

General Relativity and Quantum Cosmology

Observables for FRW model with cosmological constant in the framework of loop cosmology

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We consider a flat cosmological model with a free massless scalar field and the cosmological constant Λ in the framework of loop quantum cosmology. The scalar field plays the role of an intrinsic time. We apply the reduced phase space approach. The dynamics of the model is solved analytically. We identify elementary observables and their algebra. The compound physical observables like the volume and the energy density of matter field are analysed. Both compound observables are bounded and oscillate in the $\Lambda < 0$ case. The energy density is bounded and oscillates in the $\Lambda > 0$ case. However, the volume is unbounded from above, but periodic.

Comments: 7 pages, 4 figures, improved version

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