Abstract Submitted
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Spin-flip induced magnetoresistance in positionally disordered organic solids[1] NICHOLAS HARMON, MICHAEL FLATTÉ, University of Iowa — A theory for magnetoresistance in positionally disordered organic materials is presented and solved using percolation theory. The model describes the effects of spin dynamics on hopping transport by considering changes in the effective density of hopping sites, a key quantity determining the properties of percolative transport. Faster spin-flip transitions open up 'spin-blocked' pathways to become viable conduction channels and hence produce magnetoresistance. Features of this percolative magnetoresistance can be found analytically in several regimes, and agree with previous measurements, including the sensitive dependence of the magnetic-field-dependence of the magnetoresistance on the ratio of the carrier hopping time to the hyperfine-induced carrier spin precession time. Studies of magnetoresistance in known systems with controllable positional disorder would provide an additional stringent test of this theory.

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