

PROBABILITY SEMINAR

Gaussian-type density bounds for solutions of multidimensional backward SDEs and application to gene expression.**Evelina Shamarova**

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ZOOM link

<https://us02web.zoom.us/j/86716263615?pwd=YnI4V3JXTDIXTHZBS1NyRE1GTDZOZz09>

Abstract. We obtain upper and lower Gaussian-type density bounds for the law for each component of the solution to a multidimensional backward SDE (BSDE). Our approach is based on the Nourdin-Viens formula and a stochastic version of the classical Wazewski theorem on the positivity of components of solutions to ODEs. Our version of the latter theorem introduces a sufficient condition for the positivity of components of solutions to a class of linear BSDEs, and gives explicit expressions of their lower bounds. To the best of our knowledge, the problem of Gaussian density estimates for a backward SDE in the multidimensional setting is addressed for the first time. Furthermore, we apply our results to the gene expression model developed in [E. Shamarova, R. Chertovskih, A. F. Ramos, and P. Aguiar, Backward-stochastic-differential-equation approach to modeling of gene expression, *Physical Review E*, v. 95, p. 032418 (2017)]. Namely, we estimate protein levels of separate genes in a gene regulatory network and compute confidence intervals. This talk is based on a joint work with Roman Chertovskih (University of Porto).