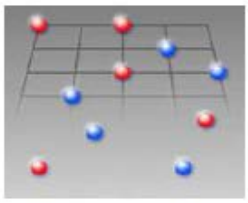

SPIN+X
SFB/TRR 173
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JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Fachbereich Physik, Mathematik und Informatik

SONDERTERMIN:
SFB TRR 173 Spin+X - Kolloquium

Thursday 30th, 2020 at 3 pm
online via Skype for Business

Alan Farhan

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Frustrated spin architecture: from macroscopically degenerate artificial spin ice to artificial spin glasses

Artificial spin ice [1] is a class of magnetic metamaterials consisting of coupled nanomagnets lithographically arranged onto a variety of lattices [2-4], leading to exotic emergent phenomena that are not only fascinating from a fundamental point of view, but also bear potential for future applications. Recently, by placing ultra-thin nanomagnets on pre-etched silicon substrates, we were able to create macroscopically degenerate artificial spin ice systems exhibiting emergent magnetic monopoles, which effectively behave as a plasma of magnetic charges [2]. This is done by a direct comparison of real-space observations with theoretical calculations based on Debye-Huckel theory. Our 3D spin architecture, combined with appropriate magnetic imaging, shows great promise not only in generating significant steps towards real-space observations of magnetic monopole currents or shedding light into the spin ice ground state, but will also lead to a whole new generation of artificial frustrated spin systems, exhibiting properties that cannot be realized by a simple 2D approach. Furthermore, first steps towards the realization of artificial spin glasses have been recently made [5,6], further confirming the importance of dimensionality as a crucial entity in achieving the first finite-temperature artificial spin glass system.

1. S.H. Skjærvø et al. Nat. Rev. Phys. (2020).
2. A. Farhan et al. Sci. Adv. **5**, eaav 6380 (2019).
3. A. Farhan et al., Nature Comms. 8, 995 (2017).
4. A. Farhan et al. Nature Comms. 7, 1263 (2016).
5. M. Saccone et al. PRB **99**, 224403 (2019).
6. M. Saccone et al. Nanoscale **12**, 189 (2020).

The guest is invited by Prof. Dr. M. Kläui
Everybody interested is welcome!