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The Anomalous Hall Effect in Ultra-Thin Amorphous CNi₃ Films YIMIN XIONG, PHILIP ADAMS, Department of Physics and Astronomy, Louisiana State University, GIANLUIGI CATELANI, Department of Physics, Yale University — The anomalous Hall resistance in homogeneous CNi₃ films with sheet resistance near the quantum resistance was studied. Tunneling measurements show that the saturation behavior is commensurate with the emergence of the 2D Coulomb gap, suggesting that e-e interactions mediate the high-disorder phase. The saturation of anomalous Hall resistance is associated with the crossover from the weak-localization regime to that of a 2D correlated insulator. In the weak-localization regime, where the sheet conductance $G \gg e^2/h$, the anomalous Hall resistance of the films increases with increasing disorder and the Hall conductance scales as $G_{xy} \propto G^\varphi$ with $\varphi = 1.6$. However, at sufficiently high disorder the system begins to enter the 2D correlated insulator regime, at which point the Hall resistance R_{xy} abruptly saturates and the scaling exponent becomes $\varphi = 2$. The crossover is also clearly evident in the scaling behavior of the Hall conductivity as well as in the tunneling density of states.

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