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SURPRISES IN TOPOLOGICAL INSULATORS -- SINGULAR PARAMAGNETISM AND SUPERCONDUCTIVITY

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Abstract:

Magnetic susceptibility of several common topological insulators (Bi2Se3,Sb2Te3, Bi2Te3) is singular at low field, $\chi(B=0)-\chi(B)\sim |B|+...$, as recently reported by Zhao et.al in Nature Materials 13, 580–585 (2014).

I will summarize experimental facts, including unambiguous identification of surface origins of this singularity, as well as some theoretical considerations. One of these compounds (Sb2Te3) was also found to super-conduct upon fine-tuning of growth chemistry (Zhao etal, Nat. Commun. 6, 2015). The transition to zero resistance state takes place at 9K but is precipitated by a "local" superconducting transition at much higher temperature, near 50 K as detected in magnetization, transport and scanning tunneling spectroscopy studies. This talk will overview these recent surprising discoveries and outline a few basic ideas and models that appear relevant.