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Fingerprints of intrinsic phase separation in magnetically-doped 2DEG HANNA TERLETSKA, VLADIMIR DOBROSAVLJEVIC, Florida State University,Natinal High Magnetic Field Laboratory — We theoretically study the properties of a recently observed [1] inhomogeneous phase preceding the metal-insulator transition in a magnetically-doped two-dimensional electron gas (2DEG). We show that, due to competition between (ferromagnetic) double-exchange and (anti-ferromagnetic) super-exchange, at very low carrier density such a system is unstable toward intrinsic phase separation (PS). Here, ferromagnetic carrier-rich (metallic) "droplets" emerge within a magnetically disordered carrier-poor (insulating) matrix. Our calculations indicate that this regime should display very unusual transport, featuring colossal magneto-resistance with exceptionally weak density dependence - in striking agreement with experiments [1] on CdMnTe quantum wells. Such exotic transport properties - we argue - should be considered as "fingerprints" for intrinsic phase separation, a behavior very different from situations where phase coexistence is driven by disorder due to extrinsic impurities or defects.
[1] J. Jaroszyski *et al.*, Phys. Rev. B **76**, 045322 (2007).

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