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A global study of the extended scalar singlet model

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We perform a global study of the extended scalar singlet model with a fermionic dark matter (DM) candidate. Using the most up-to-date results from the Planck measured DM relic density, direct detection limits from the PandaX-II experiment, electroweak baryogenesis (EWBG), electroweak precision observables (EWPO) and Higgs searches at colliders, we constrain the 7-dimensional model parameter space. We also find regions in the model parameter space where a successful EWBG is viable. This allows us to compute the gravitational wave (GW) signals arising from the phase transition and discuss the potential discovery prospects of the model at current or future GW experiments. Our global fit places an upper limit on the second scalar mass, the fermion DM mass and the scalar-fermion DM coupling. We also show that the GW spectra of viable points are often within reach of future GW experiments such as LISA, DECIGO and BBO.

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