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Bound on Gravitational Wave Luminosity from Non-Perturbative Quantum Effects of Gravity

Tuesday 8 July 2025 12:40 (20 minutes)

This talk presents recent developments on a non-perturbative quantisation of gravitational subsystems on a light cone. Starting from the covariant phase space for the γ -Palatini–Holst action, we identify an auxiliary conformal field theory (CFT), which carries a representation of the constraint algebra of general relativity on a null surface. In the model, the radiative data, which is encoded into the shear of each null generator, is mapped into an auxiliary SU(1, 1) current algebra on each light ray. We study the resulting quantum theory for both bosonic and fermionic representations. In the fermionic representations, the central charge on each null ray is positive, for bosons it is negative. To avoid non-unitary representations, the central charge must be positive. I explain how this requirement alters the spectrum of the radiated power. In this way, we obtain a bound on the radiated power (Bondi flux) of gravitational waves in asymptotically flat spacetimes. The talk is based in part on arXiv:2402.12578, arXiv:2401.17491, arXiv:2104.05803, arXiv:2504.10802.

Working Group

WG1 - High Energy QG Theory

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