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The Effects of Fringe Fields on Organic Magnetoresistance[1]
NICHOLAS HARMON, Department of Physics and Astronomy, University of Iowa, FERRAN MACIÀ, Deptarment of Physics, New York University, FUJIAN WANG, MARKUS WOHLGENANNT, Department of Physics and Astronomy, University of Iowa, ANDREW KENT, Deptarment of Physics, New York University, MICHAEL FLATTÉ, Department of Physics and Astronomy, University of Iowa — The importance of random hyperfine fields is now widely acknowledged as a vital ingredient for the phenomena of organic magnetoresistance (OMAR). Recent experiments (Phys. Rev. X 2 021013 (2012)) have shown that another type of random field - fringe fields due to a nearby ferromagnet - can also dramatically affect magnetoconductivity. A theoretical analysis of the fringe field OMAR is challenging due to the different properties of the fringe fields when compared to the hyperfine fields. For instance, the range of fringe field strengths is 1-2 orders of magnitude larger than that of the hyperfine couplings. The correlation length between fringe fields is also larger by the same degree. We use a recent theory of OMAR that is well-suited to numerically calculate the magnetoresistance with both hyperfine and fringe fields present. We find agreement with key features of experimental fringe-field magnetoresistance dependences on applied magnetic field, including the field values of extrema of the magnetoresistance, the region of large magnetoresistance effects from the fringe fields, and the sign of the effect.

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Nicholas Harmon
Department of Physics and Astronomy, University of Iowa

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