**Exploiting Sparsity in Bayesian Inverse Problems of Parametric Operator Equations**

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In this talk, we will present and analyze a new class of sparse, adaptive tensor quadrature methods for Bayesian inverse problems of parametric operator equations.
The proposed method relies on a parametric deterministic reformulation of Bayesian inverse problems with distributed parameter uncertainty from infinite dimensional, separable Banach spaces, with uniform prior probability measure on the uncertain parameter. The goal of computation is to evaluate moments of quantities of interest under the Bayesian posterior, conditional on given noisy observational data. For forward problems belonging to a certain sparsity class, we quantify analytic regularity of the Bayesian posterior and prove that the parametric, deterministic density of the Bayesian posterior belongs to the same sparsity class. These results suggest in particular dimension-independent convergence rates for data-adaptive Smolyak integration algorithms, so that the proposed approach is suitable for application to the infinite dimensional setting.
Instances of the considered class of forward problems are definite or indefinite elliptic and parabolic evolution problems, with scalar or tensorial unknowns and also with uncertainty in domains, and high-dimensional initial value problems with uncertain coefficients. Results from selected numerical experiments confirming the theoretical findings will be presented.

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