A new experimental setup for microscopic studies of colloidal systems under confinement

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Both equilibrium and non-equilibrium behaviour of confined many particle systems is of great scientific interest. To investigate confined colloidal model systems we constructed a new experimental high-precision setup for microscopic applications. The confinement consisting basically of flat quartz plates can be adjusted precisely by use of special Piezo drives allowing a variable plate separation (contact – 100µm) and the application of compression and shear forces. The experimental setup is designed for observations using common optical scientific microscopes. The goal of our experiments is the investigation of the phase behaviour of mono-disperse and bi-disperse charged sphere systems as well as their non-equilibrium behaviour. We present the new setup as well as first interesting results of fully deionized suspensions of charged spheres in confinement. Open crystal structures in one- and more-layer systems have been observed as well as Moiré rotation patterns in double-layer systems and heterogeneous nucleation events in mono-layer systems.