

PHYSIKALISCHES KOLLOQUIUM

Sommersemester 2024

Das Kolloquium findet (soweit unten nicht anders angegeben) jeweils montags **jeweils montags um 16:15 Uhr online via Zoom** statt.

(Der jeweilige Link wird noch zur Verfügung gestellt.).

27.05.2024

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Causal dynamical triangulations as a gateway to nonperturbative quantum gravity

Abstract

If we take the need for a nonperturbative theory of quantum gravity seriously, we must address the question of how our available tools can realistically get us there and what kind of results we may therefore be able to derive. Lattice gravity based on Causal Dynamical Triangulations (CDT) provides a blueprint in terms of both methodology and results. Analogous to lattice QCD, it is not so much an "approach" to quantum gravity as the best-developed way to construct and evaluate the gravitational path integral nonperturbatively. It has allowed us to move away from formal considerations in quantum gravity to extracting quantitative results on the spectra of invariant quantum observables, describing physics near the Planck scale. A breakthrough result of CDT quantum gravity in four dimensions is the emergence, from first principles, of a nontrivial, nonperturbative vacuum state which exhibits properties compatible with a de Sitter universe. I will summarize these findings and also discuss the new quantum Ricci curvature, which opens the door to constructing new observables that can relate to early-universe cosmology.

Für die Dozentinnen bzw. Dozenten der Fakultät

Prof. Dr. Hinkov, Prof. Dr. Hinrichsen, Prof. Dr. Porod, Dr. Ünzelmann und Hr. Kuhr