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Quantum gravity on finite spacetimes and dynamical mass

Thursday 1 September 2022 09:00 (30 minutes)

We review quantum gravity model building using the new formalism of ‘quantum Riemannian geometry’to construct this on finite discrete spaces and on fuzzy ones such as matrix algebras. The formalism starts with a ‘differential structure’as a bimodule Ωˆ1 of differential 1-forms over the coordinate algebra 𝒜, which could be noncommutative. A quantum metric is a noncommutative rank (0,2) tensor in Ωˆ1⊗_𝒜Ωˆ1 , for which we then search for a quantum Levi-Civita connection (this is no longer unique or guaranteed). We outline the three models which have so far been constructed in this formalism, commonalities among them, and issues going forward. One commonality is a uniform nonzero variance of metric expectation values in the strong gravity limit. We also outline and discuss the construction of quantum FLRW cosmology and black-hole backgrounds using quantum Riemannian geometry. Among new results, we perform a Kaluza-Klein type analysis where we tensor classical spacetime coordinates with a finite quantum Riemannian geometry and we give an example where a scalar field on the total space appears as a multiplet of scalar fields on spacetime with a spread of dynamically generated masses.

Is this abstract from experiment?

No

Name of experiment and experimental site

N/A

Is the speaker for that presentation defined?

No

Details

See note above - could be either of us. Queen Mary University of London https://webspace.maths.qmul.ac.uk/s.majid/Welcome.html

Internet talk

Maybe

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