

Nonlinear magnetization dynamics in far-from-equilibrium: prospects of curvature and angular momentum transport

Ezio Iacocca

Department of Physics, UCCS

Abstract

We study the dynamics of magnetic materials under an ultrafast excitation. The magnetic materials have perpendicular magnetic anisotropy, an energy term that is analogous to focusing media in fluid dynamics. As such, we observe a variety of fluid-like behavior, including the nucleation of solitons [1]. In the talk, I will focus on the fluid-dynamic interpretation of these dynamics and how it could explain recent experimental observations. In particular, I will show results obtained at the European XFEL [2], where domain curvature appears to be an important factor in the far-from-equilibrium dynamics [3]. The implications of these study are primarily in the magnetic storage sector but also opens intriguing fundamental questions on the transport of angular momentum in magnetic media.

References:

- [1] E. Iacocca et al., Nat. Comm. 10, 1756 (2019); D. Turenne, Science Advances 8, eabn0523 (2022)
- [2] N. Zhou Hagström et al., In Review, arXiv:2112.09587 (2022)
- [3] R. Jangid et al., in preparation (2022); K. Rockwell and E. Iacocca, In preparation (2022)