

Title: Nonmonotonic Magnetic Susceptibility of Dipolar Hard-Spheres at Low Temperature and Density

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Source: Physical Review Letters **Volume:** 110 **Issue:** 14

Article Number: 148306 **DOI:** 10.1103/PhysRevLett.110.148306 **Published:** Apr 5 2013

Document Type: Article

Language: English

Abstract: We investigate, via numerical simulations, mean field, and density functional theories, the magnetic response of a dipolar hard sphere fluid at low temperatures and densities, in the region of strong association. The proposed parameter-free theory is able to capture both the density and temperature dependence of the ring-chain equilibrium and the contribution to the susceptibility of a chain of generic length. The theory predicts a nonmonotonic temperature dependence of the initial (zero field) magnetic susceptibility, arising from the competition between magnetically inert particle rings and magnetically active chains. Monte Carlo simulation results closely agree with the theoretical findings. DOI: 10.1103/PhysRevLett.110.148306

Keywords Plus: Monte-Carlo; Behavior; Fluid; Ferrofluids; Association; Transition; Chain; Model; Particles; Model; System

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Funding:

Funding Agency	Grant Number
RFBR	mol-a 1202-31-374 mol-a-ved 12-02-33106
Ministry of Science and Education of RF	2.609.2011
Portuguese Foundation for Science and Technology (FCT)	PEst-OE/FIS/UI0618/2011 PTDC/FIS/098254/2008
	FP7-IDEAS-ERC-226207-PATCHYCOLLOIDS
	ITN-234810-COMPLOIDS

Publisher: Amer Physical Soc

Publisher Address: One Physics Ellipse, College PK, MD 20740-3844 USA

ISSN: 0031-9007

Citation: KANTOROVICH, Sofia; IVANOV, Alexey O.; ROVIGATTI, Lorenzo; TAVARES, Jose Maria; SCIORTINO, Francesco - Nonmonotonic Magnetic Susceptibility of Dipolar Hard-Spheres at Low Temperature and Density. Physical Review Letters. ISSN 0031-9007. Vol. 110, nr 14 (2013).