

1. Phase Transition of Interacting Particle Systems

(Jose Carrillo etc. CMP)

★ $dx_i^t = -\nabla V(x_i^t) + \frac{1}{\sqrt{2}} \sum_{j \neq i} \nabla W(x_i - x_j) + \sigma \nabla dW_i^t$

2. SFD: Ben Arous etc.

(Classical literature)

Message Passage (Time fixed)

(Dynamical version by viewing iteration steps as time)

3. Langevin Dynamics (Analysis,

Gradient Flows

Sampling. - phase transition)

$$\partial_t \rho + \nabla \cdot (\rho \nabla V) = \sigma \Delta \rho$$

$$\partial_t \rho + \nabla \cdot \left(\rho \frac{\delta E}{\delta \rho} \right) = 0$$

$$E = \text{Energy} + \sigma \int \rho \log \frac{\rho}{\rho_x}$$

Langevin type dynamics & Phase transition

meta-stability Diffusion Model

4. Song Mei: Loss = $1 \cdot 1^2$

TWO Layer NN: Loss = cross entropy?

$$\int (\Phi(x, \gamma) - \mathbb{E} \Phi(x, \gamma))$$

Pengkan Yang, Cong Fang

Multi-layer NNs.
Mean-Field Approach.

5: Quantum Boltzmann Eq. (Haibo Wang)

(Yan H-2, Erdős, 04. JSP)

Schrödinger \Rightarrow Quantum Boltzmann Eq.

Computation: 

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Cai Shuzhe & Lu.

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(Bose-Einstein Condensate)