

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

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**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

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