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PAMELA and FERMI limits on the neutralino-chargino mass degeneracy

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Searches for Dark Matter particles with indirect detection techniques have reached an important milestone with the measurements of the anti-proton and positron spectra by the PAMELA experiment and the gamma-ray fluxes by the FERMI-LAT experiment. While the γ-ray results have been used to test the thermal Dark Matter hypothesis and constrain the Dark Matter annihilation cross section into Standard Model particles, the anti-proton flux measured
by the Pamela experiment remains relatively unexploited. Here we show that the latter can be used to set a constraint on the mass spectrum in the dark sector that can be as strong as that derived from the Fermi-LAT data. To illustrate our point we use a Supersymmetric model in which the gauginos are light, the sfermions are heavy and the lightest particle is the neutralino. In
this framework the WW production is expected to be very significant, thus leading to large p and γ-ray fluxes. We show that the neutralino-chargino mass difference can be constrained up to
20 GeV for a mixed neutralino, using PAMELA data. As a result, we can safely rule out the pure wino neutralino hypothesis if it constitutes all the Dark Matter.

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