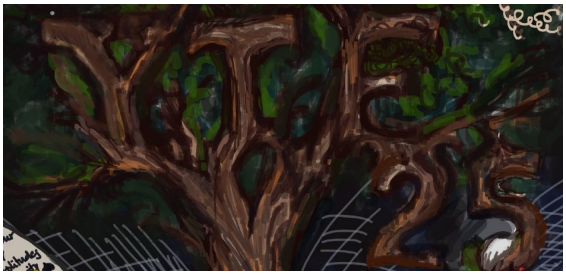

Contribution ID: **85** Type: **not specified**

M-Theory Through Matrix Models

A compelling quantum theory of gravity should provide a geometrically intuitive framework, continuing the tradition established by Einstein's insight that geometry and physics are inseparable. String theory extends this legacy by replacing point-like structures with fundamentally extended objects, offering a richer geometric vocabulary and a natural setting in which causality and topology emerge from first principles. Its historical connection to both gauge dynamics and confinement further motivates parallels with the successes of lattice QCD. In particular, the lattice approach—originally developed to address non-renormalisability and strong self-interaction in non-abelian gauge theories—suggests a promising conceptual pathway for addressing gravity' s analogous self-interaction challenges in the low-energy limit of M-theory.

Within this broader context, simplified supersymmetric systems such as the matrix model serve as valuable laboratories for exploring emergent geometric structure and testing discretised approaches to quantum gravity. These models capture key qualitative features of the full theory while remaining analytically and numerically tractable, providing insight into how extended objects and their interactions may give rise to smooth spacetime dynamics.

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Session Classification: The Curious Exhibits and Mad Hatter's Dinner Party