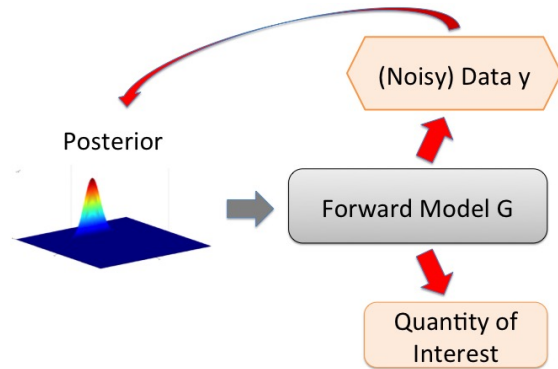# Bayesian Inverse Problems

Uncertainty quantification (UQ) is an interesting, fast growing research area aimed at developing methods to address the impact of parameter, data and model uncertainty in complex systems. In this seminar, we will focus on the identification of parameters through observations of the response of the system - the inverse problem.

The uncertainty in the solution of the inverse problem will be described via the Bayesian approach. We will derive Bayes' theorem in the setting of finite dimensional parameter spaces, and discuss properties such as well-posedness, statistical estimates and connections to classical regularization methods. The remainder of this seminar will be devoted to algorithms for the efficient approximation of the solution of the Bayesian inverse problem.

Literature: J. Kaipio and E. Somersalo, Statistical and Computational Inverse Problems.

Assessment: Presentation + short summary paper (4-5 pages).

- Possibility to focus on theoretical or (and) computational aspects.

- Implementation of methods.

- Group of two students possible (one working on the theoretical side + one implementing the method).

- Regular meetings to discuss the progress and questions.