# Abstract

Oberwolfach Workshop:

**Data Assimilation: From Mathematical and Statistical Foundations to Applications**

Dates:

**23 Feb - 28 Feb 2025** (Code: 2509a)

Organizers:

**Jana de Wiljes, Ilmenau**
**Youssef Marzouk, Cambridge MA**
**Aretha Teckentrup, Edinburgh**

Combining complex mathematical models with observational data is an extremely challenging yet ubiquitous problem in modern applied mathematics and data science. Inverse problems, where one is interested in learning physical model parameters or initial conditions from noisy indirect observations - and more broadly data assimilation, where predictions from a dynamical system are updated sequentially based on new and incomplete observations - are hence of frequent interest, and are increasingly finding applications in many areas of science and technology.

Key challenges in data assimilation and inverse problems arise from the high dimension of the underlying parameter and state spaces, the highly nonlinear and complex underlying dynamical models, and the sparsity of observations, among other issues. Advances in the field will require combining a broad range of mathematical techniques from dynamical systems, statistics, machine learning, probability, scientific computing, and mathematical modelling, together with insights from practitioners in the field.

This workshop brings together a collection of scientists representing this broad spectrum of research strands.