Chemically patterned surfaces and critical Casimir forces

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Colloids and substrates confining a (near-) critical fluid are subject to effective, solvent-mediated critical Casimir forces. The strength and the direction of these forces depend on temperature and the chemical properties of the surfaces. Thus, patterning surfaces with stripes of different chemical properties leads to a rich behavior of the critical Casimir effect.

- Colloids near chemically patterned substrates are subject to laterally confining potentials and may form highly ordered colloidal assemblies [1].
- A suitable choice of chemical stripes forming the pattern may lead to levitation of colloids at a stable distance from the substrate induced by critical Casimir forces [2].
- Rodlike particles near substrates exhibit critical Casimir torques controlled by the underlying chemical pattern of the surface.
- Changing the geometrical parameters of the pattern constitutes a crossover between different universality classes of boundary conditions

References

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