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**Colloidal dispersions in external fields: from equilibrium to non-equilibrium**[1]

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Dispersions of colloidal particles are excellent model systems of classical statistical mechanics in order to understand the principles of self-organization processes. Using an external field (e.g. electric or magnetic field) the effective interaction between the colloidal particles can be tailored and the system can be brought into non-equilibrium in a controlled way. Glass formation after an ultrafast quench in a two-dimensional superparamagnetic binary colloidal mixture [1,2] will be discussed as well as lane [3,4,5,6,7] and band [8] formation in mixtures of charged suspensions and dusty plasmas driven by an electric field.

References:

[1] L. Assoud, F. Ebert, P. Keim, R. Messina, G. Maret, H. Lowen, Phys. Rev. Letters 102, 238301 (2009).
[2] L. Assoud, F. Ebert, P. Keim, R. Messina, G. Maret, H. Lowen, J. Phys.: Condensed Matter 21, 464114 (2009).
[3] J. Dzubiella, G. P. Hoffmann, H. Lowen, Phys. Rev. E 65, 021402 (1-8) (2002).
[4] M. E. Leunissen, C. G. Christova, A. P. Hynninen, C. P. Royall, A. I. Campbell, A. Imhof, M. Dijkstra, R. van Roij, A. van Blaaderen, Nature 437, 235 (2005).
[5] M. Rex, H. Lowen, Phys. Rev. E 75, 051402 (2007).
[6] M. Rex, C. P. Royall, A. van Blaaderen, H. Lowen, Lane formation in driven colloidal mixtures: is it continuous or discontinuous?, http://arxiv.org/abs/0812.0908
[7] K. R. Sutterlin, A. Wysocki, A. V. Ivlev, C. Rath, H. M. Thomas, M. Rubin-Zuzic, W. J. Goedheer, V. E. Fortov, A. M. Lipaev, V. I. Molotkov, O. F. Petrov, G. E. Morfill, H. Lowen, Phys. Rev. Letters 102, 085003 (2009).
[8] A. Wysocki, H. Lowen, Phys. Rev. E 79, 041408 (2009).

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