



## Editorial

Welcome to the second issue of the annual SFB TR6 Gemeindebrief. This newsletter is a forum to present the recent research highlights and scientific activities of the collaborative research centre SFB TR6. It is directed both to researchers in the network and to other scientists interested in the physics of colloidal dispersions. The newsletter also includes a short personalia section and information about SFB TR6 and soft matter conferences, schools and workshops.

Those of you who want to know more about the SFB TR6 are invited to visit our web page:  
<http://www.sfb-tr6.de/>

Hartmut Löwen  
Heike Kaminski

## SOCOBIM 2007

### International Conference, Terassini, Sicily

The international SOCOBIM conference on Soft, Complex and Biological Matter took place from 15-19 July 2007 in Sicily, having a status of a satellite meeting of the StatPhys conference. SOCOBIM has been jointly organized by the SFB TR6 and the Italian Center of Excellence "SOFT-CNR: Complex Dynamics in Structured Systems". 220 participants from 25 countries attended the meeting which featured 36 talks by internationally leading scientists and about 200 poster contributions.



Conference dinner



Talks



Group photo



The organizers



Poster session

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**The SFB TR6 Summer School on Soft Matter**

The SFB TR6 Summer School "Colloids in External Fields: physics and applications" was organized by G. Maret and J. Bibette in Cargese (Corsica) from October 2-13 (2006). The idea of this summer school was first to bring together fundamental physics of colloids in external fields with their applications in biology, bio-medicine and medical imaging. The second purpose was to establish a forum for young researchers to learn about fundamental



Group photo

topics in these areas. The summer school was a great success: about 82 applications were received (29 from the young researchers within in SFB TR6). 13 internationally recognized scientists were presenting sets of lectures, 7 were from the SFB TR6. The notes were collected on the web (<http://www.sfb-tr6.de/summerschool06/index.php>). Contributed talks from the Summer School participants were also selected. There was a large poster session in which the participants could present their own research.



T. Vissers (Utrecht) and D. Weitz (Harvard) involved in scientific discussions



Fresh-air poster session



Conference excursion

**Selected scientific results****Confocal Microscopy of Colloidal Particles: Towards Reliable, Optimum Coordinates***M.C. Jenkins, S.U. Egelhaaf**Advances in Colloid and Interface Science, in press (2007)*

Based on the classical programmes by Crocker & Grier and Weeks, a method was developed to determine improved particle coordinates from microscopy data which uses the full particle image instead of the centroid only. It furthermore provides error estimates for each particle position and thus allows for a comparison between different particle locations (project sections A6/C7).

**Depletion-Induced Percolation in Networks of Nanorods***T. Schilling, S. Jungblut, and Mark A. Miller**Phys. Rev. Lett. 98, 108303 (2007)*

The impact of depletion on the percolation threshold in network-forming rod-like colloids was investigated by computer simulation. Although depletion forces favour alignment of the rods, the percolation threshold decreases significantly (project section D5).

**Partial Clustering in Binary Two-Dimensional Colloidal Suspensions***N. Hoffmann, F. Ebert, C.N. Likos, H. Löwen, and G. Maret,**Phys. Rev. Lett. 97, 078301 (2006)*

A novel clustering behaviour in a binary mixture of magnetic colloids as revealed by a prepeak in the small-small structure factor  $S_{22}(k)$  was predicted by liquid integral equation theory in Düsseldorf and confirmed in real-space experiments in two-dimensional superparamagnetic colloids in Konstanz. This is a collaboration of the project sections C2 and C3.

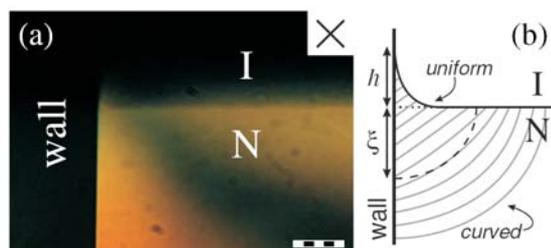
**Suppression of Thermally Excited Capillary Waves by Shear Flow***D. Derks, D.G.A.L. Aarts, D. Bonn, H.N.W. Lekkerkerker, and A. Imhof,**Phys. Rev. Lett. 97, 038301 (2006)*

Shear kills thermally excited capillary waves at the colloidal gas-liquid interface in a colloid-polymer mixture and thus smoothens the interface significantly (project sections A3 and C6).

