Impact of electronic nematicity on the unconventional superconductivity of the iron pnictides

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Recent experiments in iron-based superconductors have provided strong evidence for the existence of an unusual correlated state in the phase diagram of these materials, dubbed electronic nematic. Below the nematic transition temperature, the tetragonal symmetry of the system is broken by electronic correlations, instead of lattice fluctuations. A key open question is relationship between nematicity and superconductivity. In this talk I will explore this issue via a microscopic electronic model in which the nematic instability is caused by magnetic fluctuations arising from a degenerate ground state. I will also demonstrate that, in general, nematic order competes with the unconventional sign-changing s^{+-} superconducting state, although they may coexist under certain conditions. However, when the s^{+-} instability is in close competition with a d-wave instability – as it has been suggested in several iron pnictides – I will show that nematic and superconducting degrees of freedom are strongly coupled. As a result, not only T_c can be significantly enhanced by nematic order, but also nematicity itself can be used as a diagnostic tool to search for more exotic superconducting states – such as states that spontaneously break time-reversal or tetragonal symmetries.