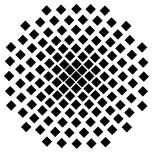
Stuttgarter Physikalisches Kolloquium

Max-Planck-Institut für Intelligente Systeme
Max-Planck-Institut für Festkörperforschung
Fachbereich Physik, Universität Stuttgart

Ansprechpartner: Dr. Michael Hirscher
E-Mail: hirscher@mf.mpg.de
Telefon: 0711 - 689-1808



Dienstag, 13. November 2012 | **17.15 Uhr** | **Hörsaal 2 D5**

Stuttgarter Max-Planck-Institute, Heisenbergstraße 1, 70569 Stuttgart-Büsnau

Gastgeber: Prof. Gisela Schütz, Max-Planck-Institut für Intelligente Systeme, Telefon: 0711 - 689-1950

Monopoles and Magnetricity in Spin Ice

Prof. Steve T. Bramwell
London Centre for Nanotechnology and Department of Physics and Astronomy, University College London

Abstract

The analogy between spin configurations in spin ice materials like $Ho_2Ti_2O_7$ and proton configurations in water ice, H_2O, has been appreciated for many years (see Ref. [1] for a review). However it is only recently that this analogy has been extended to the levelofelectrodynamics [2,3]. In this talk I shall describe our recent experimental work that identifies emergent magnetic charges ("monopoles"), transient magnetic currents ("magnetricity") and the universal properties expected of an ideal magnetic Coulomb gas (magnetic electrolyte - "magnetolyte"). These universal properties include the Onsager-Wien effect, "corresponding states" behaviour, Debye-Huckel screening and Bjerrum pairing [4-7]. I will describe experimental results for both traditional spin ice materials ($Ho_2Ti_2O_7$, $Dy_2Ti_2O_7$) and a recently discovered system ($Dy_2Ge_2O_7$). Finally I shall discuss some very recent experimental and theoretical developments.

References:
[1] Bramwell and Gingras, Science, 294 1495 2001
[2] Castelnovo et al., Nature 451 42 (2008)
[3] Ryzhkin, JETP 101 481 (2005);
[4] Bramwell et al. Nature 461 956 (2009)
[5] Fennell et al., & Bramwell Science 326 415 (2009)
[6] Giblin, Bramwell et al., Nature Physics 7 252 (2011)
[7] Zhou, Bramwell et al., Nat Comm. 478, 1483 (2011)
[8] Bramwell, arXiv:1112.0257