Reexamining Quantum Gravity

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Abstract. From the study of blackholes to that of gravitons, how gravity works on the level of quantum mechanics will be key to our understanding of nature and the beginnings of the universe. The primordial B-modes in the cosmic microwave background (CMB) have directly shown (2014) quantum gravitational waves originating during the inflationary period of cosmic evolution, from about 10^{-36} to 10^{-32} seconds after the Big Bang. Examining the recent finding of inflationary cosmology, quantum gravity may play a role both during the preinflationary, the inflationary period and the Planck epoch (5.4×10^{-44} seconds) where it either dominated or shared with discrete geometries bringing about the establishment of universal constants and preliminary states of supersymmetries. Quantum gravity with the supersymmetries Yang-Mills theory may, for example, define why gravitons (quantum gravitational fluctuations) are behaving like gluons (eight vector bosons). This leads to the latest amplituhedron which as a geometry can compose gluon and anti-gluon particles in association with gravitons. We will further examine the theory of Loop quantum gravity (LQG) that indicates that the geometry of spacetime is created as a manifestation of gravity. Using the floating lattice theory of LQC we can identify not only supersymmetries established by quantum gravity but also the existence of irregular structural possibilities due to the display of repulsive characteristics at extremely high densities. With solutions for the quantum Hamiltonian constraint equation, the Wheeler-DeWitt equation and with new theories regarding Supergravity and the field of quantum chromodynamics, we come another step closer to unifying quantum mechanics and general relativity.