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Jackiw-Teitelboim and Kantowski-Sachs quantum cosmology

We study quantum cosmology of the 2D Jackiw-Teitelboim (JT) gravity with $\Lambda > 0$ and calculate the Hartle-Hawking (HH) wave function for this model in the minisuperspace framework. Our approach is guided by the observation that the JT dynamics can be mapped exactly onto that of the Kantowski-Sachs (KS) model describing a homogeneous universe with spatial sections of S1×S2 topology. This allows us to establish a JT-KS correspondence between the wave functions of the models. We demonstrate that some earlier proposals for the HH state of JT either do not have properties expected for the HH wave function or they don't satisfy the Wheeler-deWitt equation. To offer an alternative, we shift our attention to the 4D Kantowski-Sachs framework and obtain the semiclassical Hartle-Hawking state by evaluating the path integral and employing the methods of Picard-Lefschetz theory. The JT-KS connection formulas allow us to translate this result to JT gravity, define the wave function and obtain a probability distribution for the dilaton field.

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