Supersymmetric Model Assumptions

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. Unless otherwise indicated, it is also assumed that R-parity (R) is conserved and that:

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

Limits involving different assumptions are identified in the Comments or in the Footnotes, in particular also the many simplified models, see definitions below. 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 (RPV) are characterized by a superpotential of the form: $\lambda_{ijk} L_i L_j e^c_k + \lambda'_{ijk} L_i Q_j d^c_k + \lambda''_{ijk} u^c_i d^c_j d^c_k$, where i, j, k are generation indices. The presence of any of these couplings is often identified in the following by the symbols $LL\overline{E}$, $LQ\overline{D}$, and $\overline{UDD}$. Mass limits in the presence of RPV will often refer to "direct" and "indirect" decays. Direct refers to RPV decays of the particle in consideration. Indirect refers to cases where RPV appears in the decays of the LSP. The LSP need not be the $\widetilde{\chi}_1^0$.

In several models, most notably in theories with so-called Gauge Mediated Supersymmetry Breaking (GMSB), the gravitino ($\widetilde{G}$) is the LSP. It is usually much lighter than any other massive particle in the spectrum, and $m_{\widetilde{G}}$ is then neglected in all decay processes involving gravitinos. In these scenarios, particles other than the neutralino are sometimes considered as the next-to-lighest supersymmetric particle (NLSP), and are assumed to decay to their even-R partner plus $\widetilde{G}$. If the lifetime is short enough for the decay to take place within the detector, $\widetilde{G}$ is assumed to be undetected and to give rise to missing energy ($\not{E}$) or missing transverse energy ($\not{E}_T$) signatures.

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

In the listings we have made use of the following abbreviations for simplified models employed by the experimental collaborations in supersymmetry searches published in the past year.

WARNING: Experimental lower mass limits determined within simplified models are to be treated with extreme care as they might not be directly applicable to realistic models. This is outlined in detail in the publications and we recommend consulting them before using bounds. For example, branching ratios, typically fixed to specific values in simplified models, can vary substantially in more elaborate models.

Simplified Models Table

Tglu1A: gluino pair production with $\tilde{g} \to q\bar{q}\widetilde{\chi}_1^0$.

Tglu1B: gluino pair production with $\tilde{g} \to qq'\tilde{\chi}_1^{\pm}$, $\tilde{\chi}_1^{\pm} \to W^{\pm}\tilde{\chi}_1^0$.

Tglu1C: gluino pair production with a 2/3 probability of having a $\tilde{g} \to qq'\tilde{\chi}_1^{\pm}$, $\tilde{\chi}_1^{\pm} \to W^{\pm}\tilde{\chi}_1^0$ decay and a 1/3 probability of having a $\tilde{g} \to qq\tilde{\chi}_2^0$, $\tilde{\chi}_2^0 \to Z^{\pm}\tilde{\chi}_1^0$ decay.

Tglu1D: gluino pair production with one gluino decaying to $q\bar{q}'\tilde{\chi}_1^{\pm}$ with $\tilde{\chi}_1^{\pm} \to W^{\pm}+\tilde{G}$, and the other gluino decaying to $q\bar{q}\tilde{\chi}_1^0$ with $\tilde{\chi}_1^0 \to \gamma+\tilde{G}$.

Tglu1E: gluino pair production with $\tilde{g} \to qq'\tilde{\chi}_1^{\pm}$, $\tilde{\chi}_1^{\pm} \to W^{\pm}\tilde{\chi}_2^0$ and $\tilde{\chi}_2^0 \to Z^{\pm}\tilde{\chi}_1^0$ where $m_{\tilde{\chi}_1^{\pm}} = (m_{\tilde{g}} + m_{\tilde{\chi}_1^0})/2$, $m_{\tilde{\chi}_2^0} = (m_{\tilde{\chi}_1^{\pm}} + m_{\tilde{\chi}_1^0})/2$.

Tglu1F: gluino pair production with $\tilde{g} \to qq'\tilde{\chi}_1^{\pm}$ or $\tilde{g} \to qq\tilde{\chi}_2^0$ with equal branching ratios, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate scalar tau lepton or sneutrino to $\tau\nu\tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays through an intermediate scalar tau lepton or sneutrino to $\tau^+\tau^-\tilde{\chi}_1^0$ or $\nu\bar{\nu}\tilde{\chi}_1^0$; the mass hierarchy is such that $m_{\chi_1^{\pm}} \sim m_{\tilde{\chi}_2^0} = (m_{\tilde{g}} + m_{\chi_1^0})/2$ and $m_{\tilde{\tau},\tilde{\nu}} = (m_{\tilde{\chi}_1^{\pm}} + m_{\tilde{\chi}_1^0})/2$.

