



# **SUSY Listings**

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# The PDF file of Listings has 110 pages

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# Many Simplified models



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 vear.

### Simplified Models Table

### **Tglu1A:** gluino pair production with $\tilde{g} \rightarrow q\bar{q}\tilde{\chi}_1^0$ .

- **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  $\tilde{\chi}_1^{\pm} \rightarrow W^{\pm} + \tilde{G}$ , and the other gluino decaying to  $q\bar{q}\tilde{\chi}_1^0$  with  $\tilde{\chi}_1^0 \rightarrow \gamma + \tilde{G}$ .
- **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  $\tilde{g} \rightarrow qq'\tilde{\chi}_1^{\pm}$  or  $\tilde{g} \rightarrow qq\tilde{\chi}_2^0$  with equal branching ratios, where  $\tilde{\chi}_1^{\pm}$  decays through an intermediate scalar tau lepton or sneutrino to  $\tau\nu\chi_1^0$  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  $\tilde{\chi}_{2}^{0} \to \tilde{\chi}_{1}^{0}Z^{0(*)}$ .

an intermediate slepton or sneutrino to  $l\nu\tilde{\chi}_1^0$  and where  $chiz_2$ 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 *chi2*<sub>2</sub> decays through an intermediate scalar tau lepton or sneutrino to  $\tau^+ \tau^- \tilde{\chi}_1^0$  or  $\nu \tilde{\nu} \tilde{\chi}_1^0$  and where  $m_{\tilde{\tau},\tilde{\nu}} = (m_{\tilde{\chi}^{\pm}} + m_{\tilde{\chi}_1^0})/2$ .

**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  $\tilde{\chi}_2^0 \to H + \tilde{\chi}_1^0$ .

**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  $m_{\tilde{\ell}} = (m_{\tilde{\chi}_2^0} + m_{\tilde{\chi}_1^0})/2$ .

# 49 models listed at beginning of section

**Tglu2A:** gluino pair production with  $\tilde{q} \rightarrow b\bar{b}\tilde{\chi}_{1}^{0}$ **Tglu3A:** gluino pair production with  $\tilde{g} \to t\bar{t}\tilde{\chi}_1^0$ . **Tglu3B:** gluino pair production with  $\tilde{g} \to t\tilde{t}$  where  $\tilde{t}$  decays exclusively to  $t\tilde{\chi}_1^0$ . **Tglu3C:** gluino pair production with  $\tilde{q} \to t\tilde{t}$  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  $\tilde{\chi}_1^0 \rightarrow \gamma + \tilde{G}.$ **Tglu4B:** gluino pair production with gluinos decaying to  $q\bar{q}\tilde{\chi}_1^0$  and  $\tilde{\chi}_1^0 \rightarrow \gamma + \tilde{G}.$ **Tglu4C:** gluino pair production with gluinos decaying to  $\tilde{g} \rightarrow q\bar{q}\tilde{\chi}_1^0$  and  $\tilde{\chi}_1^0 \rightarrow Z + \tilde{G}.$ **Tsqk1:** squark pair production with  $\tilde{q} \rightarrow q \tilde{\chi}_1^0$ . **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  $\tilde{\chi}_1^0 \rightarrow \gamma + \tilde{G}.$ **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  $\tilde{\chi}_1^0 \rightarrow \gamma + \tilde{G}.$ **Tsqk4B:** squark pair production with squarks decaying to  $q\tilde{\chi}_1^0$  and  $\tilde{\chi}_1^0 \rightarrow \gamma + \tilde{G}.$ **Tstop1:** stop pair production with  $\tilde{t} \to t \tilde{\chi}_1^0$ . **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  $\tilde{t} \to bf f' \tilde{\chi}_1^0$  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  $\tilde{t}_2 \rightarrow \tilde{t}_1 + H/Z$ , where  $\tilde{t}_1 \rightarrow t + \tilde{\chi}_1^0$ . 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  $\tilde{t} \to b f f' \tilde{\chi}_1^0$ 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. **Tstop11:** stop pair production with  $\tilde{t} \to b \tilde{\chi}_1^{\pm}$  with  $\tilde{\chi}_1^{\pm}$  decaying through an intermediate slepton to  $l\nu\tilde{\chi}_1^0$ **Tstop1RPV:** stop pair production with  $\tilde{t} \rightarrow \bar{b}\bar{s}$  via RPV coupling  $\lambda_{323}''$ . **Tsbot1:** sbottom pair production with  $\tilde{b} \rightarrow b \tilde{\chi}_1^0$ . **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  $\tilde{\chi}_2^0 \to \tilde{\ell} \ell^+ \to \ell^+ \ell^- \tilde{\chi}_1^0$ . Tchi1chi1A: electroweak pair and associated production of nearly massdegenerate 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  $l\nu\tilde{\chi}^0_1$  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  $l\nu\tilde{\chi}^0_1$  and where  $m_{\tilde{\ell},\tilde{\nu}} = (m_{\tilde{\nu}_{\tau}^{\pm}} + m_{\tilde{\nu}_{\tau}^{0}})/2.$ 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  $l^+ \bar{l}^- \tilde{\chi}^0_1$  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  $chiz_2$ decays through an intermediate slepton or sneutrino to  $l^+l^-\tilde{\chi}_1^0$ or  $\nu \bar{\nu} \bar{\chi}_1^0$  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

