Crystallisation and gel formation in suspensions of oppositely charged colloids

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I will present our results on the study of the kinetics of the liquid-to-solid transformation and of gel formation in colloidal suspensions of oppositely charged particles. On the one hand, at high temperatures and packing fractions the fluid-to-crystal pathway does not follow the minimum free-energy route.
On the other hand, at low temperature and packing fraction the system undergoes a spinodal decomposition that stops, giving rise to a gel-like structure. Our simulations and experiments suggest that increasing the interaction range favours crystallisation over vitrification in such gel structures.
The colloidal suspensions used in these experiments consist of charged colloids in low polarity solvents containing nanomolar salt concentration. In the next part of my talk I will present our results on association of ions in electrolyte solutions at very low concentration and low temperature, considering the case of Restrictive Primitive Model. Developing specialised simulation techniques, we obtain efficient sampling of the clusters/free ions in nanomolar solutions of simple salts. Comparing simulations with theory and experimental results for salt-solutions in low polarity solvents, we find an excellent agreement. To conclude, we suggest a "corrected" screening length when dealing with colloid-colloid interactions in such suspension. In the last part of my talk I will present our novel approach to compute the free-energy of solids.

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Institute for Computational Physics, Allmandring 3
Seminar room 1.073