

Yann Gallais

Université Paris Diderot, France

**Nematic fluctuations and criticality in unconventional
superconductors**

The spontaneous appearance of nematicity, a state of matter that breaks rotation but not translation symmetry, is ubiquitous in many iron based superconductors (Fe SC), and may have relevance for the cuprates as well. Here I will review recent electronic Raman scattering experiments which report the presence of critical electron nematic fluctuations in the tetragonal phase of several Fe SC systems [1,2,3]. I will focus in particular on the compound FeSe where the effect of both chemical (isovalent substitution with of Se with S) and physical pressure on nematic degrees of freedom have been studied [4, 5]. I will discuss in particular the possible relevance of nematic quantum criticality in enhancing T_c . I will also present recent results on the cuprate Bi2212, where similar charge fluctuations are observed near the end-point of the pseudogap, in the overdoped regime. I will however highlight key differences with regards to the nematic fluctuations observed in Fe SC, and assess their link with the pseudogap phase.

References

- [1] Y. Gallais et al. Phys. Rev. Lett. 111, 267001 (2013)
- [2] Y. Gallais and I. Paul, C. R. Phys. 17, 133 (2016)
- [3] Y. Gallais et al. Phys. Rev. Lett. 116, 017001 (2016)
- [4] P. Massat et al. PNAS 113, 9177 (2016)
- [5] P. Massat et al., D. Farina et al. submitted