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Group field theories: A view from below

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It is widely believed that quantum gravity should be background independent. Perhaps the most radical way to realize this is to imagine a quantum theory in which the abode of gravity, that is to say, the fabric of spacetime itself, becomes an emergent, rather than an inherent, entity. Group field theories constitute a concrete attempt at such a formulation of quantum gravity. However, in such theories, the question of what happens to central spacetime notions pertaining to the behavior of gravity as we know it, such as diffeomorphisms, becomes quite nontrivial. Equally of interest is to explore the connections of such theories with other known background-independent approaches to quantum gravity. We argue that free group field theory is a viable model to probe these questions, since it can be regarded as a quantum theory of an interesting toy model for gravity, namely the Husain-Kuchar model.

Author: MEHMOOD, Hassan (University of New Brunswick)

Presenter: MEHMOOD, Hassan (University of New Brunswick)

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