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Clearly would be simplified if someone would actually discover supersymmetry (although not at the very beginning).

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Each subsection is mixing various models.

In last edition, separated **R-parity-conserving** and

R-parity-conserving an

**R-parity-violating** 

into different subsections for each particle (where appropriate).

since they are unrelated.

Also, removed enormous amount of "old" data. In some cases, "old" was defined as 2012.



| R-parity conserving $\tilde{q}$ (Squark) mass limit |            |                     |                            |   |  |  |  |
|---|------------|---------------------|----------------------------|---|--|--|--|
| VALUE (GeV)   | CL%        | DOCUMENT ID         | TECN                       | COMMENT   |  |  |  |
| >1450 (CL   | . = 95%) C | UR EVALUATION       | CMSSM, ta                  | n $eta{=}30$ , $\mu>$ 0   |  |  |  |
| >1550 (CL   | . = 95%) C | OUR EVALUATION      | Mass degenerate squarks    |   |  |  |  |
| >1050 (CL = 95%) OUR EVALUATION                     |            |                     | Single light squark bounds |   |  |  |  |
| >1220   | 95         | <sup>1</sup> AABOUD | 17AR ATLS                  | 1 $\ell+$ jets+ $ ot\!$                                     |  |  |  |
| >1000   | 95         | <sup>2</sup> AABOUD |                            | GeV<br>2 same-flavour, opposite-sign $\ell$ + jets + $\not\!$ |  |  |  |
|   |            | Э                   |                            | GeV   |  |  |  |

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# Ten pages of data listings before footnotes and <u>nothing</u> older than 2014

## Heavy $\tilde{g}$ (Gluino) mass limit

For  $m_{\widetilde{g}} > 60-70$  GeV, it is expected that gluinos would undergo a cascade decay via a number of neutralinos and/or charginos rather than undergo a direct decay to photinos as assumed by some papers. Limits obtained when direct decay is assumed are usually higher than limits when cascade decays are included.

Some earlier papers are now obsolete and have been omitted. They were last listed in our PDG 14 edition: K. Olive, *et al.* (Particle Data Group), Chinese Physics **C38** 070001 (2014) (http://pdg.lbl.gov).

| VALUE (GeV) | CL% | DOCUMENT ID           |     | TECN | COMMENT  |
|-------------|-----|-----------------------|-----|------|--|
| >2040       | 95  | <sup>1</sup> SIRUNYAN | 18D | CMS  | top quark (hadronically decaying)<br>+ jets + $\!$   |
| >1930       | 95  | <sup>1</sup> SIRUNYAN | 18D | CMS  | 0 GeV<br>top quark (hadronically decay-<br>ing) + jets + $\not{E}_T$ , <u>Tglu3B</u> ,<br>$m_{\tilde{t}_1} - m_{\tilde{\chi}_1^0} = 175$ GeV, $m_{\tilde{\chi}_1^0}$ |
| >1690       | 95  | <sup>1</sup> SIRUNYAN | 18D | CMS  | = 200  GeV<br>top quark (hadronically decay-<br>ing) + iets + Em. Tglu3C.  |

