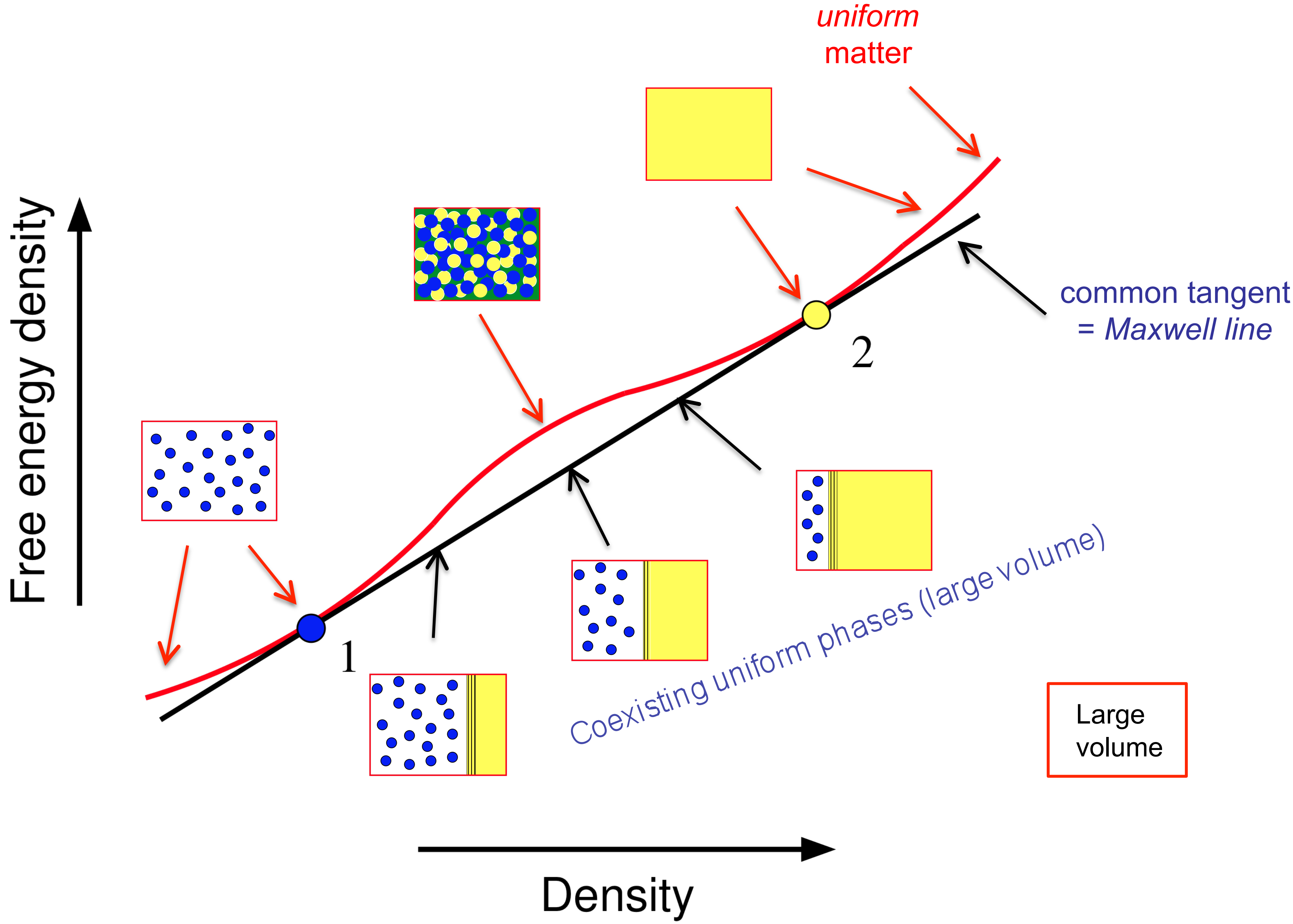
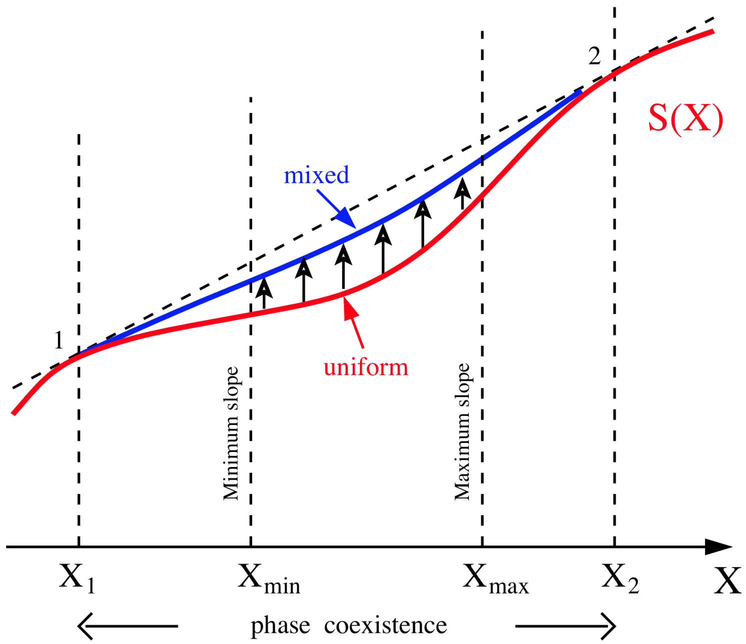


