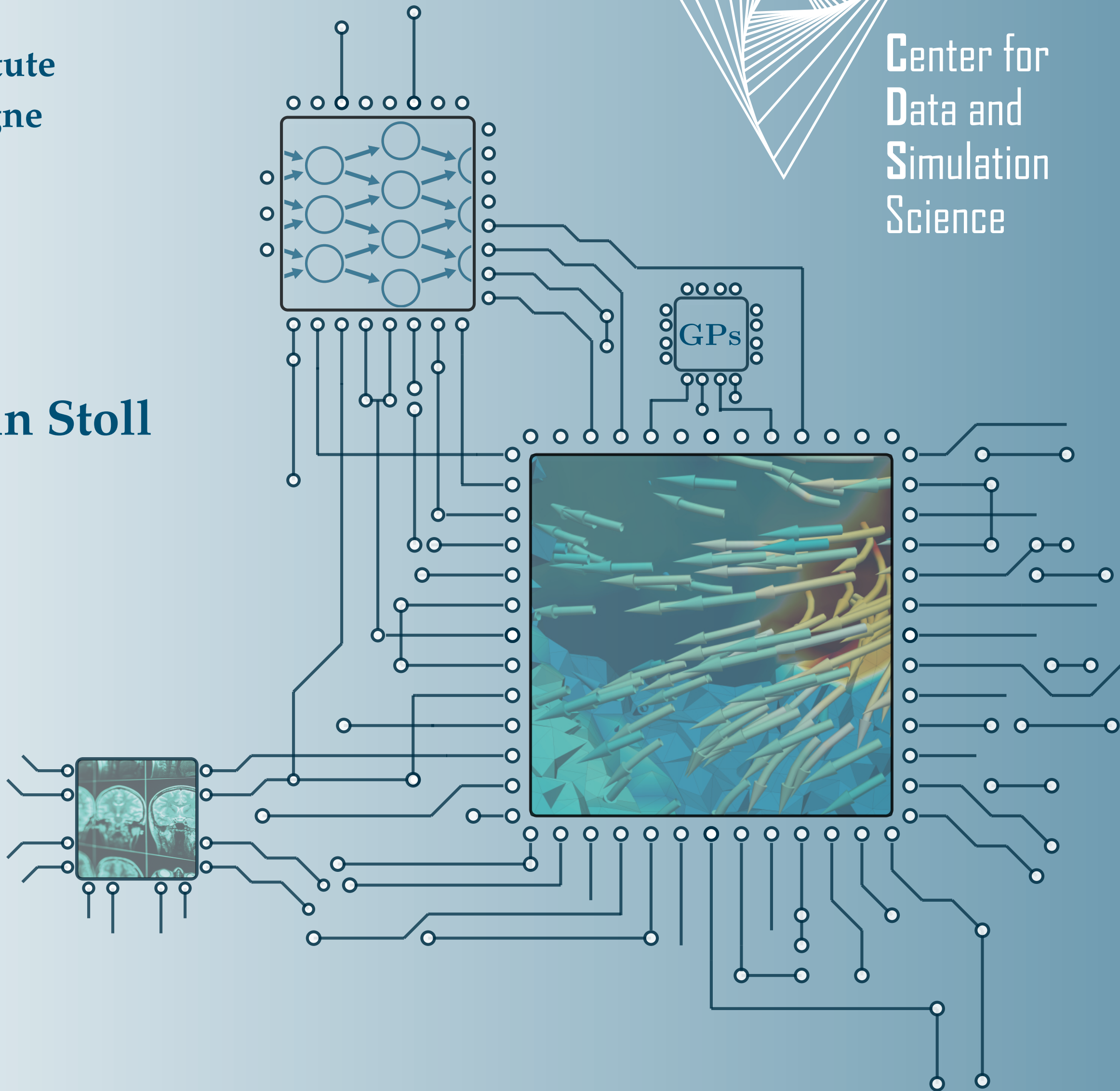
Seminar

SciML Lab · CDS

Wednesday, January 21, 2026
16:00–17:30
Seminar Room 1
Mathematical Institute
University of Cologne
Weyertal 86–90

Center for
Data and
Simulation
Science



Speaker:

Prof. Dr. Martin Stoll
TU Chemnitz

The numerical linear algebra of Gaussian processes

Gaussian processes are an important tool in statistics and machine learning, and have emerged as a powerful tool for providing surrogate models for complex simulations. A key advantage in using GPs is that they automatically provide a measurement for the prediction of uncertainty. With all these advantages, there is an associated numerical cost that arises from the dense and typically large scale covariance matrices that need to be handled in the training and estimation process. In this talk, we will look at the linear systems that need to be solved and also discuss the computation of the log-determinant that can be rephrased as a trace estimation problem. This becomes a particular challenge when the hyperparameters of the model need to be optimized. We illustrate this on a variety of different setups. Namely, one case where we can phrase the problem as a low-rank tensor problem and another problem where an additional graph structure comes with the underlying data.

cds.uni-koeln.de

UNIVERSITY
OF COLOGNE