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Stochastic Partial Differential Equations and Renormalization à la Epstein-Glaser

Abstract: We present a novel framework for the study of a large class of non-linear stochastic partial differential equations, which is inspired by the algebraic approach to quantum field theory. The main merit is that, by realizing random fields within a suitable algebra of functional-valued distributions, we are able to use specific techniques proper of microlocal analysis. These allow us to deal with renormalization using an Epstein-Glaser perspective, hence without resorting to any specific regularization scheme. As a concrete example we shall use this method to discuss both the stochastic Φ^3_d model and the non-linear Schrödinger equation.

Talk based on
[1] C.D., Nicolò Drago, Paolo Rinaldi & Lorenzo Zambotti, Commun. Contemp. Math. 24 (2022), no. 7, Paper No. 2150075,
[2] Alberto Bonicelli, C.D. & Paolo Rinaldi, https://arxiv.org/pdf/2111.06320