

# Séminaire de Probabilités et Statistique

Mardi 12 Décembre 2023 à 14h00

Salle de conférences

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*Kolmogorov equations associated to nonlinear filtering processes:  
well-posedness on spaces of measures and applications .*

Stochastic filtering has been intensively studied since the 1960s, as the mathematical framework to describe the practical problem of reconstructing an unobservable signal from limited noisy information. In this context, two measure-valued stochastic processes are introduced, namely the filter and the unnormalized filter. A classical result is the fact that they evolve according to two stochastic differential equations, called Kushner-Stratonovich and Zakai equations.

This talk aims to present a class of backward Kolmogorov equations on spaces of measures, associated to the filtering processes (and in particular the Kushner-Stratonovich and the Zakai equations). Backward Kolmogorov equations are partial differential equations of parabolic type with a given final condition. The relation between them and certain stochastic processes has been intensively investigated in both finite and infinite dimensional cases.

We will first present the tools necessary for formulating these partial differential equations over a space of positive or probability measures. Subsequently, we will provide well-posedness results for classical solutions. Lastly, potential connections between these findings and other aspects of filtering theory are explored, such as the particle-based approximation of the filter and its implications in optimal control with partial observation.