Seminar: Axel Hoffmann

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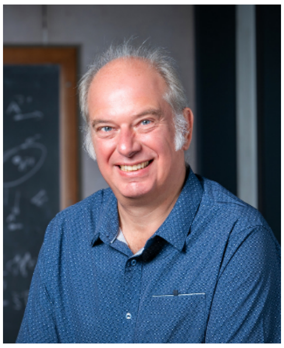
Magnetic Matchmaking: Hybrid Magnon Modes

Biography



Axel Hoffmann received his Diploma in physics from the RWTH Aachen in 1994 and his PhD in physics from the University of California – San Diego in 1999. Subsequently, he worked at the Los Alamos National Laboratory as a postdoctoral fellow. In 2001 he joined the Argonne National Laboratory as a staff scientist and became in 2014 the Senior Group Leader of the Magnetic Thin Film Group within the Materials Science Division. In 2019 he joined the Department of Materials Science and Engineering at the University of Illinois Urbana-Champaign as a Founder Professor. His research interests encompass various magnetism topics, including magnetic heterostructures, spin-transport, and magnetization dynamics. He has more than 200 publications, five book chapters, four magnetism-related U.S. patents, and edited two books. He is a fellow of the American Physical Society, American Vacuum Society, and IEEE. His awards include Distinguished Lecturer for the IEEE Magnetics Society (2011), Outstanding Researcher Award by the Prairie Section of the American Vacuum Society (2015), Highly Cited Researcher by Clarivate (2019–2025), the David Adler Lectureship Award in the Field of Materials Physics from the American Physical Society (2022), and the Research Award by the Alexander von Humboldt Foundation (2024).

Abstract

Magnons interact with a wide variety of different excitations, including microwave and optical photons, phonons, and other magnons [1]. Resulting hybrid magnon dynamic excitations open new pathways for hybrid quantum information systems [2–4]. I will discuss examples and strategies for essential building blocks for more complex integrated coherent quantum systems. This includes strong magnon-photon coupling in coplanar superconducting microwave photon resonators [5], long distant coupling between two magnon resonators [6], and nonreciprocal photon coupling due to magnons [7]. Lastly, I will show how a superconducting qubit can be used for sensitively detecting magnon populations over a broad dynamic range [8]. These examples illustrate the potential of magnons for coherently controlled interactions ultimately even in the single quantum limit.
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References:
[1] Y. Li,,et al., J. Appl. Phys. 128, 130902 (2020).
[2] D. D. Awschalom, et al., IEEE Quantum Engin. 2, 5500836 (2021).
[3] Y. Li, et al., 2022 IEEE Intern. Electr. Dev. Meeting, 14.6.1 (2022).
[4] Z. Jiang, et al., Appl. Phys. Lett. 123, 130501 (2023).
[5] Y. Li, et al., Phys. Rev. Lett. 123, 107701 (2019).
[6] M. Song, et al., Nat. Commun. 16, 3649 (2025).
[7] Y. Li, et al., Phys. Rev. Lett. 124, 117202 (2020).
[8] S. Rani, et al., Phys. Rev. Appl. 23, 064032 (2025).

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