Abstract: "On some recent advancements in embedding problems and their interactions with stochastic control, variational inequalities and optimal transportation"

In this talk I will discuss recent advancements in the field of Skorokhod embeddings. The focus coming from mathematical finance meant that new methodologies were applied recently to better understand existing results and approach previously unsolved problems. I will aim to showcase some of these. I will discuss Root's solution, its computation through solutions to a free boundary problem and a probabilistic representation, and proof of the embedding, via optimal stopping techniques. I will also present an extension of the Azema-Yor solution to the case of n-marginal problem and explain how stochastic control methods were necessary to guess the right solution. I will then link the results to pathwise inequalities and their applications to martingale inequalities.

The talk is based on joint works with Pierre Henry-Labordere, Peter Spoida and Nizar Touzi.