

# Analyses in simple\_LHC\_bounds

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19-May-2022 12:34:40

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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  $\tau^\pm$  are labelled by its decay product:  $\tau_h$  means those decaying hadronically and are observed as tau jets, while  $\tau_\ell$  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  $p_T^{\text{miss}}$ .

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

## 1 Standard neutralino–chargino (NC) searches

1909.09226/A NC/HW.

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 Standard stau-pair (TaTa) searches

1911.06660/A Standard  $2\tau_{\text{h}} + p_{\text{T}}^{\text{miss}}$ .

## 5 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.

## 6 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  $\tilde{H}^\pm$ .