Tglu1G: gluino pair production with $\tilde{g} \to q\bar{q}\tilde{\chi}_2^0$, and $\tilde{\chi}_2^0$ decaying through an intermediate slepton or sneutrino to $l^+l^-\tilde{\chi}_1^0$ or $\nu\bar{\nu}\tilde{\chi}_1^0$ where $m_{\tilde{\chi}_2^0} = (m_{\tilde{g}} + m_{\tilde{\chi}_1^0})/2$ and $m_{\tilde{\ell},\tilde{\nu}} = (m_{\tilde{\chi}_2^0} + m_{\tilde{\chi}_1^0})/2$.

Tglu1H: gluino pair production with $\tilde{g} \to q\bar{q}\tilde{\chi}_2^0$, and $\tilde{\chi}_2^0 \to \tilde{\chi}_1^0 Z^{0(*)}$.

Tglu1I: gluino pair production with $\tilde{g} \to q\bar{q}\tilde{\chi}_2^0$, and $\tilde{\chi}_2^0 \to \tilde{\chi}_1^0 H$.

Tglu1J: gluino pair production with $\tilde{g} \to q\bar{q}\tilde{\chi}_2^0$, and $\mathrm{BR}(\tilde{\chi}_2^0 \to \tilde{\chi}_1^0 Z^{0(*)}) = \mathrm{BR}(\tilde{\chi}_2^0 \to \tilde{\chi}_1^0 H) = 0.5$.

Tglu1LL gluino pair production where $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ happens with 1/3 probability and $\tilde{g} \to q\bar{q}\tilde{\chi}_1^{\pm}$ happens with 2/3 probability. The $\tilde{\chi}_1^{\pm}$ is assumed to be few hundreds of MeV heavier than the $\tilde{\chi}_1^0$, and decays to $\tilde{\chi}_1^0$ via a pion.

Tglu2A: gluino pair production with $\tilde{g} \to b\bar{b}\tilde{\chi}_1^0$.

Tglu3A: gluino pair production with $\tilde{g} \to t\bar{t}\tilde{\chi}_1^0$.

Tglu3B: gluino pair production with $\tilde{g} \to t\bar{\tilde{t}}$ where $\tilde{t}$ decays exclusively to $t\tilde{\chi}_1^0$.

Tglu3C: gluino pair production with $\tilde{g} \to t\bar{\tilde{t}}$ where $\tilde{t}$ decays exclusively to $c\tilde{\chi}_1^0$.

Tglu3D: gluino pair production with $\tilde{g} \to t\bar{b}\tilde{\chi}_1^{\pm}$ with $\tilde{\chi}_1^{\pm} \to W^{\pm}\tilde{\chi}_1^0$.

Tglu3E: gluino pair production where the gluino decays 25% of the time through $\tilde{g} \to t\bar{t}\tilde{\chi}_1^0$, 25% of the time through $\tilde{g} \to b\bar{b}\tilde{\chi}_1^0$ and 50% of the time through $\tilde{g} \to t\bar{b}\tilde{\chi}_1^{\pm}$ with $\tilde{\chi}_1^{\pm} \to W^{\pm}\tilde{\chi}_1^0$

Tglu4A: gluino pair production with one gluino decaying to $q\bar{q}'\tilde{\chi}_1^{\pm}$ with $\tilde{\chi}_1^{\pm} \to W^{\pm}+\tilde{G}$, and the other gluino decaying to $q\bar{q}\tilde{\chi}_1^0$ with $\tilde{\chi}_1^0 \to \gamma+\tilde{G}$.

Tglu4B: gluino pair production with gluinos decaying to $q\bar{q}\tilde{\chi}_1^0$ and $\tilde{\chi}_1^0 \to \gamma+\tilde{G}$.

Tglu4C: gluino pair production with gluinos decaying to $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ and $\tilde{\chi}_1^0 \to Z+\tilde{G}$.

Tglu4D: gluino pair production with $\tilde{g} \to q\bar{q}\tilde{\chi}_1^0$ where the $\tilde{\chi}_1^0$ decays with equal probability to $\tilde{\chi}_1^0 \to \gamma+\tilde{G}$ or to $\tilde{\chi}_1^0 \to H+\tilde{G}$.

