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Cosattering in the Extended Singlet-Scalar Higgs Portal

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We study the coscattering mechanism in a simple Higgs portal which adds two real singlet scalars to the Standard Model. In this scenario, the lighter scalar is stabilized by a single \mathcal{Z}_2 symmetry and acts as the dark matter relic, whose freeze-out is driven by conversion processes. The heavier scalar becomes an unstable state which participates actively in the coscattering. We find viable parameter regions fulfilling the measured relic abundance, while evading direct detection and big-bang nucleosynthesis bounds. In addition, we discuss collider prospects for the heavier scalar as a long-lived particle at present and future detectors.

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