

# Critical Elasticity and Superconductivity in the Iron Based Systems

Indranil Paul

*Laboratoire Matériaux et Phénomènes Quantiques, Université Paris Diderot & CNRS, UMR 7162,  
75205 Paris, France*

Email: indranil.paul@univ-paris-diderot.fr

In unconventional superconductors an important question is whether superconducting transition temperature  $T_c$  is boosted in the vicinity of a nematic quantum critical point (QCP). While existing theories have predicted significant  $T_c$  enhancement, experiments on doped FeSe clearly show that  $T_c$  is unaffected by the QCP. We provide an explanation of this observation based on effects of the interaction between the electrons and the acoustic phonons of the lattice. Including this interaction restricts criticality only to certain high symmetry directions due to the presence of non-critical shear modes that necessarily exist in a crystalline solid. This physics, in conjunction with the presence of a non-nematic pairing interaction, possibly of magnetic origin, leads to a  $T_c$  that is unaffected by the nematic QCP. Our theory emphasizes the importance of electron-phonon interaction to understand the physical effects of critical nematic fluctuations.

## References

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- [2] I. Paul and M. Garst 2017, Phys. Rev. Lett. **118**, 227601.