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## First two pages of footnotes



- <sup>1</sup> SIRUNYAN 18D searched in 35.9 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events containing identified hadronically decaying top quarks, no leptons, and  $\not\!\!\!E_T$ . No significant excess above the Standard Model expectations is observed. Limits are set on the stop mass in the Tstop1 simplified model, see their Figure 8, and on the gluino mass in the Tglu3A, Tglu3B, Tglu3C and Tglu3E simplified models, see their Figure 9.
- <sup>2</sup> AABOUD 17AI searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with one or more isolated lepton, at least eight jets, either zero or many *b*-jets, for evidence of R-parity violating decays of the gluino. No significant excess above the Standard Model expectations is observed. Limits up to 2.1 TeV are set on the gluino mass in R-parity-violating supersymmetry models as Tglu3A with LSP decay through the non-zero  $\lambda_{112}''$

coupling as 
$$\tilde{\chi}_1^0 \rightarrow u ds$$
. See their Figure 9.

- <sup>3</sup>AABOUD 17AI searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with one or more isolated lepton, at least eight jets, either zero or many *b*-jets, for evidence of R-parity violating decays of the gluino. No significant excess above the Standard Model expectations is observed. Limits up to 1.65 TeV are set on the gluino mass in R-parity-violating supersymmetry models with  $\tilde{g} \rightarrow t\tilde{t}, \tilde{t} \rightarrow bs$  through the non-zero  $\lambda_{323}''$  coupling. See their Figure 9.
- <sup>4</sup> AABOUD 17AI searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with one or more isolated lepton, at least eight jets, either zero or many *b*-jets, for evidence of R-parity violating decays of the gluino. No significant excess above the Standard Model expectations is observed. Limits up to 1.8 TeV are set on the gluino mass in R-parityviolating supersymmetry models as Tglu1A with the LSP decay through the non-zero  $\lambda'$ coupling as  $\tilde{\chi}_1^0 \rightarrow qq\ell$ . See their Figure 9.
- <sup>5</sup> AABOUD 17AJ searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with two same-sign or three leptons, jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 1.75 TeV are set on the gluino mass in Tglu3A simplified models in case of off-shell top squarks and for  $m_{\widetilde{\chi}_1^0} = 100$  GeV. See their Figure 4(a).
- <sup>6</sup> AABOUD 17AJ searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with two same-sign or three leptons, jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 1.57 TeV are set on the gluino mass in Tglu1E simplified models (2-step models) for  $m_{\tilde{\chi}_{1}^{0}} = 100$  GeV.

### See their Figure 4(b).

<sup>7</sup> AABOUD 17AJ searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with two same-sign or three leptons, jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 1.86 TeV are set on the gluino mass in Tglu1G simplified models for  $m_{\widetilde{\chi}_1^0} = 200$  GeV. See their Figure

#### 4(c)

- <sup>8</sup> AABOUD 17AJ searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with two same-sign or three leptons, jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 1.8 TeV are set on the gluino mass in R-parity-violating supersymmetry models as Tglu3A with LSP decaying through the non-zero  $\lambda''_{112}$  coupling as  $\tilde{\chi}^0_1 \rightarrow uds$ . See their Figure 5(d).
- <sup>9</sup> AABOUD 17AJ searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with two same-sign or three leptons, jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 1.75 TeV are set on the gluino mass in R-parity-violating supersymmetry models as Tglu1A with LSP decaying through the non-zero  $\lambda'$  coupling as  $\tilde{\chi}_1^0 \rightarrow qq\ell$ . See their Figure 5(c).

