## Ordering in Soft Matter [pln25]

Soft matter exhibits a rich variety of ordering on a large span of length scales.

**Orientational versus translational ordering:** Different combinations of orientational and translational ordering are best known from realizations in liquid crystals [tsl51].

**Hierarchical ordering:** Ordering of molecules on a microscopic scale and ordering of molecular aggregates on a mesoscopic scale. The degree of ordering may be different one way or the other on the two scales. Hierarchical orderings are best known from realizations with surfactant molecules [tsl50].

**Thermotropic versus lyotropic phase transitions:** *Thermotropic* phase transitions are driven by changes in temperature and *lyotropic* phase transitions by changes in concentration.

**Entropy driven ordering:** Entropy is a measure of disorder overall. This notion is compatible with the possibility that a transition which establishes some kind of ordering increases the entropy.

**Steric interactions:** Macromolecules or aggregates of smaller molecules may be treated as constituent particles with shapes in the statistical mechanics of soft matter. Their dominant interactions may no longer by the molecular forces discussed in [pln18] but some hardcore repulsion (*steric interaction*) that can be accounted for as a *statistical interaction*.

**Polydispersity:** Constituent particles with a distribution of sizes such as in colloids are a common occurrence in soft matter.

**Polymorphism:** Constituent particles of soft matter may further aggregate in configurations with different ordering tendencies.