

# Self-assembly of superparamagnetic colloids in a quasi-two-dimensional vessel

Nicolás Rojas<sup>1</sup>

Service de Physique de l'Etat Condensé (SPEC), CEA Saclay  
nicolas.rojas@email.com

At thermodynamic equilibrium, superparamagnetic colloidal particles aggregate forming chains oriented parallel to the direction of the magnetic field. Leading to wider structures such as ribbons, the magnetic field magnitude is controlled in experiments [1,2]. A theory for the mean length of the aggregates was recently developed in good agreement with multistable data [3]. A first approach considers that the total number of particles in the chamber is conserved, which serves as a technique to be employed when the magnetic interaction potential is introduced. Numerical and analytic results considering the magnetic interaction energy are obtained, employing a coarse grained approximation. A good agreement with experimental measurements is achieved by taking into account the mean interaction free energy per particle. The multistability of the experimental findings is provided by the multiplicity of real positive numerical solutions and the absolute value of complex solutions, which increases with the magnetic field magnitude.

## Références

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