### Isotropic-Nematic Interface and Wetting in Suspensions of Colloidal Platelets

*D. van der Beek, H. Reich, P. van der Schoot, M. Dijkstra, T. Schilling, R. Vink, M. Schmidt, R. van Roij, and H. Lekkerkerker*  
*Phys. Rev. Lett.* **97**, 087801 (2006)

By a combined effort of experiment, density functional theory and computer simulations the isotropic-nematic surface tension of colloidal platelets was determined and found to be extremely small. Furthermore the wetting, capillary rise and anchoring behaviour near a wall was explored and revealed. This was a SFB TR6 collaboration between the three locations Utrecht (experiments), Düsseldorf (theory), and Mainz (computer simulation), of the project sections A3, C7, D3, D4, D5.



### Nonequilibrium Sedimentation of Colloids on the Particle Scale

*C.P. Royall, J. Dzubiella, M. Schmidt, and A. van Blaaderen*  
*Phys. Rev. Lett.* **98**, 188304 (2007)

Sedimentation behaviour under strong confinement on the particle-scale was studied by real-space experiments and described by dynamical density functional theory. At high Peclet numbers a Rayleigh-Taylor-like instability was found which is a topic of current collaboration between Düsseldorf-Jülich-Utrecht.

### Electrophoresis of Colloidal Dispersions in the Low-Salt Regime

*V. Lobaskin, B. Dünweg, M. Medebach, T. Palberg, and C. Holm*  
*Phys. Rev. Lett.* **98**, 176105 (2007)

The electrophoretic mobility of charged colloids was simultaneously simulated and measured in Mainz (project sections B1 and B4), and excellent agreement was found.

### Critical Behavior of Colloidal-Polymer Mixtures in Random Porous Media

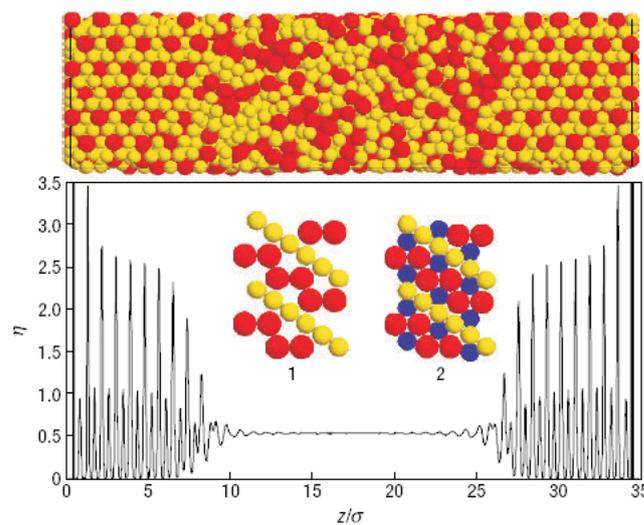
*R.L.C. Vink, K. Binder, and H. Löwen*  
*Phys. Rev. Lett.* **97**, 230603 (2006)

An old conjecture of de Gennes was finally proved by computer simulation: the critical behaviour of fluids in a random matrix falls into the random-field Ising universality class. This was a collaboration between Düsseldorf (project section D3) and Mainz (project section A5).

### Self-assembly route for photonic crystals with a bandgap in the visible region

*Antti-Pekka Hynninen, Job H.J. Thijssen, Esther C. M. Vermolen, Marjolein Dijkstra, A. van Blaaderen*  
*Nature Materials* **6**, 202 (2007)

Colloidal self-assembly is crucial to construct photonic band-gap materials. In fact it was shown by computer simulation that optical band-gap materials can be found in binary colloidal crystals with diamond and pyrochlore structure (project section A3).



**Figure:** Density profile and a snapshot of the simulation along the  $z$  direction. Structure 1: Small (yellow) and large (red) spheres attached to a wall resembling the (110) plane of the  $\text{MgCu}_2$  structure. Structure 2: Wall pattern plus the first plane of mobile small spheres (dark blue) slightly above the wall.

### Dense Colloidal Suspensions under Time-Dependent Shear

*J.M. Brader, Th. Voigtmann, M.E. Cates, and M. Fuchs*  
*Phys. Rev. Lett.* **98**, 058301 (2007)

In collaboration with scientists from Edinburgh, the Konstanz theory group laid the foundation of a new mode-coupling theory for sheared suspensions. In particular, this approach is designed to describe nonequilibrium situations with a time-dependent shear rate. This work was funded within the project section A6.

