Analyzing Loop Quantum Cosmology of Bianchi Models with Numerical Methods

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General Relativity and Quantum Mechanics are incompatible. In General Relativity, singularities are found in black holes and at the start of the universe where the space-time curvature diverges. Often singularities are indicative that that a theory is incomplete. Loop Quantum Gravity (LQG) offers a potential route to the quantization of General Relativity making it compatible with Quantum Dynamics and removing the singularities. In order to gain a richer understanding of the dynamics of LQG, its effects are applied to the anisotropic Bianchi spaces and its effect on the equations of motion are observed. Approximate transition rules have been derived for both Kasner transitions and the LQG bounces which occur when quantum gravity effects become non-negligible at the Planck scale. This presentation will explore these transitions numerically, using higher order Runge-Kutta methods, comparing the output with the analytically derived bounce and transition rules, and thereby testing the approximates used in the analytical calculations.