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## **A new vacuum state for quantum fields in curved spacetime and its application to cosmology**

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In this talk I will present a new method to define a vacuum state for fields in curved spacetimes, which encompasses the adiabatic prescription. New vacuum states can emerge in situations where the adiabatic method is impossible. Its application is immediate. As it is well known, cosmological observations suggest that the structures in the Universe arise from quantum fluctuations of an adiabatic vacuum of quantum cosmological perturbations, either at the onset of inflation, or in the far past of the contracting phase of bouncing models. However, in many situations, the presence of a cosmological constant destroys the adiabatic conditions. The new method is successfully applied to this case, and the stability of the new vacuum suggests a deep connection between dark matter and dark energy.

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