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Flow diagram of the metal-insulator transition in two dimensions¹ SERGEY KRAVCHENKO, Northeastern University, SVETLANA ANISSI-MOVA, Boston University, ALEXANDER PUNNOOSE, CCNY, ALEXANDER FINKEL'STEIN, Weizmann Institute, TEUN KLAPWIJK, TU Delft — Recently, a two-parameter scaling theory comprehensively describing the metal-insulator transition in 2D was developed by two of us [1]. Here, we report experimental verification of the basis of this theory. We demonstrate, for the first time, that as a result of the interplay between the electron-electron interactions and disorder, both the resistance and the interactions become scale (temperature) dependent. We show that not only the resistance but also the interaction amplitude exhibits a fan-like spread as the MIT is crossed. We use these data to construct a resistance-interaction flow diagram of the MIT that clearly reveals a quantum critical point, as predicted in Ref.[1]. The metallic side of this diagram is accurately described by the theory without any fitting parameters. In particular, the temperature dependence of the resistance, which is non-monotonic, passes through a maximum when the interaction amplitude reaches a certain value $\gamma_2 \approx 0.45$ that is in remarkable agreement with the calculated one.

[1] A. Punnoose and A. M. Finkel'stein, *Science* **310**, 289-291 (2005).

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