- $^{10}$  AABOUD 17AJ searched in 36.1 fb $^{-1}$  of  $p\,p$  collisions at  $\sqrt{s}=$  13 TeV for events with two same-sign or three leptons, jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 1.45 TeV are set on the gluino mass in R-parity-violating supersymmetry models where  $\tilde{g} \rightarrow t \tilde{t}_1$  and
  - $\widetilde{t}_1 \rightarrow sd$  through the non-zero  $\lambda_{321}''$  coupling. See their Figure 5(b).
- <sup>11</sup> AABOUD 17AJ searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with two same-sign or three leptons, jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 1.45 TeV are set on the gluino mass in R-parity-violating supersymmetry models where  $\tilde{g} \rightarrow t \tilde{t}_1$  and
- $\tilde{t}_1 \rightarrow bd$  through the non-zero  $\lambda_{313}''$  coupling. See their Figure 5(a).
- <sup>12</sup> AABOUD 17AJ searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with two same-sign or three leptons, jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 400 GeV are set on the down type squark ( $\tilde{d}_R$  mass in R-parity-violating supersymmetry models where
- $\tilde{d}_R \to t b$  through the non-zero  $\lambda''_{313}$  coupling or  $\tilde{d}_R \to t s$  through the non-zero  $\lambda''_{321}$ . See their Figure 5(e) and 5(f).
- <sup>13</sup>AABOUD 17AR searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with one isolated lepton, at least two jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 2.1 TeV are set on the gluino mass in Tglu1B simplified models, with  $x = (m_{\chi_1^\pm} m_{\widetilde{\chi}_1^0}) / (m_{\chi_1^\pm} m_{\widetilde{\chi}_1^0}) / (m_{\chi_1^\pm} m_{\widetilde{\chi}_1^0})$
- $(m_{\widetilde{g}} m_{\widetilde{\chi}_1^0}) = 1/2$ . Similar limits are obtained for variable x and fixed neutralino mass,  $m_{\widetilde{\chi}_1^0} = 60$  GeV. See their Figure 13.
- 14 AABOUD 17AR searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with one isolated lepton, at least two jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 1.74 TeV are set on the gluino mass in Tglu1E simplified model. Limits up to 1.7 TeV are also set on pMSSM models leading to similar signal event topologies. See their Figure 13.
- <sup>15</sup>AABOUD 17AY searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with at least four jets and large missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits up to 1.8 TeV are set on the gluino mass in Tglu3A simplified models assuming  $m_{\widetilde{t}_1} m_{\widetilde{\chi}_1^0} = 5$  GeV. See their Figure 13.
- <sup>16</sup> AABOUD 17AZ searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with at least seven jets and large missing transverse momentum. Selected events are further classified based on the presence of large R-jets or *b*-jets and no leptons. No significant excess above the Standard Model expectations is observed. Limits up to 1.8 TeV are set on the gluino mass in Tglu1E simplified models. See their Figure 6b.
- $^{17}$  AABOUD 17AZ searched in 36.1 fb $^{-1}$  of pp collisions at  $\sqrt{s}=13$  TeV for events with at least seven jets and large missing transverse momentum. Selected events are further classified based on the presence of large R-jets or *b*-jets and no leptons. No significant excess above the Standard Model expectations is observed. Limits up to 1.54 TeV are set on the gluino mass in Tglu3A simplified models. See their Figure 7a.
- <sup>18</sup> AABOUD 17AZ searched in 36.1 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events with at least seven jets and large missing transverse momentum. Selected events are further classified based on the presence of large R-jets or *b*-jets and no leptons. No significant excess above the Standard Model expectations is observed. Limits are set for R-parity violating decays of the gluino assuming  $\tilde{g} \to t \tilde{t}_1$  and  $\tilde{t}_1 \to bs$  through the non-zero  $\lambda''_{323}$  couplings. The range 625–1375 GeV is excluded for  $m_{\tilde{t}_1} = 400$  GeV. See their Figure 7b.

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## ...and eight more pages of footnotes municipation of the second s

<sup>19</sup>AABOUD 17N searched in 14.7 fb<sup>-1</sup> of pp collisions at  $\sqrt{s}$  = 13 TeV in final states Addouble 1/n searched in 14.7 m<sup>-</sup> or pp consistent at  $\sqrt{s} = 15$  feer mma states with 2 same-flavor, opposite-sign leptons (electrons or monos), jets and large missing transverse momentum. In Tglu1 models, gluino masses are excluded at 95% C.L. up to 1300 GeV for  $m_{\chi_0} = 0$  GeV and  $m_{\chi_0} = 1100$  GeV. See their Fig. 12 for exclusion limits as a function of  $m_{\chi_0^0}^{\gamma_1}$ . Limits are also presented assuming  $m_{\chi_0^0} = m_{\chi_0^0} + 100$  GeV, see their Fig. 13.

