Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Plasticity-Induced Magnetism in Frustrated Amorphous Solids
GEORGE HENTSCHEL, Emory University, Atlanta, GA, ITAMAR PROCACCIA, BHASKAR SEN GUPTA, Weizmann Institute, Rehovot, Israel — Amorphous magnetic solids, like metallic glasses, with no macroscopic magnetic order due to random locally favoured orientations for individual spins exhibit a novel effect: the emergent growth of a macroscopic magnetic Order in the presence of an imposed mechanical strain in athermal conditions in the presence of a imposed magnetic field. The magnetic moment increases in steps whenever there is a plastic event. Thus plasticity induces the magnetic moment, acting as the effective noise driving the system towards equilibrium. We present results of atomistic simulations of this effect in a model of a magnetic amorphous solid subjected to pure shear and a magnetic field. While to elucidate the dependence on external strain and magnetic field we offer a mean-field theory that provides an adequate qualitative understanding of the observed phenomenon.

George Hentschel
Emory University, Atlanta, GA

Date submitted: 11 Nov 2013 Electronic form version 1.4