

Most of the results shown below, unless stated otherwise, are based on the Minimal Supersymmetric Standard Model (MSSM), as described in the Note on Supersymmetry. Unless otherwise indicated, this includes the assumption of common gaugino and scalar masses at the scale of Grand Unification (GUT), and use of the resulting relations in the spectrum and decay branching ratios. It is also assumed that R -parity (\mathcal{R}) is conserved. Unless otherwise indicated, the results also assume that:

- 1) The $\tilde{\chi}_1^0$ is the lightest supersymmetric particle (LSP)
- 2) $m_{\tilde{f}_L} = m_{\tilde{f}_R}$, where $\tilde{f}_{L,R}$ refer to the scalar partners of left- and right-handed fermions.

Limits involving different assumptions are identified in the Comments or in the Footnotes. We summarize here the notations used in this Chapter to characterize some of the most common deviations from the MSSM (for further details, see the Note on Supersymmetry).

Theories with R -parity violation (\mathcal{R}) are characterized by a superpotential of the form: $\lambda_{ijk} L_i L_j e_k^c + \lambda'_{ijk} L_i Q_j d_k^c + \lambda''_{ijk} u_i^c d_j^c d_k^c$, where i, j, k are generation indices. The presence of any of these couplings is often identified in the following by the symbols $LL\bar{E}$, $LQ\bar{D}$, and $\bar{U}DD$. Mass limits in the presence of \mathcal{R} will often refer to “direct” and “indirect” decays. Direct refers to \mathcal{R} decays of the particle in consideration. Indirect refers to cases where \mathcal{R} appears in the decays of the LSP.

In several models, most notably in theories with so-called Gauge Mediated Supersymmetry Breaking (GMSB), the gravitino (\tilde{G}) is the LSP. It is usually much lighter than any other massive particle in the spectrum, and $m_{\tilde{G}}$ is then neglected in all decay processes involving gravitinos. In these scenarios, particles other than the neutralino are sometimes considered as the next-to-lightest supersymmetric particle (NLSP), and are assumed to decay to their even- \mathcal{R} partner plus \tilde{G} . If the lifetime is short enough for the decay to take place within the detector, \tilde{G} is assumed to be undetected and to give rise to missing energy (\cancel{E}) or missing transverse energy (\cancel{E}_T) signatures.

When needed, specific assumptions on the eigenstate content of $\tilde{\chi}^0$ and $\tilde{\chi}^\pm$ states are indicated, using the notation $\tilde{\gamma}$ (photino), \tilde{H} (higgsino), \tilde{W} (wino), and \tilde{Z} (zino) to signal that the limit of pure states was used. The terms gaugino is also used, to generically indicate wino-like charginos and zino-like neutralinos.