General Relativity and Quantum Cosmology

Holomorphic Lorentzian Simplicity Constraints

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We develop an Hamiltonian representation of the sl(2,C) algebra on a phase space consisting of N copies of twistors, or bi-spinors. We identify a complete set of global invariants, and show that they generate a closed algebra including gl(N,C) as a subalgebra. Then, we define the linear and quadratic simplicity constraints which reduce the spinor variables to (framed) 3d spacelike polyhedra embedded in Minkowski spacetime. Finally, we introduce a new version of the simplicity constraints which (i) are holomorphic and (ii) Poisson-commute with each other, and show their equivalence to the linear and quadratic constraints.

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