<sup>20</sup>AABOUD 17N searched in 14.7 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV in final states And both The second term that it is on pp consisting at  $\sqrt{s} = 10$  fer in massive with 2 same-flavor, opposite-sign leptons (electrons or muons), jets and large missing transverse momentum. In TgluIH models, gluino masses are excluded at 95% C.L. up to 1310 GeV for  $m_{\chi_1^0}^{-0} < 400$  GeV and assuming  $m_{\chi_2^0}^{-0} = (m_{\tilde{g}} + m_{\chi_1^0})/2$ . See their Fig.

<sup>21</sup>AABOUD 17N searched in 14.7 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV in final states <sup>4</sup> AABOUD 17% searched in 14.7 to <sup>+</sup> or *pp* commune at  $y_{-} = t_{-}$  with the method of the second se to 1700 GeV for small  $m_{\chi_1^0}$ . The results probe kinemat  $m_{\chi_1^0} = (m_{\widetilde{g}} - m_{\widetilde{\chi}_1^0})/2 = 50$  GeV. See their Fig. 14.

particle data

 $x_1 = x_1$ <sup>22</sup> KHACHATRYAN 17 searched in 2.3 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events containing four or more jets, no more than one lepton, and missing transverse momentum, using the razor variables ( $M_R$  and  $R^2$ ) to discriminate between signal and background processes. No evidence for an excess over the expected background is observed. Limits are derived on the gluino mass in the TglulA. Tglu2A and Tglu2A aimplified models, see Figs. 16 and 17. Also, assuming gluinos decay only via three-body processes involving third-generation quarks plus a neutralino/chargino, and assuming  $m_{\chi_1^\pm} = m_{\chi_1^0} + 5 \text{ GeV}$ .

a branching ratio-independent limit on the gluino mass is given, see Fig. 16. <sup>23</sup> KHACHATRYAN 17AD searched in 2.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events The sector is a second of the second second

 $^{24}$  KHACHATRYAN 17AD searched in 2.3 fb $^{-1}$  of pp collisions at  $\sqrt{s} = 13$  TeV for event containing at least four jets (including b-jets), missing transverse momentum and tagged top quarks. No evidence for an excess over the expected background is observed. Gluino masses up to 1450 GeV and neutralino masses up to 820 GeV are excluded at 95% C.L. See Fig. 13.

<sup>25</sup> KHACHATRYAN 17AS searched in 2.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for event with a single electron or muon and multiple jets. No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in the Tglu3A and Tglu1B simplified models, see their Fig. 7

<sup>26</sup> KHACHATRYAN 17AW searched in 2.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events with at least three charged leptons, in any combination of electrons and muons, and significant  $\mathcal{E}_T$ . No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in the Tglu3A and Tglu1C simplified models, and on the sbottom mass in the Tsbot2 simplified model, see their Figure 4.

<sup>27</sup> KHACHATRYAN 17P searched in 2.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events with one or more jets and large  $U_T$ . No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in the TgluIA, Tglu2A, Tglu3B, Tglu are also set on the squark mass in the Tsqk1 simplified model, see their Figure 7 and on the shottom mass in the Tsqk1 simplified model, see Fig. 8. Finally, limits are set on the stop mass in the Tstop1, Tstop3, Tstop4, Tstop6 and Tstop7 simplified models, see Fig. 8.

