General Relativity and Quantum Cosmology

Cosmic recall and the scattering picture of Loop Quantum Cosmology

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The global dynamics of a homogeneous universe in Loop Quantum Cosmology is viewed as a scattering process of its geometrodynamical equivalent. This picture is applied to build a flexible (easy to generalize) and not restricted just to exactly solvable models method of verifying the preservation of the semiclassicality through the bounce. The devised method is next applied to two simple examples: (i) the isotropic Friedman Robertson Walker universe, and (ii) the isotropic sector of the Bianchi I model. For both of them we show, that the dispersions in the logarithm of the volume $\ln(v)$ and scalar field momentum $\ln(p_\phi)$ in the distant future and past are related via strong triangle inequalities. This implies in particular a strict preservation of the semiclassicality (in considered degrees of freedom) in both the cases (i) and (ii). Derived inequalities are general: valid for all the physical states within the considered models.

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