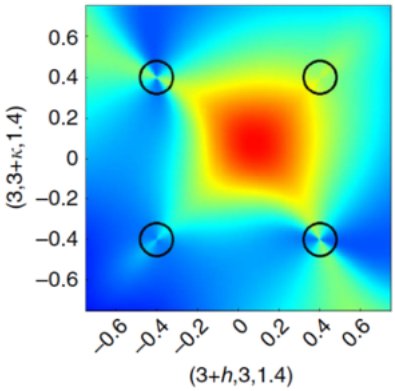
Emergent phenomena in spin liquids

Ludovic Jaubert[1,2], *Marion* Brooks-Barklett[3], *Simon* Banks[3], *Adam* Harman-Clarke[3,4], *Peter* Holdsworth[4], *Taoran* Lin[5], *Tuba* Opel[5], *Michel* Gingras[5,6,7], *Claudio* Castelnovo[8], *Roderich* Moessner[9], *Tomonari* Mizoguchi[10], *Masafumi* Udagawa[11], *Owen* Benton[12], *Han* Yan[2], *Nic* Shannon[2]

[1]*LOMA, University of Bordeaux, France*	[7]*CIFAR, Toronto, Canada*
[2]*OIST, Okinawa, Japan*	[8]*University of Cambridge, UK*
[3]*University College London, UK*	[9]*MPI-PkS, Dresden, Germany*
[4]*ENS Lyon, France*	[10]*University of Tokyo, Japan*
[5]*University of Waterloo, Canada*	[11]*University of Gakushuin, Tokyo, Japan*
[6]*Perimeter Institute, Waterloo, Canada*	[12]*RIKEN, Tokyo, Japan*

Spin liquids are malleable magnetic textures obeying their own microscopic rules. These rules, due to frustrated constraints, can take the form of emergent gauge fields able to support quasi-particles, readily accessible by experimental probes.

In this talk we will illustrate the diversity of emergent phenomena supported by spin liquids, starting from the Coulomb gauge field of spin-ice materials. This Coulomb field can be for example confined in thin-film geometries, or serve as a foundation for exotic phases such as fragmented spin liquids — coexisting with long-range order — whose excitations are reminiscent of the particle-hole physics of semi-conductors. Beyond Coulomb gauge field, we will discuss how topological defects can form fluctuating clusters *without* long-range order, and how other forms of gauge fields, such as linearised general relativity, can appear in a crystal.



Pinch line singularities: signatures of an emergent gauge field beyond electromagnetism