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Sign change of anomalous Hall coefficient with temperature in $Ga_{1-x}Mn_xSb$ random alloys. M. EGINLIGIL, G. B. KIM, H. LUO, B. D. MCCOMBE, SUNY Buffalo — We have observed sign changes as a function of temperature (T) in the anomalous Hall (AH) coefficient of ferromagnetic (FM) $Ga_{1-x}Mn_xSb$ films showing weakly localized behavior in the electrical transport. Low magnetic field measurements vs. T (below the Curie temperature, T_c, which is between 13K and 24K) show changes in the sign of the slope of the AH resistance vs. field. We attribute this unusual behavior to the movement of the chemical potential (μ) through the density of states (DOS) extrema in the spin dependent impurity band(s) as recently predicted theoretically [1]. We have developed a model based on the prediction that the AH coefficient depends on the local slope of the DOS in the hopping conduction regime. Our model uses the experimentally determined hole and Mn_{Ga} concentrations to find the position of the μ vs. T. The two spin dependent impurity bands in the FM state are assumed to be gaussian. Below T_c with increasing T, the spin-up and spin-down impurity bands move into the energy gap and converge. As T increases μ moves from its initial position on the positive slope of the low energy band (EB) through the minimum before continuing across the maximum of the higher EB. This analysis is in qualitative agreement with our experimental results. [1] Burkov and Balents, PRL, 91 (2003) Supported by NSF ESC 0224206 and University at Buffalo, SUNY

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