Approved by the Regents
May 16, 2019

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

Vanessa Sih, associate professor of physics, with tenure, College of Literature, Science, and the Arts, is recommended for promotion to professor of physics, with tenure, College of Literature, Science, and the Arts.

Academic Degree:

Ph.D.	2006	University of California, Santa Barbara
B.S.	2001	California Institute of Technology

Professional Record:

2017 – present	Associate Chair for the Graduate Program, Department of Physics, University of Michigan
2014 – present	Associate Professor, Department of Physics, University of Michigan
2008 – 2014	Assistant Professor, Department of Physics, University of Michigan
2008	Lecturer, Department of Electrical Engineering, Stanford University
2007 – 2008	Post-doctoral Researcher, Stanford University
2006 – 2007	Graduate Intern Technical, Intel Corporation

Summary of Evaluation:

Teaching – Professor Sih has taught four different courses at both the undergraduate and graduate levels since her promotion to associate professor. Physics 160 and 260 are in the introductory honors sequence, which is part of the main track of introductory physics courses developed for incoming physics majors. Student evaluations of her teaching are very good in Physics 160 (Q2 of 4.4), excellent in Physics 260 (Q2 of 4.8), and are similar to those obtained by other faculty teaching the same courses. Professor Sih has contributed strongly to the department's intermediate lab course, which was first offered during the 2015 fall term and covers modern physics concepts such as the photoelectric effect, superconductivity, and radioactivity. Professor Sih has been actively involved in graduate student education and teaching, initially through her graduate seminar in Physics 501, and then through various initiatives as the associate chair for graduate studies. This course exposes incoming graduate students to the various research directions available in the department and helps facilitate contacts with Physics faculty who are interested in recruiting graduate students. Professor Sih has had seven Ph.D. students in nine years at Michigan, with five more in the pipeline, three of whom are candidates.

Research – Professor Sih is an experimental condensed matter physicist. Since joining the University of Michigan in 2008, she has established a highly visible, vigorous, and well-funded research program in the field of "spintronics." This field focuses on the interaction between electron and nuclear spins in nanostructures, usually by controlling and probing the electron spins using light. Spintronics has potential applications for optical communications, and both classical and quantum information processing. Professor Sih is pursuing experimental studies of electron spin dynamics to provide a complete picture of all the facets of spin as well as preparing and measuring spin. Since 2014, Professor Sih has published fifteen papers in high quality

refereed journals that have rigorous reviewing processes. In addition, she has given seven invited talks at international conferences and eight colloquia or seminars at universities and research institutes. One highlight of her recent research is observation of long-lived spin/valley polarization in monolayer tungsten diselenide at low temperature (10K). This compound belongs to a class of two-dimensional materials, transition metal dichalcogenides, that have attracted intense interest in the past few years. Professor Sih has been very successful at attracting external research funding, including multiple single PI grants and participation in group efforts.

Recent and Significant Publications:

"Effect of modified periodic waveforms on current-induced spin polarization measurements," with J. R. Iafrate, et al., *AIP Advances*, 8, 2018, p. 065133.

"Current-induced spin polarization in InGaAs and GaAs epilayers with varying doping densities," with M. Luengo-Kovac, et al., *Physical Review B*, 96, 195206.

"Long-lived hole spin/valley polarization probed by Kerr rotation in monolayer WSe_2," with X. Song, et al., *Nano Letters*, 16, 2016, pp. 5010-5014.

"Resonant and time-resolved spin noise spectroscopy," with B. C. Bursley and X. Song, *Applied Physics Letters*, 107, 2015, p. 182102 (2015).

Service – Professor Sih has made significant service contributions at the department and national levels. She has served on the Graduate Admission Committee reviewing several hundred applications, recommending about 80 students for admission, and then working to recruit the selected students to Michigan. She has also served on the Faculty Search Committee. In July 2017, Professor Sih became the associate chair for the Physics Graduate Program. Other assignments include the Graduate Mentor Committee, Physics REU Selection Committee, and Introductory Physics Committee. National service includes reviewing proposals for the Department of Energy (DoE) Basic Energy Sciences, the National Science Foundation, the German Research Foundation (Deutsche Forschungsgemeinschaft – DFG), and the Chinese Academia Sinica. She has also been asked to review numerous papers for publication in leading journals. She serves on the Executive Committee of the American Physical Society Topical Group on Magnetism. Her outreach activities cover a very broad field, from organization of the Saturday Morning Physics program, a highly successful series of public lectures, to workshops and conferences aimed at increasing the participation of women in science.

External Reviews:

Reviewer (A)

"All of Professor Sih's work has been carefully executed. …I respect Professor Sih's accomplishments and how she presents them. …I would be happy to have her as a colleague and look forward to seeing new work from her group."

Reviewer (B)

"…[Professor Sih's] work has been clear, coherent, insightful, and remarkably modest (a characteristic that is highly uncommon…). By modest I mean that she does not overclaim for her work or the understanding developed by her research. … Despite this her work is highly visible in the national and international setting. … University of Michigan is lucky to have Prof. Sih, who has established an internationally-leading program in coherent semiconductor

spintronics, and who is likely poised to have an even greater impact as the focus of the national scientific enterprise turns even more to the study of quantum coherent phenomena."

Reviewer (C)
"I am very impressed by the productivity and high quality of Prof. Sih's scientific results. …[she] has become a leader in the control of electron spin polarization via spin-orbit fields and in the understanding of electron-nuclear spin interactions and dynamic nuclear polarization. … Recently, she has published a high impact paper on valley-spin dynamics in 2D materials, which is her first study on this class of materials. This is an interesting new direction for her research and I am impressed by her achievement."

Reviewer (D)
"…Prof. Sih['s] scholarship has continued to increase, as well as her ranking among the community. Her very healthy research funding portfolio and her extensive publications…shows clearly her deserving promotion from this perspective. … The leadership that she demonstrates is something that I would welcome in any department that seeks to increase its visibility both in research and education innovation..."

Reviewer (E)
"…I believe Prof. Sih is a solid researcher with a well-earned reputation for excellent work… It is my assessment that Prof. Sih's work is of excellent quality, and demonstrates leadership in her field. Her reputation is quite solid and [she] has managed to secure a consistent stream of external funding, while advising a number of students at all levels."

Reviewer (F)
"For about ten years Professor Sih has led a vigorous and well-funded research program… The work is fundamental in nature, but has great potential for applications. …[her] curriculum is very strong in the core areas of research, scholarship, advising, and grant writing…"

Summary of Recommendation:
Professor Sih has established a productive and well-funded research program. She is a committed and successful teacher who regularly offers research opportunities to undergraduates. She has contributed valuable service, including leadership in the graduate program in her department. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Associate Professor Vanessa Sih be promoted to the rank of professor of physics, with tenure, College of Literature, Science, and the Arts.

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

May 2019