



Contribution ID: 183

Type: Talk

Award of PSI thesis medal and presentation: The artificial kagome spin-ice system: from building blocks to emergent monopoles

Thursday, 15 September 2011 14:15 (30 minutes)

Arrays of dipolar coupled ferromagnetic islands, arranged in specific geometries, provide an ideal tool to directly study the behavior of frustrated systems mimicking those found in Nature. In this presentation, single domain ferromagnetic islands arranged in the two dimensional kagome spin-ice geometry have been fabricated with electron beam lithography and the magnetic configurations have been imaged employing x-ray magnetic circular dichroism in a photoemission electron microscope.

This study begins with a bottom-up approach, starting with the three basic building blocks of the artificial kagome spin-ice consisting of one, two, and three rings. Here the energy characterization is presented together with results achieved after using a demagnetization procedure. After setting the baseline with the building block structures, the magnetization reversal processes in the infinite kagome spin-ice array were studied with a magnetic charge model. It is shown that magnetization reversal proceeds through the nucleation and avalanche-type dissociation of emergent monopole- antimonopole pairs along one dimensional Dirac strings.

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Talk

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Plenary session

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Session Classification: Plenary session

Track Classification: Plenary session