Themenvorschläge für Bachelorarbeiten Stand 01/2019

1. **Holden, Peres, Zhai: Gravitational allocation for uniform points on the sphere**
   https://www.pnas.org/content/115/39/9666.short https://arxiv.org/abs/1704.08238
   (Point process, optimal transport/optimal matching)

2. **Lee & Vempala: Eldan's stochastic localization and the KLS hyperplane conjecture**
   https://arxiv.org/abs/1612.01507 https://arxiv.org/abs/1807.03465
   (Convex geometry, stochastic calculus)
3. **Mattingly, Stuart & Higham: Ergodicity for SDEs and approximations: locally Lipschitz vector fields and degenerate noise**
   http://home.warwick.ac.uk/~masdr/JOURNALPUBS/stuart50.pdf
   Stochastic Proc. Appl. 101 (2002)
   (Stochastic stability, SDE, numerical approximations)
4. **Wilson: The local time-space integral and stochastic differential equations**
   (Stochastic calculus, local time, Ito-Tanaka formula)
   https://arxiv.org/abs/1812.07566

5. **Abbe: Community detection and stochastic block models**
   (Random graphs, belief propagation, phase transition in statistics, machine learning)
   https://web.math.princeton.edu/~eabbe/
6. **Devroye et al: Minimax learning rate of normal and Ising undirected graphical models**
   (Ising model, graphical model, density estimation, complexity, VC dimension)
   https://arxiv.org/abs/1806.06887
7. **Martinelli & Sinclair: Mixing time for SOS model**
   Annals of Applied Probability 2012, Vol. 22, No. 3, 1136–1166
   (Coupling, Mixing time bounds for Markov chains, statistical physics)
8. **Mourrat: Hamilton-Jacobi equations for mean-field disordered systems**
   (Mean-field interaction, free energy, nonlinear pde, viscosity solution)
   https://arxiv.org/abs/1811.01432

9. **Ma & Chen et al: Sampling can be faster than optimization**
   (Langevin dynamics, MCMC, convergence rates, complexity of sampling vs. optimization)
   https://arxiv.org/abs/1811.08413
10. **Zhang, Liang, Charikar: A hitting time analysis of stochastic gradient Langevin dynamics**
    (Hitting times of Markov chains, isoperimetric constant, statistics, machine learning)
    PMLR 65:1980-2022, 2017. https://arxiv.org/abs/1702.05575
11. **Qin & Hobert: Wasserstein-based methods for convergence complexity analysis of MCMC with application to Albert and Chib's algorithm**
    https://arxiv.org/abs/1810.08826
    (MCMC, coupling, Wasserstein distance, Bayesian statistics in high dimensions)
12. **Johndrow & Mattingly: Error bounds for approximations of Markov chains used in Bayesian sampling**
    (Perturbations of Markov chains, convergence rates, applications in Bayesian statistics)
    https://arxiv.org/abs/1711.05382
13. **Comets et al: Billiards in a General Domain with Random Reflections**
    Dieker & Vempala: Stochastic billiards for sampling from the boundary of a convex set
    https://arxiv.org/abs/math/0612799 https://arxiv.org/abs/1410.5775
    (Markov processes in discrete and continuous time, geometry, isoperimetric inequality)