Effect of electron-electron interactions on the magnetoresistivity of a weakly-screened, low-density, two-dimensional electron liquid

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We study the strength of electron-electron interactions using magneto-resistivity measurements of two dimensional non-degenerate electrons on helium. Magneto-resistivity of electrons were measured as a function of a magnetic field transverse to the two-dimensional electron layer. With our ability to achieve very low densities we were able to study the effect of electron-electron interactions on magneto-resistivity in the classical regime and at intermediate fields. We observe a crossover from strongly-interacting electron (Drude) regime to independent-electron regime where the data are qualitatively described by self-consistent Born approximation (SCBA) at finite fields. Our data confirm the theory of Lea and Dykman [1-3], and show that electron-electron interactions are important to very low densities. We also find that the SCBA magnetoresistance is density dependent, which in turn suggests that SCBA theory is incomplete.

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