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Cosmological constraints on supersymmetric superWIMPs

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Supersymmetric extensions of the standard model with a stable neutral lightest supersymmetric particle (LSP) provide a natural candidate for the dark matter of the Universe. Here we consider scenarios in which the LSP is a superWIMP, i.e., an extremely weakly interacting particle (e.g., a gravitino or axino), produced via the decay of a neutralino NLSP.

These scenarios can be probed at colliders, but only within a very narrow range of NLSP lifetimes. However, if the decay happens in the early Universe, it may affect cosmological observables, such as the Cosmic Microwave Background (CMB), Big Bang Nucleosynthesis (BBN) or the Lyman-alpha forest. We discuss the physics behind this and present constraints on the parameter space of superWIMP scenarios from current cosmological observations, as well as what future experiments will be able to tell us.

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