

Superferromagnetic sensors

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Superferromagnets (SFMs), e.g., magnetic nano-crystal self-assemblies and/or arrays, represent promising candidates for Lab on a Chip systems including many laboratory tasks. Such soft magnetic systems provide an opportunity to develop new materials with characteristics far beyond traditional solids. The randomly jumping interacting moments (RJIM) model, see [1] and refs. therein, gives useful framework for studies of SFMs. In particular, it provides a basis for developing analytical tools employed in order to specify, quantify and analyse respective magnetic structures. Such tools explore correlations of magnetic noise amplitudes and allow for quantitative definition, description and study the SFM origin, as well as self-organized criticality in the response properties. In this contribution we briefly overview some results for a sensor mode of SFM reactivity associated with spatially local external fields, i.e., a detection of magnetic particles. Favorable designs of superferromagnetic systems for sensor implications are revealed.

References:

[1] V.N. Kondratyev. J. Phys.: CS, 248, 012027 (2010)