

**Title:** Challenges in high dimensional nonlinear filtering

**Abstract:** The seamless integration of large data sets into computational models is one of the central challenges for the mathematical sciences of the 21st century.

Even though the underlying assumptions do not hold for many applications, Gaussian approximative filters are considered state of the art as they have been successfully implemented for highly nonlinear settings with large dimensional state spaces. Moreover, several recent studies have been devoted to showing accuracy of such filters in terms of tracking ability for nonlinear evolution models and we will present distinct bounds on the expected accuracy for certain filter variants. While the robustness of such Gaussian approximative filters is undeniable there has been considerable aspiration to design filters that can achieve even higher levels of accuracy while maintaining an appropriate level of robustness and stability. We will discuss a family of such filters and associate properties that do not require a parametrization of the posterior distribution.