Integer quantum Hall transition on a tight-binding lattice

Thomas Vojta[1], Martin Puschmann[1], Philipp Cain[2], and Michael Schreiber[2]

[1]*Missouri University of Science and Technology, Department of Physics, 1315 North Pine Street, Rolla, MO 65409, USA*
[2]*Chemnitz University of Technology, 09107 Chemnitz, Germany*

Even though the integer quantum Hall transition has been investigated for nearly four decades its critical behavior remains a puzzle. The best theoretical and experimental results for the localization length exponent ν differ significantly from each other, casting doubt on our fundamental understanding. While this discrepancy is often attributed to long-range Coulomb interactions, Gruzberg et al. [1] recently suggested that the semiclassical Chalker-Coddington model, widely employed in numerical simulations, is incomplete, questioning the established central theoretical results. To shed light on the controversy, we perform a high-accuracy study of the integer quantum Hall transition for a microscopic model of disordered electrons. We find a localization length exponent $\nu = 2.58(3)$ validating the result of the Chalker-Coddington network.

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[1] I. A. Gruzberg, A. Klumper, W. Nuding, and A. Sedrakyan, Phys. Rev. B 95 (2017), 125414.