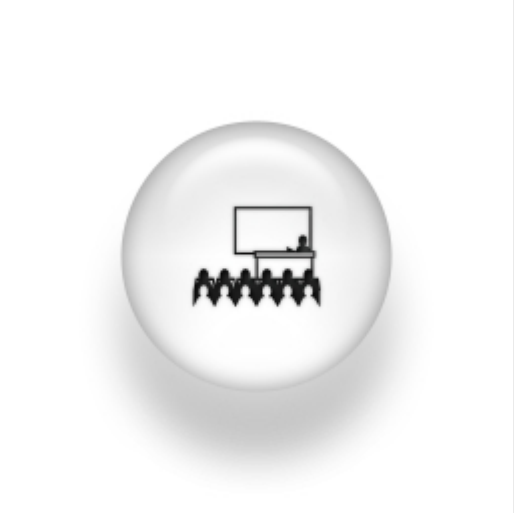
2D nematics in a circular cavity

Wednesday, 25th May 2011. 12:00-13.00



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ABSTRACT:
In this informal seminar, we present our current work on confined two-dimensional nematics. A nematic is a fluid where particles are on average oriented along a particular direction, the director, which causes these material to be birefringent (hence their numerous applications) and to possess elasticity associated with director distortions. Even tiny bulk and surface external fields may have dramatic implications for the spatial dependence of the director. Frustration often occurs when the material is subject to competition due to conflicting fields, which generates defects in the samples. Here we discuss an interesting case where a 2D nematic is confined into a circular cavity; because of surface curvature, the inner surface creates a continuously varying favoured direction for the director near the surface which induces frustration in the whole sample. The material minimises the total free energy by creating defects which lower the total elastic distortion. A combination of Monte Carlo simulation, density-functional theory and experiments on vertically vibrated quasimonolayers of granular rods is used to unveil the apparently complex phase diagram. Preliminary results are presented as well as directions for future research.