Northeastern
SMART Center

2021 Seminar Series –

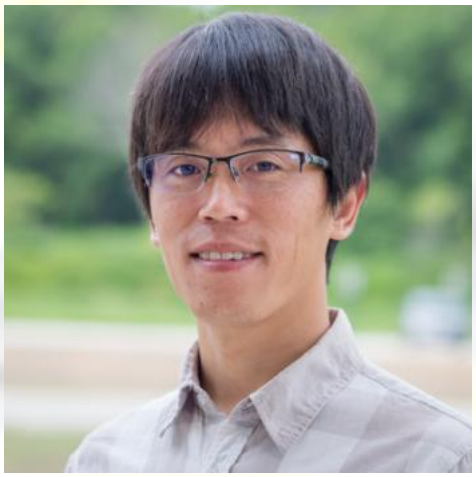
ADVANCING QUANTUM INFORMATION SCIENCE WITH HYBRID CAVITY MAGNONICS

Dr. Xufeng Zhang

Abstract: With recent demonstration of quantum computers and quantum communication, quantum technologies have started to change our world in an unprecedented way. To fully explore the power of quantum information science and technology, it is critical to further combine discrete quantum elements and build distributed quantum networks. However, this poses significant technical challenges because the quantum coherence can be easily destroyed as the weak quantum signal propagates across different systems. In this talk, I will show that magnons — the collective excitations of magnetization — provide a promising solution for efficiently transducing quantum information among different systems while preserving the delicate quantum coherence. Specifically, cavity magnonics can be conveniently hybridized with other physical platforms that operate in the microwave, mechanical and optical domains because of its exceptional compatibilities with them. Moreover, thanks to the large spin density in our magnonic system, the interactions between magnons and the information carriers used in other systems (such as photons and phonons) are drastically boosted, providing elevated protection for the signal coherence. Most importantly, the excellent tunability of magnons permits unparalleled manipulation for the signal transduction. Therefore, high-fidelity magnon-based signal transduction can be achieved. I will finish the talk by describing opportunities and our efforts toward quantum operations and on-chip integration of hybrid cavity magnonics.

Time: 2:10 pm – 3:30 pm, January 28th, Thursday, 2021

Virtual:
Join by Zoom: https://northeastern.zoom.us/j/99243183435



Dr. Xufeng Zhang has been working as an assistant scientist at the Center for Nanoscale Materials, Argonne National Laboratory, and CASE fellow of the University of Chicago since 2018. Dr. Zhang received his Ph.D. in Engineering from Yale University in 2016, where he worked on hybrid magnonic devices in Prof. Hong Tang's group. He is the winner of the Henry Prentiss Becton Graduate Prize for his exceptional graduate research at Yale University. After graduation he joined Argonne National Laboratory as the Nikola-Tesla postdoctoral fellow. His research interests include hybrid quantum devices, magnon spintronics, integrated photonics, nanomechanics, and high frequency devices.