SEMINAR NOTICE

Pumping Iron: Revealing Counterintuitive Mechanisms of Magnetization Dynamics

By

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Thin-film magnetic metals are workhorses in nanomagnetic devices, including sensors, memories, and oscillators. Yet, even in the most widely used ferromagnets, we still do not fully understand the mechanisms of key phenomena – such as magnetic damping and spin-orbit torques – for critical device applications.
This lecture will showcase progress in revealing rather counterintuitive mechanisms of magnetization dynamics in thin films, especially those based on iron. In particular, I will walk the audience through the following findings: (1) a fundamental damping mechanism from “procrastinating” electrons in clean iron films; (2) a spin-orbit torque from subtle symmetry breaking in iron-nickel alloy films. I aim to convey that even seemingly mundane magnetic metals can exhibit intriguing foundational science, offering fresh perspectives on materials for nanomagnetic devices.

Satoru EMORI is an Associate Professor in the Department of Physics at Virginia Tech. He received his B.S. in Materials Science and Engineering at the University of California, Irvine in 2008 and his Ph.D. in Materials Science and Engineering at the Massachusetts Institute of Technology in 2013. Following his postdoctoral work at Northeastern University and Stanford University, he joined the faculty of Virginia Tech in Fall 2017. His research team aims to understand and control such phenomena as magnetic damping, spin transport, and spin torque effects. At Virginia Tech, he has developed interdisciplinary nanoscience courses, which connect basic science with technological applications in accessible ways for undergraduate students. He received a National Science Foundation CAREER Award in 2022, was selected as an APS Outstanding Referee in 2024, and is now serving as an IEEE Magnetics Society Distinguished Lecturer for the year 2024.

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