

Analyses in simple_LHC_bounds

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This note summarizes analyses available on the Mathematica package `simple_LHC_bound`, which collects LHC results with $\sqrt{s} > 13$ TeV related to non-colored SUSY particles. Preliminary results are not included. For references and a citation guideline, see `readme.md` files included in respective analyses.

Throughout this note, $l = (e, \mu, \tau)$ and $\ell = (e, \mu)$. Tau-leptons τ^\pm are labelled by its decay product: τ_h means those decaying hadronically and are observed as tau jets, while τ_ℓ means it decays as $\tau^\pm \rightarrow \ell^\pm \nu$. SFOS denotes an e^+e^- or $\mu^+\mu^-$ pair, standing for “same-flavor opposite sign.” The missing transverse momentum is denoted by p_T^{miss} .

Colored SUSY particles and heavy Higgs bosons are assumed to be decoupled unless otherwise noted. In addition to $\tilde{\chi}_i^0$ and $\tilde{\chi}_j^\pm$ ($i = 1, 2, 3, 4$ and $j = 1, 2$), which denote the i -th lightest neutralino and the j -th lightest chargino, respectively, we use \tilde{B} , \tilde{W}^0 , and \tilde{H}^0 to describe particles that are assumed to be mostly bino-like, wino-like, or Higgsino-like, respectively, and similarly \tilde{W}^\pm and \tilde{H}^\pm . Note that \tilde{H}^0 is made of two Majorana fermions, i.e., \tilde{H}_u^0 and \tilde{H}_d^0 with a Dirac-type mass term, and neutralino pair-production $pp \rightarrow \tilde{\chi}_i^0 \tilde{\chi}_j^0$ for Higgsino-like neutralinos happens only for $i \neq j$.



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Visit https://github.com/misho104/simple_lhc_bound for further information, updates, and reporting issues.

1 Standard neutralino–chargino (NC) searches

2012.08600/C NC/ZW by $2\ell^{Z\text{-like}} + \text{jet(s)} + p_{\text{T}}^{\text{miss}}$ signature.

2108.07586/A NC/ZW and NC/HW.

2 Standard chargino-pair (CC) searches

- CC/WW for $\tilde{\chi}^+ \tilde{\chi}^- \rightarrow W^+ W^- p_{\text{T}}^{\text{miss}}$.
- CC/slep for $\tilde{\chi}^+ \tilde{\chi}^-$ into $(\tilde{\ell}_{\text{L}}, \bar{\nu}) \times (\tilde{\ell}_{\text{L}}, \bar{\nu})$, which anyway results in $2\ell^{\text{SFOS}}$ signature.

1908.08215/A $\tilde{\chi}^+ \tilde{\chi}^-$ to $2\ell^{\text{SFOS}} + p_{\text{T}}^{\text{miss}}$. Both of CC/WW and CC/slep.

2108.07586/A CC/WW.

3 Standard slepton-pair (LL) searches

1908.08215/A Standard $2\ell^{\text{SFOS}} + p_{\text{T}}^{\text{miss}}$.

2012.08600/C Standard $2\ell^{\text{SFOS}} + p_{\text{T}}^{\text{miss}}$.

4 Inclusive chargino/neutralino searches

2108.07586/A Productions of all chargino/neutralino combinations.

- Wino-like $\tilde{\chi}_1^\pm \tilde{\chi}_2^0$ with bino-like $\tilde{\chi}_1^0$ and decoupled sleptons; CC/WW plus NC/(H|Z)W are all considered.
- Higgsino-like $\tilde{\chi}_1^\pm \tilde{\chi}_2^0 \tilde{\chi}_3^0$ with bino-like $\tilde{\chi}_1^0$ and decoupled sleptons; CC/WW, N2C/(H|Z)W, N3C/(H|Z)W, and NN/(H|Z)(H|Z) are all considered.

5 Long-lived chargino searches

2004.05153/C Standard centimeter-track searches for quasi-LSP \tilde{W}^\pm and \tilde{H}^\pm .

2201.02472/A Standard centimeter-track searches for quasi-LSP \tilde{W}^\pm and \tilde{H}^\pm .