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Generalization of the van der Pauw Method: Analyzing Longitudinal Magnetoresistance Asymmetry to Quantify Doping Gradients[1] M. GRAYSON, WANG ZHOU, HEUN-MO YOO, S. PRABHU-GAUNKAR, Northwestern University, L. TIEMANN, C. REICHL, W. WEGSCHEIDER, ETH Zurich, Switzerland — A longitudinal magnetoresistance asymmetry (LMA) between a positive and negative magnetic field is known to occur in both the extreme quantum limit and the classical Drude limit in samples with a nonuniform doping density. By analyzing the current stream function in van der Pauw measurement geometry, it is shown that the electron density gradient can be quantitatively deduced from this LMA in the Drude regime [1]. Results agree with gradients interpolated from local densities calibrated across an entire wafer, establishing a generalization of the van der Pauw method to quantify density gradients. Results will be shown of various semoconductor systems where this method is applied, from bulk doped semiconductors, to exfoliated 2D materials.
[1] W. Zhou, H.M. Yoo, S. Prabhu-Gaunkar, L. Tiemann, C. Reichl, W. Wegscheider, and M. Grayson, Phys. Rev. Lett. **115**, 186804 (2015).

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