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Quantum Space Time Engineering

BIANCA DITTRICH, Perimeter Institute

Loop quantum gravity and spin foams offer a quantization of space time itself. We discuss how the choice of different kinematical vacua leads to different pictures of quantum space time. In particular we describe a recently introduced new vacuum and the associated representation of geometric observables. This (BF) vacuum is based on a topological phase and can be viewed as a condensate state arising from the more standard Ashtekar-Lewandowski vacuum. We argue that this new vacuum is a crucial step towards constructing a fully physical vacuum, leading to a description for the quantum dynamics of 4D space time.