Title:	Thermal noise induced stochastic resonance in self organizing Fe nanoparticle system
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Abstract:	The natural world is replete with examples of multistable systems, known to respond to periodic modulations and produce a signal that exhibits resonance with noise amplitude. This is a concept not demonstrated in pure materials, which involve a measured physical property. In a thermoremanent magnetization experiment with a common magnetic material, Fe, in the nanoparticulate form, we establish how magnetization in a system of dilute spins during dissipation of stored magnetic energy breaks up into spontaneous oscillatory behavior. Starting at 175K and aided by temperature (stochastic noise) the oscillation amplitude goes through a maximum reminiscent of stochastic resonance. Our observation of thermal noise induced coherent resonance is due to intrinsic self-organizing magnetic dynamics of the Fe nanoparticle system without applying any external periodic force. These results yield new possibilities in the design of magnetic materials and a platform to understand stochastic interference and phase synchronization in neural activity, as models for neural communication
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