

Self-tuning of the cosmological constant in brane-worlds with Cuscuton bulk field

jeudi 2 juin 2022 16:30 (20 minutes)

In this talk, I revisit the idea of self-tuning the observed cosmological constant to a vanishing value and promote it to a selection criterion of brane-world models, in which our Universe is described by a 3-brane embedded in a 5d bulk. As a concrete setup, I consider a bulk scalar field φ described by a general Lagrangian $P(X, \dots)$ with $X = -(\partial\mu\varphi)^2/2$. By requiring that the model enforces the 4d curvature of the maximally symmetric 3-brane world-volume to vanish independently of the 4d effective vacuum energy, only two possibilities remain: one with a canonical bulk kinetic term and the other with an unconventional bulk kinetic term similar to a Cuscuton field. Further demanding the absence of bulk singularity, the latter is selected as a unique possibility within the class of models. The solution can accommodate any warp factor profile free from bulk singularity and with a finite effective 4d Planck mass. In a cosmological context, our solution would describe our (almost) flat Universe at late times, with a bulk warp factor profile expected to be determined by the evolution of the Universe before dilution of the matter fields by cosmic expansion.

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Classification de Session: Parallel session 4

Classification de thématique: HEP-TH