

**Abstract:**

Rapidly increasing computational power has led to a massive increase in research on developing efficient algorithms for various tasks based on high-dimensional and complex data. While there is now a fairly established theory in high-dimensional statistics for i.i.d. data, results for more involved data-generating mechanisms are relatively scarce. This applies, in particular, to statistics for high-dimensional stochastic processes. To bridge this gap in our understanding, new statistical methods and estimators must be derived that are suitable for the analysis of high-dimensional stochastic processes. Furthermore, a quantification of the estimators' performance requires drawing connections to fundamental probabilistic concepts, such as concentration inequalities or rates of ergodicity, and developing extensions thereof to overcome the particular challenges posed by high-dimensional stochastic processes.

In this talk, we give an overview of existing results, useful tools for developing new techniques, and we discuss future developments. Based on joint work with Andreas Basse-O'Connor, Niklas Dexheimer, and Lukas Trottner.