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Some remarks on singularities in quantum cosmology.

(English. English summary)

Constrained dynamics and quantum gravity 1996 (Santa Margherita Ligure).

Nuclear Phys. B Proc. Suppl. **57** (1997), 227–230.

Introduction: “The question of whether classical singularities persist in quantum cosmology remains a fascinating one. In [M. J. Gotay and J. Demaret, *Phys. Rev. D* (3) 28 (1983), no. 10, 2402–2413; MR 85f:83029], we conjectured that (F) self-adjoint quantum dynamics in a fast-time gauge is singular, whereas (S) self-adjoint quantum dynamics in a slow-time gauge is always nonsingular. By a ‘fast-time gauge’ we mean a choice of time t such that the classical singularities occur at $t = +\infty$ or $t = -\infty$. A time t is ‘slow’ if the singularities occur when $|t| < \infty$.

“In this paper, we verify conjecture (F) for a $k = 0$ Robertson-Walker cosmology containing a massless scalar field in a matter-time gauge. We also discuss the status of conjecture (S) in the case of a dust-filled Friedmann-Robertson-Walker cosmology in an extrinsic-time gauge. These two examples have drawn some attention recently [N. A. Lemos, *Phys. Rev. D* (3) 41 (1990), no. 4, 1358–1359; *Classical Quantum Gravity* 8 (1991), no. 7, 1303–1310; MR 92b:83053; *Phys. Rev. D* (3) 53 (1996), no. 8, 4275–4279; MR 97b:83031], and are interesting as they exhibit certain features which have not received adequate consideration in the literature.”

{For the entire collection see MR 98f:83002.}