Tglu4E: gluino pair production with $\tilde{g} \to b\bar{b}\tilde{\chi}_1^0$ where the $\tilde{\chi}_1^0$ decays with equal probability to $\tilde{\chi}_1^0 \to \gamma + \tilde{G}$ or to $\tilde{\chi}_1^0 \to Z + \tilde{G}$.

Tglu4F: gluino pair production with $\tilde{g} \to t\bar{t}\tilde{\chi}_1^0$ where the $\tilde{\chi}_1^0$ decays with equal probability to $\tilde{\chi}_1^0 \to \gamma + \tilde{G}$ or to $\tilde{\chi}_1^0 \to Z + \tilde{G}$.

Tglu1RPV: gluino pair production with $\tilde{g} \to uds$ via RPV coupling λ''_{112}.

Tglu2RPV: gluino pair production with $\tilde{g} \to (tbd,\, tbs)$ via RPV coupling λ''_{313} or λ''_{323}.

Tsqk1: squark pair production with $\tilde{q} \to q\tilde{\chi}_1^0$.

Tsqk1LL squark pair production where $\tilde{q} \to q\tilde{\chi}_1^0$ and $\tilde{q} \to q\tilde{\chi}_1^\pm$ each happen with 50% probability. The $\tilde{\chi}_1^\pm$ is assumed to be few hundreds of MeV heavier than the $\tilde{\chi}_1^0$, and decays to $\tilde{\chi}_1^0$ via a pion.

Tsqk2: squark pair production with $\tilde{q} \to q\tilde{\chi}_2^0$ and $\tilde{\chi}_2^0 \to Z + \tilde{\chi}_1^0$.

Tsqk3: squark pair production with $\tilde{q} \to q'\tilde{\chi}_1^\pm$, $\tilde{\chi}_1^\pm \to W^\pm\tilde{\chi}_1^0$

(like Tglu1B but for squarks)

Tsqk4: squark pair production with squarks decaying to $q\tilde{\chi}_1^0$ and $\tilde{\chi}_1^0 \to \gamma + \tilde{G}$.

Tsqk4A: squark pair production with one squark decaying to $q\tilde{\chi}_1^\pm$ with $\tilde{\chi}_1^\pm \to W^\pm + \tilde{G}$, and the other squark decaying to $q\tilde{\chi}_1^0$ with $\tilde{\chi}_1^0 \to \gamma + \tilde{G}$.

Tsqk4B: squark pair production with squarks decaying to $q\tilde{\chi}_1^0$ and $\tilde{\chi}_1^0 \to \gamma + \tilde{G}$.

Tstop1: stop pair production with $\tilde{t} \to t\tilde{\chi}_1^0$.

Tstop1LL stop pair production where $\tilde{t} \to t\tilde{\chi}_1^0$ and $\tilde{t} \to b\tilde{\chi}_1^\pm$ each happen with 50% probability. The $\tilde{\chi}_1^\pm$ is assumed to be few hundreds of MeV heavier than the $\tilde{\chi}_1^0$, and decays to $\tilde{\chi}_1^0$ via a pion.

Tstop2: stop pair production with $\tilde{t} \to b\tilde{\chi}_1^\pm$ with $\tilde{\chi}_1^\pm \to W^\pm\tilde{\chi}_1^0$.

Tstop3: stop pair production with the subsequent four-body decay $\tilde{t} \to bff'\tilde{\chi}_1^0$ where f represents a lepton or a quark.

Tstop4: stop pair production with $\tilde{t} \to c\tilde{\chi}_1^0$.

Tstop5: stop pair production with $\tilde{t} \to b\bar{\nu}\tilde{\tau}$ with $\tilde{\tau} \to \tau\tilde{G}$.

Tstop6: stop pair production with $\tilde{t} \to t + \tilde{\chi}_2^0$, where $\tilde{\chi}_2^0 \to Z + \tilde{\chi}_1^0$ or $H + \tilde{\chi}_1^0$ each with Br=50%.

Tstop7: stop pair production with $\tilde{t}_2 \to \tilde{t}_1 + H/Z$, where $\tilde{t}_1 \to t + \tilde{\chi}_1^0$.

Tstop8: stop pair production with equal probability of the stop decaying via $\tilde{t} \to t\tilde{\chi}_1^0$ or via $\tilde{t} \to b\tilde{\chi}_1^\pm$ with $\tilde{\chi}_1^\pm \to W^\pm\tilde{\chi}_1^0$.

