High Energy Physics - Theory

The Entropic Landscape

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We initiate a quantitative exploration of the entire landscape. Predictions thus far have focused on subsets of landscape vacua that share most properties with our own. Using the entropic principle (the assumption that entropy production traces the formation of complex structures such as observers), we derive six predictions that apply to the whole landscape. Typical observers find themselves in a flat universe, at the onset of vacuum domination, surrounded by a recently produced bath of relativistic quanta. These quanta are neither very dilute nor condensed, and thus appear as a roughly thermal background. Their characteristic wavelength is of order the inverse fourth root of the vacuum energy. These predictions hold for completely arbitrary observers, in arbitrary vacua with potentially exotic particle physics and cosmology. They agree with observation: We live in a flat universe at the onset of vacuum domination, whose dominant entropy production process (the glow of galactic dust) has recently produced a radiation bath (the cosmic infrared background). This radiation is marginally dilute, relativistic, and has a wavelength of order 100 microns, as predicted.

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