Anisotropic Behavior of Hysterestic Transport Phenomena in the $\nu = 2/3$ Quantum Hall State in the Tilted Magnetc Field

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In fractional quantum Hall effects (FQHEs), the spin degree of freedom opens up a rich variety of quantum phenomena. For instance, in FQHE at the Landau level filling factor $\nu = 2/3$, a phase transition between a spin-polarized and -unpolarized states occur. Around the transition, a domain structure accompanied by a hysteresis is formed. In this work, we study the domain structure in tilted magnetic fields $B_{\|}$, and elusidete that it has an anisotropic structure against the direction of $B_{\|}$. We used two-axis goniometer, by which both the strength of $B_{\|}$ and an angle ϕ between a current I and $B_{\|}$ are controlled. We measured magnetoresistance around the phase transition at $\nu = 2/3$ by changing ϕ. When I is orthogonal to $B_{\|}$ ($\phi = 90°$), a strong hysteresis emerges. As ϕ decreases, the hysteresis becomes small and almost disappears when I is parallel to $B_{\|}$ ($\phi = 0°$). We suggest that domain walls align along $B_{\|}$, and the number of electrons passing across the domain wall increases with ϕ. We also investigated the dependence of the current and the sweep rate of a magnetic field of the anisotropy.

Sorting category: Db Conducting electrons in condensed matter

Keywords: two dimensional electron system, fractional quantum Hall effect, domain wall, hysteresis