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Temperature Dependence of Anomalous Hall Effect in Metallic (Ga,Mn)As films XINYU LIU, ZHIGUO GE, SHAOPING SHEN, MARGARET DOBROWOLSKA, JACEK FURDYNA, Department of Physics, University of Notre Dame, Notre Dame, IN 46556 — We present a systematic study of the temperature dependence of anomalous Hall effect (AHE) in metallic (Ga,Mn)As films. The Hall effect in (Ga,Mn)As is described as $\rho_{xy} = R_0 B + c\rho_{xx}^n M_z$, where R_0 $(1/ep)$ is the ordinary Hall coefficient, ρ_{xy} and ρ_{xx} are the transverse and longitudinal resistivities, and n is a scaling parameter. In this work we have developed a self-consistent method to determine R_0, c and n simultaneously. We use this method to analyze the Hall and resistivity data measured up to B = 6 T at various temperatures. We find that for the metallic samples, a distinct evolution of the AHE occurs as temperature increases, as evidenced by the temperature or magnetization dependence of the parameter c. We propose that the correlation between the AHE and the resistivity should be reconsidered by using a two- component model in order to separate contributions due to different scattering mechanisms.

Xinyu Liu
University of Notre Dame

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