"Decentralized Optimization: A Simulation Approach"

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In this talk, I present recent breakthroughs in the design of decentralized optimization algorithms based on simulation techniques, namely Markov Chain Monte Carlo methods. I first consider discrete combinatorial optimization problems. For this type of problems, solutions exploiting results from Freidlin-Wentzell theory of perturbed dynamical systems have been recently proposed. I review these solutions and highlight their advantages and shortcomings. I then focus on decentralized continuous convex optimization problems with linear constraints, and present ways of approximating steepest descent algorithms via MCMC simulation. Finally I illustrate the results on the example of decentralized resource sharing in wireless networks, and show that the proposed algorithms outperform the state-of-art in terms of convergence rate.