### Colloid-polymer mixtures between asymmetric walls: Evidence for an interface localization transition

*A. De Virgiliis, R.L.C. Vink, J. Horbach and K. Binder*  
*EPL* **77**, 60002 (2007)

By simulations, colloid-polymer mixtures were identified to be ideal candidates for the interface localization transition which takes place in strong confinement between two plates one favouring the colloid-rich and the other the colloidal-poor phase.

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**Colloids at international meetings**

Colloidal suspensions were a prominent topic on the **StatPhys 23** meeting in Genova/Italy which had more than 1000 participants. Plenary talks on colloid/polymer mixtures were given by the SFB TR6 members H. Lekkerkerker and K. Binder.

SFB TR6 members were very active in organizing further meetings: the **SOFT Matter Conference** will be held in Aachen organized by G. Gompper, J. Dhont and D. Richter. Furthermore a **SIMU** meeting will be organized by P. Nielaba in Konstanz right after the CODEF II meeting.

**CODEF II 2008**

held on

**31.03 - 02.04.2008**

in the

Gustav-Stresemann Center  
Bonn (Bad-Godesberg), Germany

Europäische Tagungs- und  
Bildungsstätte Bonn

Langer Grabenweg 68  
53175 Bonn

Sonderforschungsbereich TR6  
"Physics of Colloidal Dispersions  
in External Fields"  
www.sfb-tr6.de

**Open positions for ...**

... a **PhD student** working on the dynamics of charged and attractive colloidal particles in the group of Prof. Nägele (g.naegele@fz-juelich.de), FZ Jülich

... **PhD students and postdocs** working on fundamental aspects of colloidal self-assembly in the theory group of Prof. Dijkstra (m.dijkstra@phys.uu.nl), Utrecht University

... **PhD students and postdocs** working in the field of non-equilibrium behaviour of colloids and surfactants in the experimental group of Prof. Egelhaaf (Stefan.Egelhaaf@uni-duesseldorf.de), University of Düsseldorf.

For more detailed information about the job openings, please visit  
[www.sfb-tr6.de/public/job/jobopenings.php](http://www.sfb-tr6.de/public/job/jobopenings.php)

**DAAD science tour**

In December 2006 a group of 24 American scientists did a German science tour organized by the DAAD. The SFB TR6 was selected to be on their visiting program and they came to Düsseldorf to get an impression of our network on 6th December 2006.

**prizes and honors**

December 2006

**Prof. Dr. Marjolein Dijkstra** (Utrecht, project section A3) has received a prestigious VICI grant (1.275.999 euro) to set up a new research line on colloidal self-assembly by the Netherlands Organisation for Scientific Research (NWO).

January 2007

**Prof. Dr. Kurt Binder** (Mainz, project section A5, C4, D5) has received the honorary doctorate in chemistry from the Marie-Curie-Sklodowska University, Lublin, Polen.

May 2007

**Prof. Dr. Marjolein Dijkstra** (Utrecht, project section A3) has been appointed professor of computer simulations of condensed matter at Utrecht University.

July 2007

**Prof. Dr. Kurt Binder** (Mainz, project section A5, C4, D5) was awarded the Boltzmann Medal. This was the first time that the highest award in the field of statistical physics was given to a physicist working in Germany.

August 2007,

**Dr. Richard L.C. Vink** (Düsseldorf, project section D3) has received a Emmy Noether fellowship.

**upcoming**

Conference/Place	Date
<b>SFB TR6 PhD workshop:</b> Grenoble, France	<b>17-21 Sept. 07</b>

<b>CODEF II</b> Bonn, Germany	<b>Mar.31-Apr.2 2008</b>
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**Special among the SFB TR6 guests:**

**Prof. Dr. Surajit Sengupta, SN Bose National Centre for Basic Science, Kolkata, India,** September - October 2007 visiting Mainz

**Prof. Dr. Ian Snook** June 2007 visiting Mainz

**Dr. J. Chakrabarti SN Bose National Centre for Basic Science, Kolkata, India,** June 18 to July 21, 2007 visiting Düsseldorf.

**Prof. Dr. Ted Burkhardt, Temple University, Philadelphia, USA,** January 2007 to February 8, 2007 visiting Jülich