<sup>56</sup> KHACHATRYAN 19: searched in 19.5 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 8$  TeV for events in which bjets and four W-bosons are produced. Five individual search channels are combined (billy hadronic, single lepton, same-sing dilepton, oppositie-sign dilepton, oppositie-sign dilepton, mu-tilepton). No significant excess above the Standard Model expectations is observed Limits are set on the gluino mass in a simplified model where the decay  $\tilde{g} \rightarrow t \tilde{T} \tilde{\chi}_1^0$  takes

Limits are set on the gluine mass in a simplified model where the decxy  $\tilde{g} \rightarrow \{\Gamma_X^{\rm ex}\}$  takes place with a branching ratio of 100%, see Fig. 5. Also a simplified model with gluinos decxying into on-shell top squarks is considered, see Fig. 6. Si YKHCATERTYN IX5 searched in 130%<sup>1</sup>-d a p collisions at  $\sqrt{s} = 8$  TeV for events with at least two energetic jets, at least one of which is required to originate from a 9 quark, and significant [ $P_T$ , using the racor variables ( $M_D$ ) and  $R^2$ ) to discriminate between signal and background processes. No significant excess above the Standard Model expertations is a com-OL.

Mode expectations is observed. Limits are set on the guino mass in simplified modes where the decxy  $\vec{p} \rightarrow b \tilde{b}_1^{(2)}$  and the decxy  $\vec{p} - t | \tilde{t}_1^{(2)}$  take place with branching ratios varying between 0, 50 and 100%, see Figs. 13 and 14. 59 AAD 144. searched in 20.3 fb<sup>-1</sup> of *p* a collisions at  $\sqrt{s} = 8$  TeV for strongly pro-duced supersymmetric particles in events containing jets and large missing transverse momentum, and no electrons or muons. No exects over the expected SM background

<sup>60</sup>AAD 14x searched in 20.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events with at least four leptons (electrons, muons, taus) in the final state. No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in an

the Standard Model expectations is observed. Limits are set on the gluino mass in an Reparty violating simplified model where the decay  $\frac{1}{2} - q^2 \tau_1^0$ , which  $\overline{\chi}_1^0 - e^+ c^+ \overline{c}^+$ , takes place with a branching ratio of 100%, see Fig. 8. Standard Model model model for 30  $B^+ - 0$  proclimions at  $\chi^- = B$  TeV for events with at least four laptons (electrons, moons, taus) in the final state. No significant excess above the gauge-modilized model (SGM) where the decay  $\frac{1}{2} - q^{-2} \tau_1^0$ , takes place with a branching ratio of 100%, for two choices of tand) = 1.5 and 50, see Fig. 11. Also sence constraints on the Bigglion mass primater  $\mu$  are discussed.  $M^2$  ChATRCHYAN 14a4 searched in 4.7  $B^{-1}$  d p collisions at  $\chi^- = -7$  TeV for events with at least (Mg and R<sup>2</sup>) to discriminate biothesens signal and background processes. No significant eccess before the model where the decay  $\frac{1}{2} - 1$  takes place with a branching ratio of 100%, for two choices of tand) = 1.5 and 50, see State (SGM) and R<sup>2</sup> to discriminate biothesens signal and background processes. No significant eccess the state (Mg and R<sup>2</sup>) to discriminate biothesens the ratio  $m^2 = 0$ . The second scale of the significant grave  $m^2 = 0$ . The second  $m^2$  shows the significant grave  $m^2$  shows the model (SGM) where  $m^2 = 0$ . The second  $m^2$  shows the significant grave  $m^2$  shows the signal model background processes. No significant eccess the signal model background processes  $m^2 = 0$ .

in simplified models where the decay  $\widetilde{g} o q \overline{q} \widetilde{\chi}_1^0$  takes place with a branching ratio of 100%, see Fig. 28. Exclusions in the CMSSM, assuming tan $\beta$  = 10, A<sub>0</sub> = 0 and  $\mu$  > 0, are also presented, see Fig. 26.

