

Filtered Dark Matter

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We describe a new mechanism of dark matter production that employs a first order cosmological phase transition to suppress the dark matter relic abundance. While the mechanism can be applied generally, we study it specifically in a toy model consisting of a single real scalar field and a Dirac fermion (which will constitute the dark matter). During the cosmological phase transition the scalar field obtains a vev. If the dark matter particles then acquire a significant mass, it is energetically disfavoured for them to enter the bubbles. Instead, most dark matter particles are reflected from the bubble wall and annihilate into the thermal bath. This suppresses their relic abundance within the bubbles, which eventually merge as the phase transition is completed.

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