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Constraining Non-thermal Dark Matter by CMB

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A period of early matter domination can give rise to the correct dark matter abundance for a broad range of dark matter annihilation rate. I show that obtaining the correct relic abundance for small annihilation rates sets a lower bound on the duration of early matter domination era. On the other hand, the requirement that the scalar spectral index of inflationary fluctuations be within the observationally allowed range limits the duration of this epoch from above. By combining these considerations, I show that data from the cosmic microwave background experiments can tightly constrain the parameter space for this scenario. In particular, models of inflation with a tensor-to-scalar ratio below $calO(0.01)$ may disfavor non-thermal supersymmetric dark matter from a modulus-driven early matter domination epoch.

Preferred Session

Dark Matter

Comments

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