SFB/TRR 21 - Seminar

18. März 2015, Ulm

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Structural transitions of nearly second order in dipolar gases

Particles with repulsive power-law interactions undergo a transition from a single to a double chain (zigzag) by decreasing the confinement in the transverse direction. We theoretically characterize this transition when the particles are classical dipoles, polarized perpendicularly to the plane in which the motion occurs, and argue that this transition is of first order, even though weakly. The nature of the transition is determined by the coupling between transverse and axial modes of the chain and contrasts with the behaviour found in Coulomb systems, where the linear-zigzag transition is continuous and belongs to the universality class of the ferromagnetic transition. Our results hold for classical systems with power-law interactions $1/r^{\alpha}$ when $\alpha > 2$, and show that structural transitions in dipolar systems and Rydberg atoms can offer the testbed for simulating the critical behaviour of magnets with lattice coupling.

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