0, are also presented, see Fig. 2b.  $\frac{1}{33}$  CHATRCHYAN 14AH searched in 4.7 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 7$  TeV for events with at least two energetic jets and significant  $E_T$ , using the razor variables ( $M_R$  and  $R^2$ ) to its contrast between signal and background processes. A second analysis requires at least one of the jets to be originating from a b-quark. No significant excess above the Standard Model expectations is observed. Limits are set on sbottom masses in simplified models where the decay  $\bar{g} \rightarrow b \bar{b} \bar{\chi}_1^0$  takes place with a branching ratio of 100%, see Figs. 28 and 29. Exclusions in the CMSSM, assuming  $\tan \beta = 10$ ,  $A_0 = 0$  and  $\mu > 0$ , are also presented, see Fig. 26. 28 KHACHATRYAN 17V searched in 2.3 fb<sup>-1</sup> of an collisions at  $\sqrt{s} = 13$  TeV for events with two photons and large  $\mathcal{U}_T$ . No significant excess above the Standard Model expectations is observed. Limits are set on the gluino and squark mass in the context of general gauge mediation models TgludB and Tsq4, see their Fig. 4.

<sup>29</sup>KHACHATRYAN 17Y searched in 19.7 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events <sup>-</sup> KHACHAIKYAN 1/Y searched in 19. / fb <sup>-</sup> of *pp* collisions at  $\sqrt{s} = 8$  leV to events containing at least 8 or 10 jets, possibly 6-tagged, coming form Arpanity-violating decays of supersymmetric particles. No excess over the expected background is observed. Limits are derived on the gluino mass, assuming various RPV decay modes, see Fig. 7. <sup>30</sup> SIRUNYAN 17AF searched in 35.9 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  TeV for events

with a single lepton (electron or muon), jets, including at least one jet originating from a b-quark, and large  $E_T$ . No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in the Tglu3A and Tglu3B simplified models,

see their Figure 2. see their Figure 2. <sup>11</sup> SIRUNYAN 17AY searched in 35.9 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events with Solution and the second secon

see their Figure 6. 32 SIRUNYAN 1747 searched in 35.9 fb<sup>-1</sup> of an collisions at  $\sqrt{s} = 13$  TeV for events with one or more jets and large  ${\mathcal F}_T.$  No significant excess above the Standard Mode expectations is observed. Limits are set on the gluino mass in the TgluIA, TgluA TgluA TgluA set heir Figures 6. Limits are also set on the squark mass in the Tsqk1 simplified model (for single light squark and for 8 degenerate light squarks), on the sbottom mass in the Tsbot1 simplified model and on the stop mass in the Tstop1

on the sbottom mass in the Tabol 3 implified model and on the stop mass in the Tstop1 simplified model, see therif g. 7. Finally, limits are set on the stop mass in the Tstop2. Tstop4 and Tstop8 simplified models, see Fig. 8. 35 RIRUYNAN Thy warched in 35 b her <sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events with multiple jets and large  $\mathcal{E}_{\rm T}$ . No significant access above the Standard Model expectations is observed. Limits are set on the stop mass in the Tstop1 signified model, are the signa for significant constraints and the stop significant set is the Tstop1 signified model, and the Stop1 signified model, so the stop mass in the Tstop1 signified model, so the 1-d op collisions at  $\sqrt{s} = 13$ . TeV for events with STRUYNAN TIS searched in 350 b for 1-d op collisions at  $\sqrt{s} = 13$  TeV for events with

<sup>45</sup> SHOMYAN 17s searched in 35.9 fb<sup>-2</sup> of *pp* collisions at  $\sqrt{s} = 13$  feV for events with two isolated same-sign leptons, it less, and large  $\frac{p}{2}$ . No significant coses above the Standard Model expectations is observed. Limits are set on the mass of the gluion mass in the Tg13A3, Tg13B3, Tg13C2, Tg13D3 and Tg13D1 significith models, see their Figure 6. 35 Ad80UD 16A5 searched in 3.2 fb<sup>-1</sup> of *pp* collisions at  $\sqrt{s} = 13$  FeV in final states

AADOUD Jok, searched in 3.2 m<sup>-</sup> or pp consists at  $\sqrt{s} = 13$  feV in final states with hadronic jets. 1 or two hadronic jets, 1 or two hadronic jets  $R_{\rm TV}$ , in Tguits, gluino masses di 100 GeV or below. Neutralino masses of 100 GeV values up to 700 GeV are excluded for all gluino masses between 800 GeV and J500 GeV, while the strongest neutralino-mass eclosion of 750 GeV while the strongest neutralino-mass eclosion of 750 GeV and the gluino masses around 1400 GeV. context of Gauge-Mediated Symmetry Breaking models: in this case, values of A below 92 TeV are excluded at the 95% CL, corresponding to gluino masses below 2000 GeV See their Fig. 9

