Marcelo's Talk Title/Abstract

Magnetoelastics of AFM domains in UO_2 and a novel electronic nematic state in $CeRhIn_5$

Large magnetic fields are used to tune the ground state of correlated electron systems, and to experimentally access rare states of matter in regimes where not the temperature but the magnetic field is the dominant energy scale. Adopting clever approaches to traditional techniques, designed for the microsecond time-scale, we successfully tackle low dimensional and geometrically frustrated quantum magnets, topological Kondo insulator candidates, Lifshitz-type transitions in correlated *f*-electron metals, and control pathways in 'hidden order' compounds. In this seminar I will present two recent studies of magnetoelastic correlations, *i.e.* studies of the crystal lattice as host and witness of field-induced quantum phenomena in the antiferromagnetic Mott insulator UO_2, and the antiferromagnetic metal $CeRhIn_5$. In the former, possibly the most studied *f*-electron system ever, we use pulsed field fiber Bragg grating (FBG) magnetostriction to uncover the strongest known piezomagnet with record-high switching fields. [1] These properties are likely a direct consequence of the broken time-reversal symmetry of its non-collinear magnetic ground state. In the later, transport properties in samples prepared with a focus ion beam lithographphty technique and high resolution FBG magnetostriction in pulsed and DC magnetic fields to 45 tesla are used to reveal a puzzling electronic nematic state that could help build an universal understanding of pressure and magnetic field branches of the (T,H,p) phase diagram. [2,3]

[1] M. Jaime et al. *Nature Communications* **8**, 99 (2017).
[2] F. Ronning et al., *Nature* **548**, 313 (2017).
[3]P.F.S Rosa et al., **arXiv:1803.01748**