Notre Dame Science
Department of Physics

NEMATIC SUSCEPTIBILITY AND QUANTUM CRITICALITY IN IRON-BASED SUPERCONDUCTORS

Dr. James Analytis
Staff Scientist, SLAC

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Understanding the role of quantum critical fluctuations in materials connects many problems in condensed matter physics, particularly exotic superconductivity in the cuprate, organo-metallic and heavy-fermion materials. The iron-based superconductors could provide a simpler route into understanding this broad problem because of their simple (and relatively uncontroversial) phase structure. As these materials are doped or the temperature is lowered, the different thermodynamic phases that are stabilized include magnetism and superconductivity. However recent measurements have also suggested that nematic order plays an important role by coupling to magneto-elastic or superconducting-elastic degrees of freedom. I will present evidence from transport measurements of underdoped (orthorhombic) and overdoped (tetragonal) compounds that a diverging nematic susceptibility is closely linked with quantum critical fluctuations at optimal doping, suggesting a strong connection to superconductivity.

Condensed Matter Seminar

All interested persons are cordially invited to attend.