Tstop9: stop pair production with equal probability of the stop decaying via $\tilde{t} \to c\tilde{\chi}_1^0$ or via the four-body decay $\tilde{t} \to bff'\tilde{\chi}_1^0$ where f represents a lepton or a quark.

Tstop10: stop pair production with $\tilde{t} \to b\tilde{\chi}_1^\pm$ and $\tilde{\chi}_1^\pm \to W^{\pm *}\tilde{\chi}_1^0 \to (f\bar{f}') + \tilde{\chi}_1^0$ with a virtual W-boson.

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Tstop11: stop pair production with $\tilde{t} \to b\tilde{\chi}_1^{\pm}$ with $\tilde{\chi}_1^{\pm}$ decaying through an intermediate slepton to $l\nu\tilde{\chi}_1^0$

Tstop12: stop pair production with $\tilde{t} \to t\tilde{\chi}_1^0$ and $\tilde{\chi}_1^0 \to \gamma + \tilde{G}$

Tstop13: stop pair production with $\tilde{t} \to t\tilde{\chi}_1^0$ where the $\tilde{\chi}_1^0$ can decay with equal probability to $\tilde{\chi}_1^0 \to \gamma + \tilde{G}$ or to $\tilde{\chi}_1^0 \to Z + \tilde{G}$.

Tstop1RPV: stop pair production with $\tilde{t} \to \bar{b}\bar{s}$ via RPV coupling λ''_{323}.

Tstop2RPV: stop pair production with $\tilde{t} \to b\ell$, via RPV coupling λ'_{i33}.

Tstop3RPV: stop pair production with $\tilde{t} \to q\mu$, via RPV coupling λ'_{23k}.

Tstop4RPV: stop pair production with $\tilde{t} \to b\tilde{\chi}_1^{\pm}$, $\tilde{\chi}_1^{\pm} \to bbs$ via RPV coupling λ''_{323}.

Tstop5RPV: stop pair production with $\tilde{t} \to t\tilde{\chi}_{1,2}^0$, $\tilde{\chi}_{1,2}^0 \to tbs$ via RPV coupling λ''_{323}.

Tsbot1: sbottom pair production with $\tilde{b} \to b\tilde{\chi}_1^0$.

Tsbot2: sbottom pair production with $\tilde{b} \to t\chi_1^-$, $\chi_1^- \to W^-\tilde{\chi}_1^0$.

Tsbot3: sbottom pair production with $\tilde{b} \to b\tilde{\chi}_2^0$, where one of the $\tilde{\chi}_2^0 \to Z^{(*)}\tilde{\chi}_1^0 \to f\bar{f}\tilde{\chi}_1^0$ and the other $\tilde{\chi}_2^0 \to \widetilde{\ell}\ell^+ \to \ell^+\ell^-\tilde{\chi}_1^0$.

Tsbot4: sbottom pair production with $\tilde{b} \to b\tilde{\chi}_2^0$, with $\tilde{\chi}_2^0 \to H\tilde{\chi}_1^0$

Tchi1chi1A: electroweak pair and associated production of nearly mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_1^0$, where $\tilde{\chi}_1^{\pm}$ decays to $\tilde{\chi}_1^0$ plus soft radiation, and where one of the $\tilde{\chi}_1^0$ decays to $\gamma + \tilde{G}$ while the other one decays to $Z/H + \tilde{G}$ (with equal probability).

Tchi1chi1B: electroweak pair production of charginos $\tilde{\chi}_1^{\pm}$, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate slepton or sneutrino to $l\nu\tilde{\chi}_1^0$ and where the slepton or sneutrino mass is 5%, 25%, 50%, 75% and 95% of the $\tilde{\chi}_1^{\pm}$ mass.

Tchi1chi1C: electroweak pair production of charginos $\tilde{\chi}_1^{\pm}$, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate slepton or sneutrino to $l\nu\tilde{\chi}_1^0$ and where $m_{\tilde{\ell},\tilde{\nu}} = (m_{\tilde{\chi}_1^{\pm}} + m_{\tilde{\chi}_1^0})/2$.

Tchi1chi1D: electroweak associated pair production of charginos $\tilde{\chi}_1^{\pm}$, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate scalar tau lepton or sneutrino to $\tau\nu\tilde{\chi}_1^0$ and where $m_{\tilde{\tau}}, m_{\tilde{\nu}} = (m_{\tilde{\chi}_1^{\pm}} + m_{\tilde{\chi}_1^0})/2$.

