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Probing ˜100 GeV wino-like dark matter at the LHC

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The Minimal Supersymmetric Standard Model (MSSM) predicts the existence of a total of four neutralinos, the lightest of which is one of the strongest cold dark matter (DM) candidates. The nature of this neutralino DM depends on the relative sizes of the bino, wino and higgsino mass parameters in the neutralino mass matrix. At the LHC, the trilepton channel, which is one of the most important modes for analysing certain Standard Model processes as well as for probing new physics, has been adapted for the supersymmetric DM search also. However, the selection criteria for events with three leptons and missing transverse momentum have mainly been defined assuming the DM to be bino-like. For a sufficiently large accumulated luminosity, the trilepton probe has been shown to carry promise for certain MSSM parameter space regions predicting such a DM. By carrying out a thorough signal-to-background analysis, we have established that the scope of this search channel extends to an interesting alternative candidate, the wino-like DM, also. In fact, for such a DM this topology can be sensitive to two different processes: (i) lightest chargino plus heavy neutralino production, and (ii) lightest neutralino plus heavier chargino production. The complementarity between these two modes ensures that, with slight optimisation of the cuts employed for event selection, the wino-like DM can become accessible at the LHC Run-II with an integrated luminosity as low as 100/fb, if it exists with a mass just above 100 GeV.

Parallel Session

Dark Matter, Astroparticle Physics

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