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SPEAKER SERIES

PRESENTS

Harnessing Nitrogen Vacancy Centers in Diamond for Next-Generation Quantum Science and Technology

(a joint IBNS/TcSUH Seminar)

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Friday, April 23, 2021 10:00 am
Room: Zoom*

https://uofh.zoom.us/j/845619943?pwd=QlZvYUV6M2dxNDkvNWxBd3F2YzdJZz09
Meeting ID: 845 619 943
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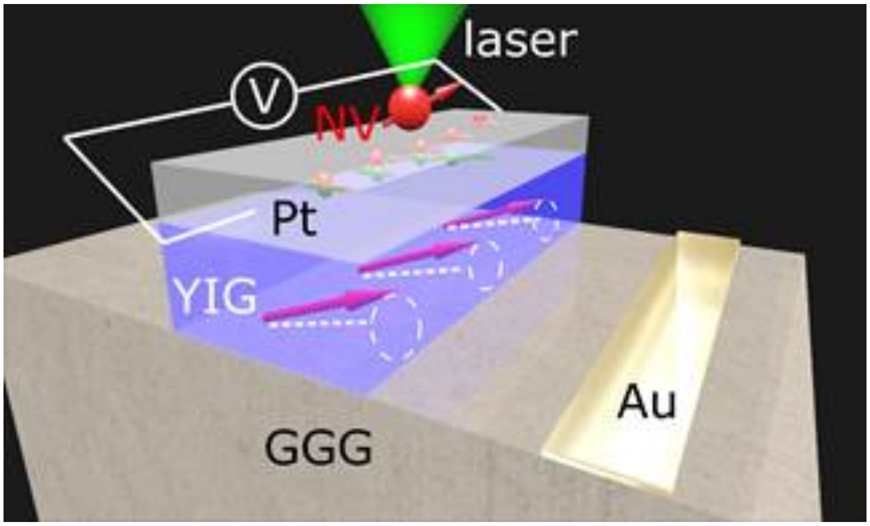
LECTURE ABSTRACT

Advanced quantum systems are integral to both scientific research and modern technology enabling a wide range of emerging applications. Nitrogen vacancy (NV) centers, optically-active atomic defects in diamond, are directly relevant in this context due to their single-spin sensitivity and functionality over a broad temperature range. Many of these advantages derive from their quantum-mechanical nature of NV centers that are endowed by excellent quantum coherence, controllable entanglement, and high fidelity of operations, enabling opportunities to outperform their classical counterpart. In this talk, I will present our recent efforts in developing NV-based quantum sensing platform and technologies. Specifically, we demonstrated electrical control of the coherent spin rotation rate of a single-spin qubit in an NV-spintronic hybrid quantum system. By utilizing electrically generated spin currents, we are able to achieve efficient tuning of magnetic damping and the amplitude of the dipolar fields generated by a micrometer-sized resonant magnet, enabling electrical control of the Rabi oscillation frequency of NV spin qubits. In addition, exploiting a state-of-the-art NV quantum sensing platform, we achieved optical detection of magnons with a broad range of wavevectors in magnetic insulator thin films. Our results highlight the potential of NV centers in designing functional hybrid solid-state systems for next-generation quantum-information technologies. The demonstrated coupling between NV centers and magnons further points to the possibility to establish macroscale entanglement between distant spin qubits and paves the way for developing transformative NV-based quantum computer.



SPEAKER BIOSKETCH

Dr. Chunhui Du is an Assistant Professor in the Department of Physics at the University of California, San Diego, which she joined in 2019. She received her Ph.D. degree in Physics from The Ohio State University in 2015 and was a postdoctoral Fellow in the Department of Physics at Harvard University from 2015 to 2019. Her honors and awards include a National Science Foundation CAREER Award, an Air Force Office of Scientific Research Young Investigator Award, and the Harold and Suzy Ticho Endowed Faculty Fellowship in Physics at the University of California, San Diego.

Please contact Prof. Xiaonan Shan <xshan@Central.UH.EDU> or Prof. Jiming Bao (jbao@uh.edu) if you want to meet with the speaker.

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