Contribution ID: **266**   Type: **Talk**

Covariant non-perturbative pointer variables for quantum fields

Tuesday, 24 June 2025 15:25 (15 minutes)

In this talk I will discuss how modelling local, nonperturvative measurements in relativistic field theories has traditionally led to a choice between mathematical untractability and frictions with covariance, locality and causality. In this context I will argue that there is a class of detector models in which nonperturbative, local and convariant, as well as mathematically tractable results can be achieved. Our approach combines several features of other models encountered in the literature of relativistic quantum nformation, namely scattering processes, quantum Brownian motion models, and Gaussian dynamics. I will argue that, when it comes to causality and covariance, pointlike, ill-defined interactions are necessary, but these can be renormalized consistently a la Epstein Glasser. I will further analyze the model in the context of quantum measurement theory and argue that these models generate well-defined induced observables. Our formalism can be used to detect non-Gaussianities present in the field's state in a local and covariant way, and the nonperturvative nature of the problem provides an operational framework to discuss Bell inequalities in of quantum field theory. arXiv:2502.01283

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