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How light a higgsino or a wino dark matter can become in a compressed scenario of MSSM

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Higgsinos and Wino have strong motivations for being
Dark Matter (DM) candidates in supersymmetry, but their annihilation cross sections are quite large.
For thermal generation and a single component DM setup
the higgsinos or wino may have masses of around 1 or 2-3 TeV respectively. For such DM candidates,
a small amount of slepton coannihilation may decrease the effective DM annihilation cross section.
This, in turn reduces the lower limit of the relic density satisfied
DM mass by more than 50\%.
Almost a similar degree of reduction of the same limit is also seen for
squark coannihilations. However, on the contrary, for
nearly mass-degenerate squarks and higgsino
DM, the associated coannihilations may decrease
the relic density, thus extending the region of right abundance
towards higher DM masses.
We also compute the direct and indirect detection signals.
Here, because of the quasi-mass degeneracy of the squarks and the
LSP, we
come across a situation where squark exchange diagrams
may contribute significantly or more strongly than the
Higgs exchange contributions in the spin-independent
direct detection cross section of DM.
For the higgsino-DM scenario,
we observe that a DM mass of 600 GeV to be consistent with
WMAP/PLANCK and LUX data for sfermion coannihilations.
The LUX data itself excludes the region of 400 to 600 GeV,
by a half order of magnitude of the cross-section, well within
the associated uncertainty.
The similar combined lower limit for
a wino DM is about 1 TeV.
There is hardly any collider bound from the LHC for squarks and
sleptons in such a compressed scenario where sfermion masses are close
to the mass of a higgsino/wino LSP.

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