Thermodynamical consistency of entropic cosmological models

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Entropic-force cosmology provides, in contrast with dark energy descriptions, a concrete physical understanding of the accelerated expansion of the universe. The acceleration appears to be a consequence of the entropy associated with the information storage in the universe. In this presentation, I analyze the thermodynamical consistency of entropic-force cosmological models based on a generalized entropy scaling with an arbitrary power of the Hubble radius. The Bekenstein-Hawking entropy, proportional to the area, and the nonadditive-entropy, proportional to the volume, are particular cases. Two points to be solved by entropic-force cosmology for being taken as a serious alternative to mainstream cosmology is 1-to provide a physical principle that points out which entropy and temperature have to be used, and 2-explain the different periods of acceleration and deceleration. In this work, a simple physical principle is proposed: the temperature of the universe horizon is determined by requiring that the Legendre structure of thermodynamics is preserved. Since these cosmological models are unable of explaining the different periods of acceleration and deceleration unless a correction term is considered, we also study the effects of including a subdominant power-law term. I show that the introduced correction term is capable of explaining different periods of acceleration and deceleration in the late-time universe and I compare the performance of thermodynamically consistent entropic-force models with regard to the available supernovae data. The results point out that the temperature differs from the Hawking one, and that some entropic-force cosmological models previously available in the literature are not thermodynamically consistent.