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Electron correlations and single particle physics in the integer quantum Hall effect ALEXANDER STRUCK, University of Kaiserslautern, BERNHARD KRAMER, International University Bremen — Recently, the local inverse compressibility of an integer quantum Hall system has been measured (Ilani et. al., Nature **427**, 328(2004)) as a function of electron density n and magnetic field B, a quantity which mimics the change of the chemical potential in the system with respect to the particle density. These compressibility patterns reveal signatures of charging in the quantum Hall system, which in general are attributed to Coulomb interaction in correlated systems and are incompatible with single-particle physics. We have developed a mean-field description for these charging patterns within a spin-unrestricted Hartree-Fock approximation, but allowing for charge rearrangement in the ground state with respect to changes in n and B. Our results match the experimental observations at least in the localized regions and are compatible with the single-particle picture of the localization-delocalization transition. In agreement with experimental data we show that electron-electron interaction cannot be neglegted in a comprehensive theory of the integer quantum Hall effect.

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