

Topics for Master Theses 2019

- **Schrödinger problem and functional inequalities**
 - Eldan, Lehec, Shenfeld: Stability of logarithmic Sobolev inequality via Föllmer process
 - Backhoff, Conforti, Gentil, Léonard: Mean-field Schrödinger problem
- **Convergence to equilibrium for singular interactions**
 - Baudoin, Gordina, Herzog: Gamma calculus and explicit convergence estimates for Langevin
 - Herzog/Mattingly: Lyapunov for singular potentials
- **Mixing times in statistical mechanics models**
 - Bertini, Giacomin, Poquet: Synchronization and random long-time dynamics for mean field planar rotators
 - Ben Arous, Jagannath: Spectral gap estimates in mean field spin glasses
- **McKean Vlasov equations**
 - Hammersley/Siska/Szpruch: McKean-Vlasov SDEs under measure dependent Lyapunov conditions
 - Al Rachid, Bossy, Ricci, Szpruch: New particle representations for McKean Vlasov SDE
- **Nonlinear filtering**
 - Stannat: Stability of the optimal filter
 - Kim, Taghvaei, Mehta, Meyn: Duality for nonlinear filtering
- **Ensemble Kalman Filters**
 - Bishop, Del Moral, Kamatani, Rémillard: One dimensional Riccati diffusions
 - Wiljes/Reich/Stannat: Long-time stability and accuracy of the ensemble Kalman filter
- **Neural networks**
 - Mei, Misakiewicz, Montanari: Mean-field theory of two layer neural networks
 - Hu, Ren, Siska, Szpruch: Mean-field dynamics and energy landscape of neural networks
 - Sirignano, Spiliopoulos: Mean-field analysis of neural networks
- **Stochastic Gradient Descent**
 - Cheng, Bartlett, Jordan: Quantitative CLT for discrete stochastic processes
 - Fehrmann, Gess, Jentzen: Convergence rates for SGD
- **Stochastic Gradient Langevin dynamics**
 - Chau, Moulines, Rasonyi, Sabanis, Zhang: On SGLD with dependent data, fully non-convex case
 - Raginsky/Rakhlín/Telgarsky: Non-convex learning via stochastic gradient Langevin
 - Aicher et al: SGMCMC for nonlinear state space models
- **Markov Chain Monte Carlo in high dimensions**
 - Yang, Roberts, Rosenthal: Optimal scaling of Metropolis on general targets
 - Vono, Paulin, Doucet: Efficient MCMC sampling with dimension-free convergence rates
 - Mangoubi, Vishnoi: Nonconvex sampling with MALA
- **Statistical applications**
 - Daskalakis, Dikkala, Kamath: Testing Ising models
 - Tzen, Raginsky: Theoretical guarantees for sampling and inference in generative models with latent diffusions
 - Wolfer, Kontorovich: Estimating the mixing time of ergodic MCMC
 - Weed, Berthet: Estimation of smooth densities in Wasserstein distance
- **Stein's method and approximations in Wasserstein distances**
 - Fang, Shao, Xu: Multivariate approximations in Wasserstein distance by Stein's method and Bismut's formula
 - Gorham, Duncan, Vollmer, Mackey: Measuring sample quality with diffusions
- **Other selected topics**
 - Bauerschmidt, Bodineau: Log-Sobolev inequality for the continuum Sine-Gordon model
 - Dizdar, Menz, Otto, Wu: Quantitative hydrodynamic limit of Kawasaki dynamics

- Cortez, Fontbana: Quantitative uniform propagation of chaos for Maxwell molecules
- Lee/Vempala: Eldan's stochastic localization and the KLS hyperplane conjecture
- Chafai, Ferré, Stoltz: Coulomb gases under constraints
- Legoll, Lelievre, Sharma: Effective dynamics for non-reversible SDE
- Duncan, Lelievre, Pavliotis: Variance reduction using nonreversible Langevin
- Mider, Jenkins, Pollock, Roberts, Sorensen: Simulating bridges using confluent diffusions
- Mou, Flammerion, Wainwright, Bartlett: Improved Bounds for Discretization of Langevin Diffusions: Near-Optimal Rates without Convexity
- Cao, Lu, Wang: Explicit L2 convergence rate estimate for underdamped Langevin
- Le Chen, Koshnevisan, Nualart, Pu: Spatial ergodicity for SPDEs via Poincaré-type inequalities