

# What do Quantum Defects Talk About? (and how can we find out?)

Speaker: **Evelyn L. Hu, Harvard University**



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School of Electrical and  
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## Abstract :

There has been recent excitement about the performance of defects (such as vacancies, or missing atoms) in crystalline semiconductors, where the defect, also termed *qubit*, can manifest optical emission at a variety of wavelengths, distinctively coupled to long spin coherence times. The deterministic creation of such defects, for example with ion beam irradiation, almost certainly implies the creation of “collateral” defects and disorder to the surrounding environment: how does this affect luminescence efficiency, spin coherent lifetimes and other important qubit metrics?

This talk will focus on Silicon Vacancies in 4H SiC, integrated into “bespoke” nanoscale optical cavities, with an effective volume of about  $(100\text{ nm})^3$ . The cavities serve to augment the optical signal by orders of magnitude, but also serve as “nanoscopes” into the material, allowing us to learn about the interactions with surrounding defects, and giving us broader insights into longer-term quantum coherence.

## Bio:

Evelyn Hu is the Tarr-Coyne Professor of Applied Physics and Electrical Engineering at the John A. Paulson School of Engineering and Applied Sciences at Harvard. She is presently a Co-Director of the Harvard Quantum Initiative. Prior to Harvard, she was a faculty member at UCSB, in the Departments of Materials, and of Electrical and Computer Engineering. While at UCSB, she also served as the founding Scientific Co-Director of the California NanoSystems Institute, a joint initiative between UCSB and UCLA. Before joining UCSB, she worked at Bell Labs in both Holmdel and Murray Hill.



She is a member of the National Academy of Sciences, the National Academy of Engineering, the American Academy of Arts and Sciences, and the Academia Sinica of Taiwan. She is a recipient of an NSF Distinguished Teaching Fellow award, an AAAS Lifetime Mentor Award, the 2019 SES Eringen Medal, the 2020 IEEE Grove Award, and the 2021 IEEE/RSE James Clerk Maxwell Medal. She holds honorary Doctorates from ETH Zurich, the University of Glasgow, Heriot-Watt University, Hong Kong University of Science and Technology, and the University of Notre Dame.

**Virtual Talk**  
Friday, March 26, 2021

Talk begins: **12:00pm**

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