Tchi1chi1F: electroweak pair and associated production of nearly mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_1^0$ (*i.e.* $\tilde{\chi}_1^{\pm}\tilde{\chi}_1^{\pm}$ and $\tilde{\chi}_1^{\pm}\tilde{\chi}_1^0$ production) where the $\tilde{\chi}_1^{\pm}$ decays exclusively to $\tilde{\chi}_1^0$ plus soft radiation and the $\tilde{\chi}_1^0$ decays to $\gamma/Z + \tilde{G}$.

Tchi1chi1G: electroweak pair production of charginos $\tilde{\chi}_1^{\pm}$, which are nearly mass-degenerate with neutralinos $\tilde{\chi}_1^0$. The $\tilde{\chi}_1^{\pm}$ decays either to $W^{\pm} + \tilde{G}$, or to $\tilde{\chi}_1^0$ plus soft radiation. The $\tilde{\chi}_1^0$ decays exclusively to $\gamma + \tilde{G}$.

Tchi1chi1H: electroweak pair production of charginos $\tilde{\chi}_1^{\pm}$, with $\tilde{\chi}_1^{\pm} \to W^{\pm} + \tilde{\chi}_1^0$ and $W^{\pm} \to \ell^{\pm} + \nu$.

Tchi1n1A: electroweak associated production of mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_1^0$, where $\tilde{\chi}_1^{\pm}$ decays exclusively to $W^{\pm} + \tilde{G}$ and $\tilde{\chi}_1^0$ decays exclusively to $\gamma + \tilde{G}$.

Tchi1n2A: electroweak associated production of mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate slepton or sneutrino to $l\nu\tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays through an intermediate slepton or sneutrino to $l^+l^-\tilde{\chi}_1^0$ or $\nu\bar{\nu}\tilde{\chi}_1^0$.

Tchi1n2B: electroweak associated production of mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate slepton or sneutrino to $l\nu\tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays through an intermediate slepton or sneutrino to $l^+l^-\tilde{\chi}_1^0$ or $\nu\bar{\nu}\tilde{\chi}_1^0$ and where the slepton or sneutrino mass is 5%, 25%, 50%, 75% and 95% of the $\tilde{\chi}_1^{\pm}$ mass.

Tchi1n2C: electroweak associated production of mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate slepton or sneutrino to $l\nu\tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays through an intermediate slepton or sneutrino to $l^+l^-\tilde{\chi}_1^0$ or $\nu\bar{\nu}\tilde{\chi}_1^0$ and where $m_{\tilde{\ell},\tilde{\nu}} = (m_{\tilde{\chi}_1^{\pm}} + m_{\tilde{\chi}_1^0})/2$.

Tchi1n2D: electroweak associated production of mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate scalar tau lepton or sneutrino to $\tau\nu\tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays through an intermediate scalar tau lepton or sneutrino to $\tau^+\tau^-\tilde{\chi}_1^0$ or $\nu\bar{\nu}\tilde{\chi}_1^0$ and where $m_{\tilde{\tau},\tilde{\nu}} = (m_{\tilde{\chi}_1^{\pm}} + m_{\tilde{\chi}_1^0})/2$.

Tchi1n2E: electroweak associated production of mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm} \to W^{\pm} + \tilde{\chi}_1^0$ and $\tilde{\chi}_2^0 \to H + \tilde{\chi}_1^0$.

Tchi1n2F: electroweak associated production of mass-degenerate wino-like charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate $W^{\pm *}$ to $l\nu\tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays through an intermediate Z^* to $l^+l^-\tilde{\chi}_1^0$ or $\nu\bar{\nu}\tilde{\chi}_1^0$.

Tchi1n2Fa: electroweak associated production of mass-degenerate wino-like charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate $W^{\pm *}$ to $q\bar{q}\tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays through an intermediate Z^* to $l^+l^-\tilde{\chi}_1^0$ or $\nu\bar{\nu}\tilde{\chi}_1^0$.

Tchi1n2G: electroweak associated production of Higgsino-like charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, and electroweak associated production of $\tilde{\chi}_2^0$ and $\tilde{\chi}_1^0$, where $m_{\tilde{\chi}_1^{\pm}} = (m_{\tilde{\chi}_2^0} + m_{\tilde{\chi}_1^0})/2$ and where $\tilde{\chi}_1^{\pm}$ decays through an intermediate $W^{\pm *}$ to $q\bar{q}\tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays through an intermediate Z^* to $l^+l^-\tilde{\chi}_1^0$.

