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Classifying magnetic interactions in nanoparticle assemblies using Cole-Cole plots WOLFGANG KLEEMANN, Angewandte Physik, Universität Duisburg-Essen, 47048 Duisburg, Germany, OLEG PETRACIC, Angewandte Physik, Universität Duisburg-Essen, 47048 Duisburg, Germany, ANDREAS GLATZ, Institut für Theoretische Physik, Universität zu Köln, 50937 Köln, Germany, SUBHANKAR BEDANTA, Angewandte Physik, Universität Duisburg-Essen, 47048 Duisburg, Germany, XI CHEN, Angewandte Physik, Universität Duisburg-Essen, 47048 Duisburg, Germany — Measuring the magnetic ac susceptibility, $\chi = \chi' - i\chi''$, of nanoparticle assemblies leads to important conclusions about the role of inter-particle interactions. We demonstrate that the Cole-Cole plot, χ'' vs. χ', can be used as a tool for classifying the magnetic behavior of interacting or non-interacting nanoparticles. Distinguishing non-interacting superparamagnetic from superspin glass (SSG) or superferromagnetic (SFM) behavior is easily possible. We performed measurements of the magnetization hysteresis and ac susceptibility on both SSG and SFM granular multilayers $[Co_{80}Fe_{20}/Al_2O_3]_{\ n}$. The SFM results are successfully compared to simulations of a driven domain wall in a random medium. Work supported by the DFG, Alexander von Humboldt Foundation and DAAD.

Oleg Petracic
Angewandte Physik, Universität Duisburg-Essen, 47048 Duisburg, Germany

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