Dephasing at the Integer Quantum Hall Transitions: Short-Ranged Interaction in the Singlet Channel"

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The temperature dependence of conductances at the integer quantum Hall transitions is determined by the exponent (kappa) which is the ratio of the localization length exponent (nu) and the dephasing length exponent (p), kappa=p/2nu. Contrary to the localization length exponent which has been intensively studied [1], the dephasing length exponent has attracted much less attention. In Refs. [2] and [3] the dephasing length has been estimated numerically under conjec4ture that the exponent is determined by an anomalous dimension of the irrelevant operator which is involved in the inverse participation ratio. In the present work we analytically demonstrate for short-ranged electron-electron interaction in singlet channel that this conjecture is true for the case of Anderson transition in the unitary class in 2+epsilon dimensions. Our results for 2+epsilon dimensions as well as our numerical calculations of anomalous dimensions of irrelevant operators at the integer quantum Hall transitions provides strong support in favor of this conjecture. Together with known numerical results for the localization length exponent, our numerical results for the dephasing length exponent allows to determine the temperature behavior of the conductances (exponent kappa) at the integer quantum Hall transitions for the case the short-ranged interaction in the singlet channel.

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