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INFLATIONARY AXION COSMOLOGY

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Abstract. If Peccei-Quinn (PQ) symmetry is broken after inflation, the initial axion angle is a random variable on cosmological scales; based on this fact, estimates of the relic-axion mass density give too large a value if the axion mass is less than about 10^{-6} eV. This bound can be evaded if the Universe underwent inflation after PQ symmetry breaking and if the observable Universe happens to be a region where the initial axion angle was atypically small, $\theta_1 \lesssim (m_a/10^{-6} \text{ eV})^{0.59}$. We show consideration of fluctuations induced during inflation severely constrains the latter alternative.

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