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Many-body effects on ρ_{xx} Ringlike Structures via SDFT[1] GERSON J. FERREIRA, HENRIQUE J. P. FREIRE, J. CARLOS EGUES, University of Sao Paulo — In the quantum Hall regime, the longitudinal resistivity ρ_{xx} plotted in a density–magnetic-field diagram displays ringlike structures due to the crossings of spin split Landau levels of distinct subbands. We theoretically investigated the dependence of the magnetoresistance on the magnetic field tilt angle and on the temperature using Spin Density Functional Theory (SDFT). Assuming a temperature dependence of the Landau levels broadenings, we show that the ringlike structures are broken at sufficiently low temperatures due to a ferromagnetic quantum phase transition. Additionally, for tilt magnetic field, the momentum in the growth direction (z) also couples to the magnetic field zP_x coupling, thus giving rise to anticrossings between consecutive Landau levels and subbands, collapsing the ring with increasing tilt angle. We find that the interplay of these anticrossings and many-body interactions (via SDFT) leads to a reduced zP_x coupling, increasing the collapsing angle at which the ring fully disappears. Our results explain some of the physical mechanisms behind ring formation and collapse which have been experimentally observed.

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