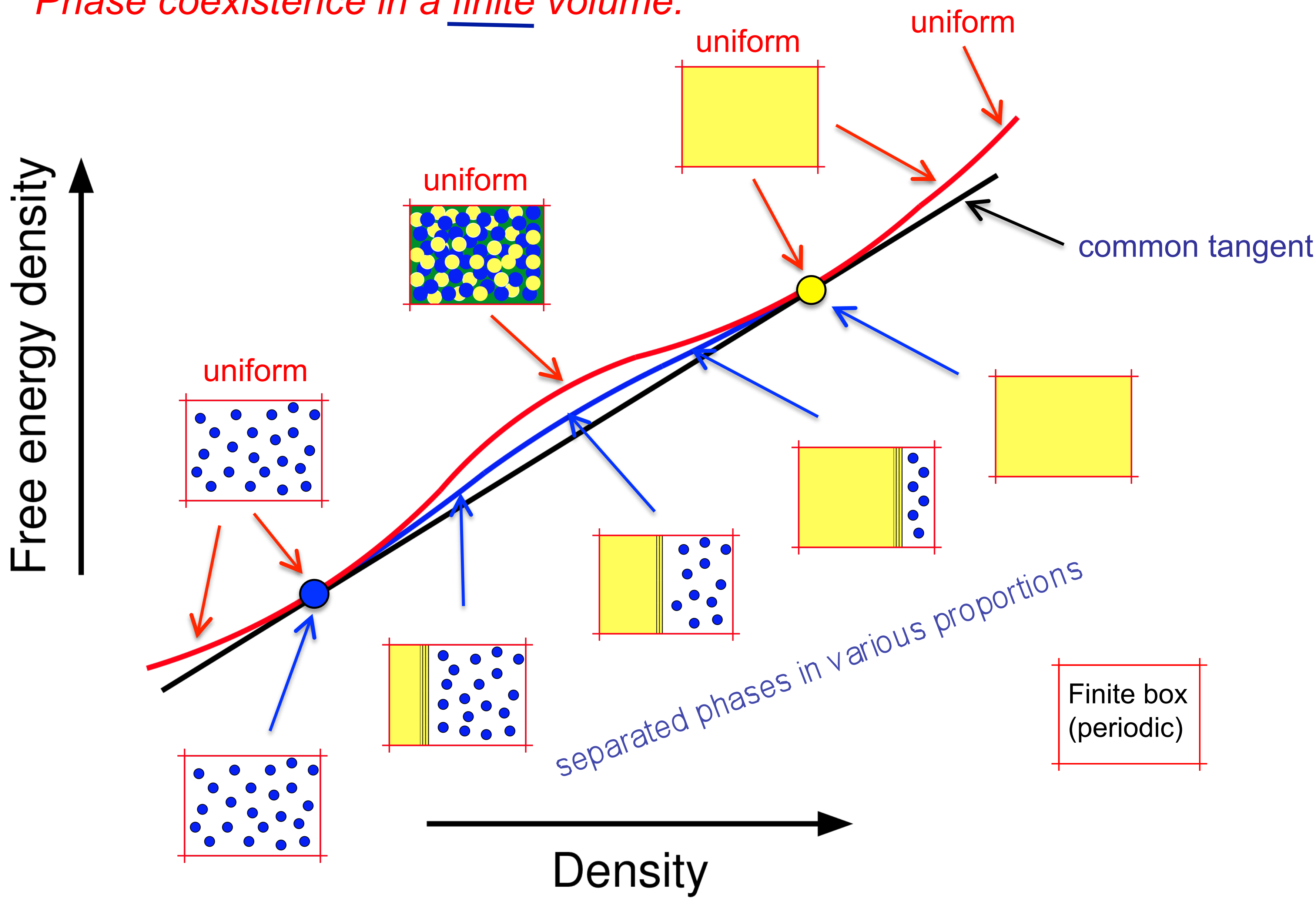
JRandrup: Dubna School, 2010

Ph Chomaz, M Colonna, J Randrup:
Nuclear Spinodal Fragmentation,
Physics Reports 389 (2004) 263



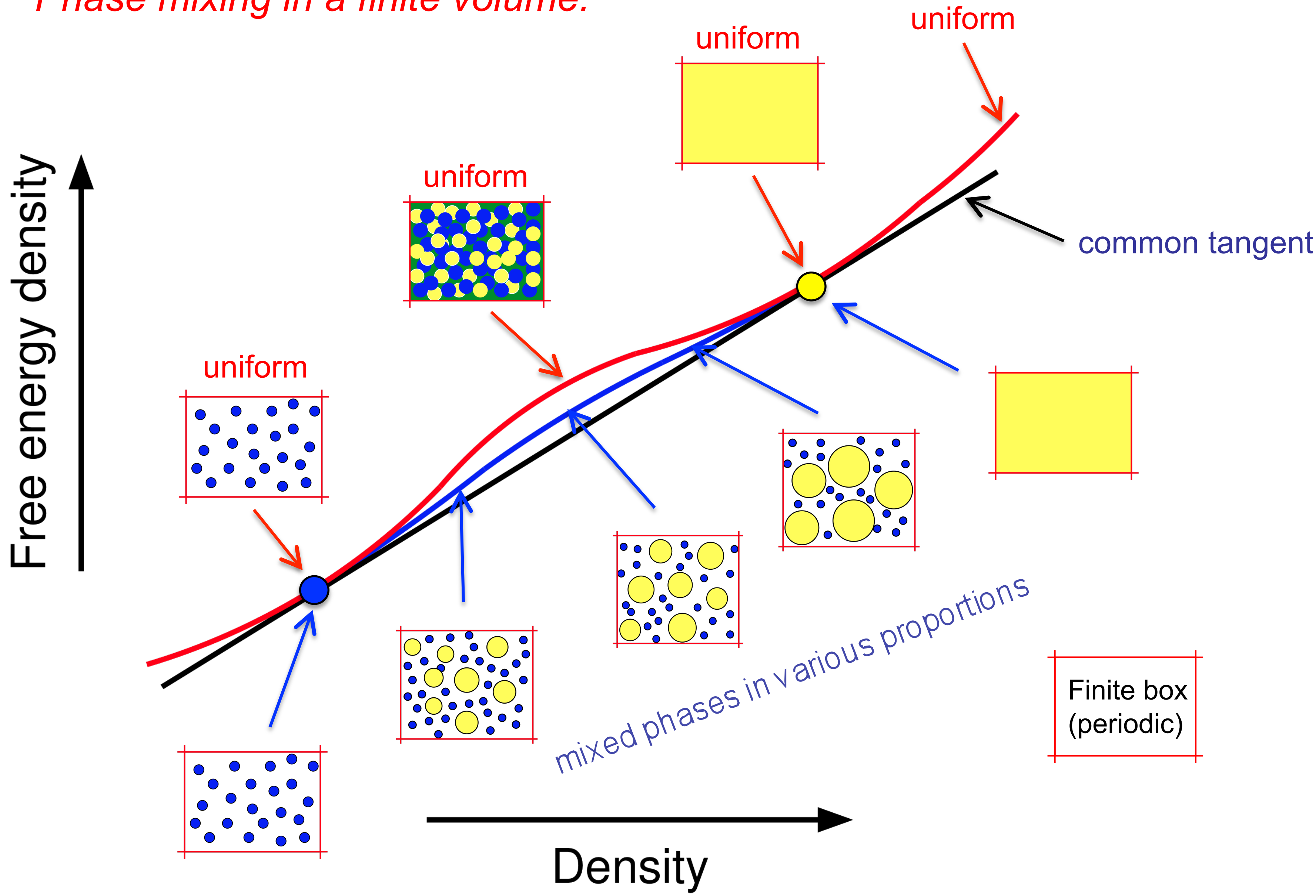
When the entropy function for a uniform finite system (lower curve) has a local convexity region, the isolated system may gain entropy by reorganizing itself into a mixture of the two coexisting phases, but the resulting equilibrium entropy function (upper curve) will always lie below the common tangent (dashed line).

