4th Chicago-Tohoku Quantum Alliance Seminar
Graduate Program in Spintronics Seminar
The 149th Nano-Spin Engineering Seminar

"Optical Properties of Mixed-dimensional Heterostructures: Progress and Opportunities"

Low-dimensional materials, like two-dimensional (2D) van der Waals materials, have been widely studied in recent years for many different applications. A critical benefit of these materials is the ability to stack different 2D or other low-dimensional materials together. These custom stacks, called heterostructures, can have special optical and electrical properties. This seminar will focus on such low-dimensional materials and new discoveries about how layered heterostructures interact with light. We will specifically look at the link between zero-dimensional (0D) materials (like molecules) and 2D materials. We will cover two main topics:

1. Changing 2D Materials: How molecules (0D) can change the properties of 2D materials. This can improve their use in quantum information science, for example, by enhancing single photon emission.
2. Controlling Molecules: How 2D materials act as a substrate (a base layer) to help control the optical properties of molecules by managing how the molecules interact with each other.

Finally, we will put this work into a broader context of optics and low-dimensional material design from the literature and discuss promising directions for future research.

Dr. S. Carin Gavin
(University of Chicago/ Argonne National Laboratory/ Tohoku University)

Date: Friday, November 21, 2025
Time: 14:15-15:45
Venue: Conference room, Laboratory for Nanoelectronics and Spintronics, RIEC, Katahira Campus

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