Tchi1n2Ga: electroweak associated production of Higgsino-like charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, and electroweak associated production of $\tilde{\chi}_2^0$ and $\tilde{\chi}_1^0$, where $m_{\tilde{\chi}_1^{\pm}} = (m_{\tilde{\chi}_2^0} + m_{\tilde{\chi}_1^0})/2$ and where $\tilde{\chi}_1^{\pm}$ decays through an intermediate $W^{\pm *}$ to $l\nu\tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays through an intermediate Z^* to $l^+l^-\tilde{\chi}_1^0$.

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Tchi1n2H: electroweak associated production of mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ decays through an intermediate slepton or sneutrino to $l\nu\tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays through an intermediate scalar tau lepton or sneutrino to $\tau^+\tau^-\tilde{\chi}_1^0$ or $\nu\bar{\nu}\tilde{\chi}_1^0$.

Tchi1n2I: electroweak associated production of mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ decays to $W^{\pm} + \tilde{\chi}_1^0$ and where $\tilde{\chi}_2^0$ decays 50% of the time to $Z + \tilde{\chi}_1^0$ and 50% of the time to $H + \tilde{\chi}_1^0$.

Tchi1n12_GGM: in the framework of General Gauge Mediation (GGM): electroweak pair and associated production of nearly mass-degenerate charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_1^0$, $\tilde{\chi}_2^0$ (*i.e.* $\tilde{\chi}_1^{\pm}\tilde{\chi}_1^{\pm}$, $\tilde{\chi}_1^{\pm}\tilde{\chi}_1^0$ and $\tilde{\chi}_1^{\pm}\tilde{\chi}_2^0$ production) where the $\tilde{\chi}_1^{\pm}$ decays exclusively to $W^{\pm} + \tilde{G}$, the $\tilde{\chi}_2^0$ decays to $Z/H + \tilde{G}$ and the $\tilde{\chi}_1^0$ decays to $\gamma/Z + \tilde{G}$. The branching ratios depend on the composition of the gauge eigenstates of the neutralinos in the GGM scenario.

Tn1n1A: electroweak pair and associated production of nearly mass-degenerate Higgsino-like charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_1^0$ and $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ and $\tilde{\chi}_2^0$ decay to $\tilde{\chi}_1^0$ plus soft radiation and where both of the $\tilde{\chi}_1^0$ decay to $H + \tilde{G}$.

Tn1n1B: electroweak pair and associated production of nearly mass-degenerate Higgsino-like charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_1^0$ and $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ and $\tilde{\chi}_2^0$ decay to $\tilde{\chi}_1^0$ plus soft radiation and where the $\tilde{\chi}_1^0$ decays 50% of the time to $H + \tilde{G}$ and 50 % of the time to $Z + \tilde{G}$.

Tn1n1C: electroweak pair and associated production of nearly mass-degenerate Higgsino-like charginos $\tilde{\chi}_1^{\pm}$ and neutralinos $\tilde{\chi}_1^0$ and $\tilde{\chi}_2^0$, where $\tilde{\chi}_1^{\pm}$ and $\tilde{\chi}_2^0$ decay to $\tilde{\chi}_1^0$ plus soft radiation and where both of the $\tilde{\chi}_1^0$ decay to $Z + \tilde{G}$.

Tn2n3A: electroweak associated production of mass-degenerate neutralinos $\tilde{\chi}_2^0$ and $\tilde{\chi}_3^0$, where $\tilde{\chi}_2^0$ and $\tilde{\chi}_3^0$ decay through intermediate sleptons to $l^+l^-\tilde{\chi}_1^0$ and where the slepton mass is 5%, 25%, 50%, 75% and 95% of the $\tilde{\chi}_2^0$ mass.

Tn2n3B: electroweak associated production of mass-degenerate neutralinos $\tilde{\chi}_2^0$ and $\tilde{\chi}_3^0$, where $\tilde{\chi}_2^0$ and $\tilde{\chi}_3^0$ decay through intermediate sleptons to $l^+l^-\tilde{\chi}_1^0$ and where $m_{\tilde{\ell}} = (m_{\tilde{\chi}_2^0} + m_{\tilde{\chi}_1^0})/2$.