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# Physics Colloquium

Tuesday, 11 July 2023 at 16:30

**Prof. Dr. Ludovic Jaubert**

Laboratoire Ondes et Matière, CNRS, LOMA, University of Bordeaux

## Is it possible to see magnetic monopoles in spin ice?

What we colloquially know about frustration is that it prevents magnetic order. But the interesting part in physics is usually not so much the absence of something but rather what happens in its place. Over years, the absence of order in spin liquids has often been described as the emergence of (gauge) field theory and quasi-particles. A famous example of which are spin-ice materials, supporting an emergent Coulomb phase and effective magnetic monopoles. However, even if magnetic monopoles have been extensively studied in spin-ice systems, their signatures have been indirect so far, leaving their direct observation an open challenge. One such technique that could realize this direct observation is electron holography.



In this seminar, we will start with a general introduction to spin liquids, then present what are spin-ice materials and explain how they are able to stabilize effective magnetic monopoles at very low temperature. Then we shall explore the possibility of imaging monopoles via electron holography through experimental measurements of artificial spin-ice structures made by nanolithography, and computational simulations of how monopoles would appear in a pyrochlore spin ice thin film [1].

[1] Dhar, Jaubert, Cassidy, Shintake & Shannon, "Observing Magnetic Monopoles in Spin Ice using Electron Holography", arXiv:2112.01362

Venue: Universität Leipzig, Faculty of Physics and Earth Sciences  
04103 Leipzig, Linnéstraße 5, **Change of room: small lecture hall**

**Everyone is welcome to a reception with coffee, drinks and cookies in the Aula following the talk.**

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