# Critical behaviour of resistivity in dilute ferromagnetic semiconductors

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One of the open questions in the physics of conducting magnets is the origin of the critical behaviour of resistivity at the Curie temperature. In $Ga_{1-x}Mn_xAs$ that has become an archetypical carrier-mediated dilute ferromagnetic semiconductor, a phenomenological approach showed that the singularity in d$R$/d$T$ at $T_C$ can be consistently interpreted in terms of large wave vector scattering of hole carriers by Mn spin fluctuations [1]. However, it is known that spin-disorder scattering affects resistance also *via* quantum localisation corrections to conductivity in a disordered systems [2]. In this work we examine the role of this effect across the paramagnet-ferromagnet phase transition. Within this approach we find a semi-quantitative agreement between our experimental and theoretical results. Furthermore, to tell the relative importance of one-electron compared to Coulomb correlation effects we extend our analysis to $(Pb_{1-x-y},Sn_y,Mn_x)Te$. Being at the edge of the ferroelectricity this compound exhibits a high dielectric constant which modifies the nature of the disorder modified electron-electron interactions [3].

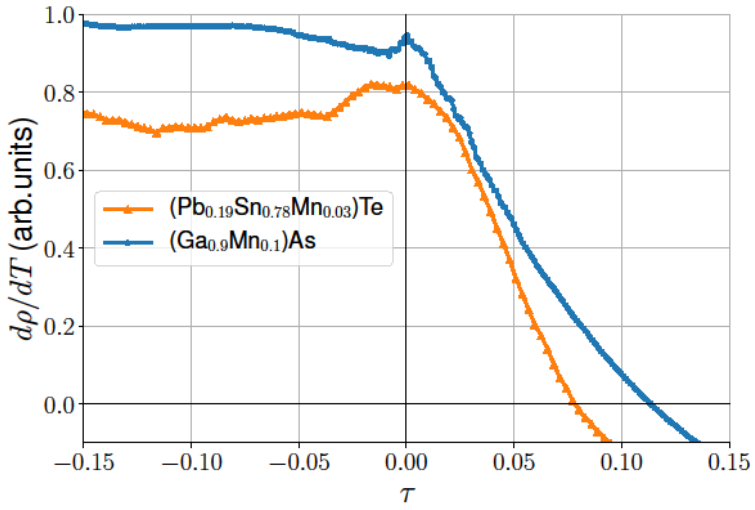


Fig 1. Temperature derivative of the measured resistivity of $Ga_{0.9}Mn_{0.1}As$ and $(Pb0._{19},Sn_{0.78}Mn_{0.03})Te$ without an external magnetic field, where τ is a relative temperature distance to $T_C$.

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[2] T. Dietl, *J. Phys. Soc. Japan.* **77**, 031005 (2008).
[3] A. Prinz *et al*., *Phys. Rev. B* **59**, 12983 (1999).