and models must closely follow each other."

Reviewer (D): "Dr. Yang states her overall goal as understanding the design principles of biological oscillators. This is an important and interesting problem where biologists expect to learn from physicists. Her laboratory has focused on one experimental system, cell cycle oscillations in cell-free extracts made from frog eggs. This is an unusual choice of system which

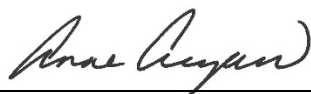
makes her work distinct from numerous groups worldwide working on more popular oscillating systems, such as oscillating gene circuits in bacteria and circadian oscillations.”

Reviewer (E): “One particular trait of [Professor] Yang’s research is the diversity of her scientific approach to understanding fundamentals of cyclic processes in living systems. [Professor] Yang’s research includes computational analysis, in vivo and in vitro experiments, and this is done brilliantly and synergistically...Prof. Yang’ scientific production is excellent at that stage of her career...”

Reviewer (F): “[Professor Yang’s] record of scholarship is solid, with a good number of papers published and a few more working their way through the publication process. What is most impressive about [Professor Yang’s] work is the breadth it spans. She has done high quality work ranging from theory (a highlight being her Cell Systems paper) to artificial biology with a systems analysis (eLife paper) all the way to more engineering-like fabrication.”

Summary of Recommendation:

Professor Yang’s work combines novel, cutting-edge experimental methods development in implementing droplet-based artificial cells with single droplet tracking, and application of these approaches to synthetic cells constructed from *Xenopus* egg extracts with creative computational modeling, leading to significant new insights into features controlling robustness in cell-cycling. This work is documented in visible publications that are well cited by the community and is delivering quantitative information on fundamental aspects of complex biological clocks that fills a unique space of signaling research. Professor Yang is also a dedicated teacher and mentor and generous citizen. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Assistant Professor Qiong Yang be promoted to the rank of associate professor of biophysics, with tenure, and associate professor of physics, without 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

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