Optimal experimental design under uncertainty
Georg Stadler, CIMS NYU

I will survey optimization methods for the optimal design of experiments in inference problems. In particular, we aim at finding optimal sensor locations that allow us to gather measurement data that, combined with a mathematical model, minimizes the average variance in the inferred parameters. This optimization criterion is commonly referred to as A-optimality and results in a nonlinear optimization problem in which we use a sparsifying term to express our preference for sparse designs, i.e., designs that only require a small number of sensors. We present extensions of our approach to problems where the model is uncertain as it involves additional parameters whose uncertainty cannot be reduced with measurements. Numerical results to infer the an initial concentration field in ground water flow are used to illustrate the approach for large-scale optimal design problems.