

Seminar

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Date & Time: November 11, 11:00-12:00

Venue: Kyushu University (<https://www.kyushu-u.ac.jp/ja/campus/ito/>)
Building West 2, 2F, Room 209

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2025 年 11 月 11 日, 11:00-12:00

九州大学伊都キャンパス ウェスト 2 号館 209 号室

Investigating light-matter interactions from defects in 2D quantum materials

Esther Wertz (wertze@rpi.edu)

Rensselaer Polytechnic Institute, Troy, NY 12180

Abstract: The potential of quantum information science is fueling demand for the design and generation of new qubits and devices operating at the single-particle level. One promising approach uses photons as information carriers. Their long decoherence lengths and fast operation speeds offer natural benefits for rapid and safe quantum communication; however, current state-of-the-art single photon sources are either bulky and poor choices for circuit integration or operate at cryogenic temperatures. On the other hand, color centers, such as defects in two-dimensional (2D) materials, are suitable for small-scale devices that can operate at room temperature, but these sources have their own limitations, particularly their restricted brightness due to fluorescence lifetimes and intermediate dark states, and the control of excitation repetition rate. Moreover, we still lack some of the most fundamental understanding of these defects, and how structural properties correlate to their optical ones. To address the first set of challenges, we work to controllably and reproducibly couple these defects to plasmonic nano-antennas, which can confine light below the diffraction limit, and thus can be used to strongly manipulate quantum emitters and couple them to existing electronic circuits. For the second, we use machine learning to better understand the material properties that are relevant to our applications.

Bio: Esther Wertz obtained her PhD in Physics in 2010 for the work she did with Dr. Jacqueline Bloch at the CNRS Photonics and Nanostructures Laboratory in France. She did her postdoctoral work with Dr. Julie Biteen at the University of Michigan, then joined the Department of Physics, Applied Physics, & Astronomy at the Rensselaer Polytechnic Institute as an Assistant Professor in 2015. She is the recipient of a PicoQuant Young Investigator Award and an NSF CAREER award, and is the RPI UPWARDS for the Future Faculty. Her research at Rensselaer focuses on investigating light-matter interactions in the vicinity of nanostructures using super-resolution microscopy techniques, and on designing structures that interface with light in predetermined ways. She is also interested in exploring the new quantum properties that emerge when excitons in two-dimensional materials are coupled to localized surface plasmon resonances.

