Physikalisches Kolloquium

Universität Konstanz

Dr. Patrick Ilg
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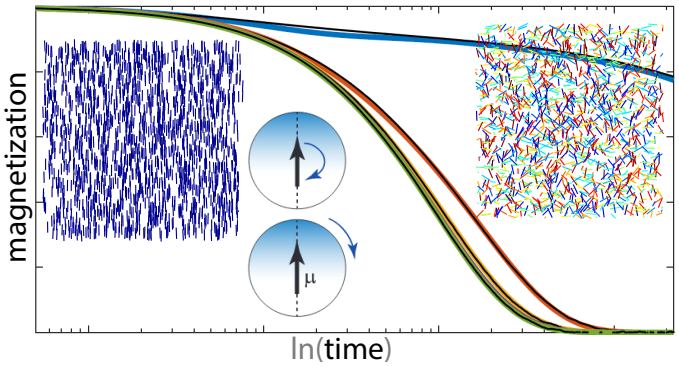
Di 08.11.22
15:15 Uhr
R 513
Im Anschluss Kaffee/Tee



Liquid Magnets - An incomplete story of 50 years research on ferrofluids

First synthesized around 50 years ago by NASA, ferrofluids with their fascinating combination of magnetic and fluid properties have opened novel technical and biomedical applications, which in turn sparked the interest of more and more researchers (see e.g. the recent review [1]).
In this talk, I will try to give an overview of some research directions on ferrofluids from a physicist's perspective, demonstrating that this field sits on the intersection of fluid dynamics, thermodynamics and statistical mechanics as well as micromagnetics. Particular emphasis will be paid to dynamic phenomena such as the nonequilibrium magnetization dynamics and magnetoviscous effects [2]. Starting from early theories relying on the so-called rigid-dipole approximation, I will sketch some more recent works trying to go beyond this restrictive assumption [3]. Finally, I will outline open questions in the field and current research directions, showing that the story of ferrofluids is far from finished.

[1] V. Socoliuc et al., Nanoscale 14, 4786 (2022).
[2] P. Ilg and S. Odenbach, in Colloidal Magnetic Fluids: Basics, Development and Applications of Ferrofluids, edited by S. Odenbach, Lecture Notes in Physics Vol. 763 (Springer, Berlin, 2008).
[3] P. Ilg, M. Kröger, Phys Chem Chem Phys 22 (2022) 22244; Phys Rev B (2022) in press.