Phase coexistence in a finite volume:



JRandrup: Dubna School, 2010

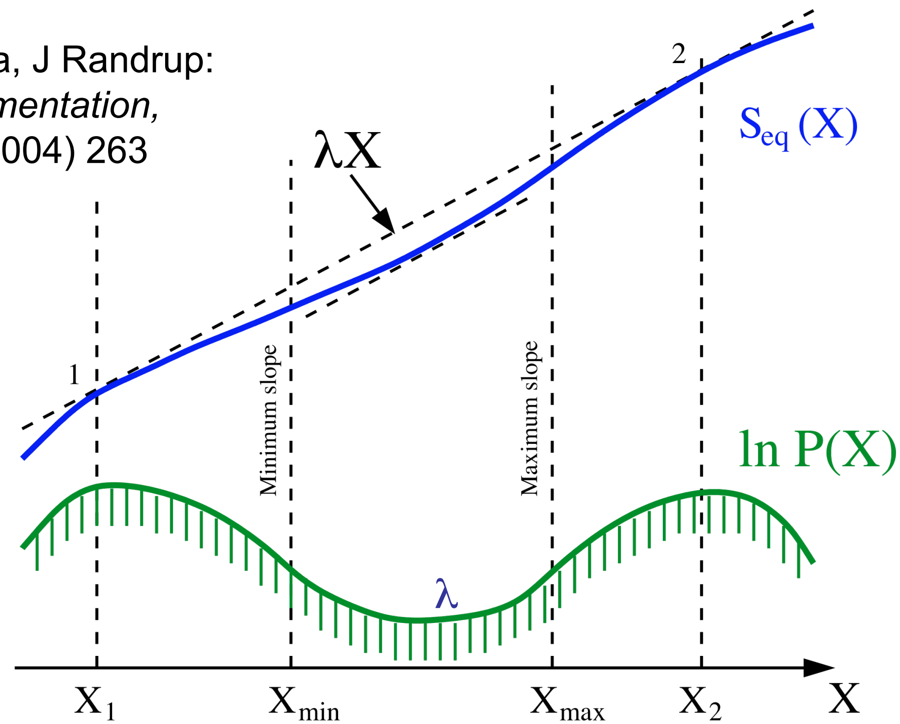
Phase mixing in a finite volume:



JRandrup: Dubna School, 2010

Finite volume: statistical distribution of X:

Ph Chomaz, M Colonna, J Randrup:
Nuclear Spinodal Fragmentation,
Physics Reports 389 (2004) 263



When the finite system is brought into contact with a reservoir, it may explore the entire range of *X* values and the resulting bimodal statistical equilibrium distribution is given by $P(X) \sim exp(S(X) - \lambda X)$.

The figure shows the case when the Lagrange multiplier λ equals the slope of the common tangent. The two peaks in *P(X)* have then the same height, its points of inversion coincide with those of *S(X)*, (so *ln P(X)* has positive curvature in between), and its minimum lies where the slope of *S(X)* also equals λ.

Clustering in nuclear matter at subsaturation densities,
G. Peilert *et al*, Phys. Lett. B260 (1991) 271

Canonical Metropolis simulations of nuclear matter at finite temperatures are made with a quasi-classical many-body model.

It is demonstrated that considerable clustering develops at subsaturation densities.

This effect lowers the energy by several MeV per nucleon, for temperatures *T* below ~ 8 MeV.

This result will modify previous simple estimates of the critical parameters of the liquid-vapour phase transition.