See their Fig. 9. 36 AABOUD 16J searched in 3.2 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV in final states with one isolated electron or muon, hadronic jets, and  $E_T$ . Gluino-mediated pair production one sources because how most inserving jets, and if j institute measures put production of stops with a nearly most-degenerate stop and neutralino are targeted and gluino masses are excluded at 95% C.L. up to 1460 GeV. A 100% of stops decaying via charm + neutralino is assumed. The results are also valid in case of 4-body decays  $t_1 \rightarrow$ ff'by0. See their Fig. 8.

Transformer  $\eta_0$  or  $2.5\,{\rm fb}^{-1}$  of pp collisions at  $\sqrt{s}=13$  TeV for events with two photons, hadronic jets and  $E_T$ . No significant excess above the Standard Model expectations is observed. Exclusion limits at 95% CL are set on guino masses in the general gauge-mediated SUSY breaking model (GGM), for bino-like NLSP. See their Fig. 3.

<sup>64</sup> CHATRCHYAN 14AH searched in 4.7 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 7$  TeV for events with at least two energetic jets and significant  $E_T$ , using the razor variables (M<sub>R</sub> and

with at least two energence yets and signmeants  $P_T$ , using the factor enhances (*mp* and  $R^2$ ) to discriminate between signal and background processes. A second analysis requires at least one of the jets to be originating from a b-quark. No significant excess above the Standard Model expectations is observed. Limits are set on sbottom masses in simplified

models where the decay  $\tilde{g} \rightarrow t \bar{t} \tilde{\chi}_1^0$  takes place with a branching ratio of 100%, see modes where the decay  $g \rightarrow \tau t_{11}^{-1}$  takes place with a contaching ratio of 100%, see Figs. 28 and 29. Exclusions in the CMSSM, assuming tab.<sup>2</sup> = 10. App. 0 = 0 and  $\mu > 0$ , are also presented, see Fig. 26. GeV (19. Contact) and  $\mu = 0$  and  $\mu > 0$ . GeV (19. Contact) and  $\mu = 0$  and  $\mu > 0$ . So that RCHAN 14 is such detain 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events containing multiplets and large  $B_T$ . No excess over the expected SM background is observed. Exclusion limits are deviced in simplified models containing gluinos that decay.

via  $\tilde{g} \rightarrow q \overline{q} \tilde{\chi}_1^0$  with a 100% branching ratio, see Fig. 7b, or via  $\tilde{g} \rightarrow t \overline{t} \tilde{\chi}_1^0$  with a

CHAIKCHYAN 144 isaached in 13.3 th  $^{-1}$  of pp collisions at  $\sqrt{s} = 8$  TeV for events containing a single isolated electron or mon and multiple jets, at least two of which are identified as originating from a b-quark. No significant eccesses over the expected SM lackgrounds are observed. The results are interpreted in three simplified models of gluino pair production with subsequent decay into virtual or on-shell top squarks, where each of the top squarks decays in turn into a toq quark and  $3\sqrt{\chi}$  as effic. 47 TeV for the simplified models of

differ in which masses are allowed to vary. <sup>57</sup> CHATRCHYAN 14P searched in 19.4 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for three

CHATROMYANT 148 sacrieds in 104. If  $r^{-1}$  of pr collisions at  $r_{r}^{-3} = 1$  feV for three three constraints and the constraints of the constraints of the constraints and the constraints and the constraints are set on the expected SM background is observed. Assuming a 100% branching ratio for the gluino pair production, see Fig. 7, and gluino masses below 605 GeV are consistent on gluino pair productions, see Fig. 7, and gluino masses helder 605 GeV are because that and the production of the gluino masses helder 605 GeV are because that and the liphetflower 20, for an eff33 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV and 833 GeV are solved at 030% for Liphetflower 200 GeV are solved at 030% for Liphetflower 200 GeV are solved at 030% for Liphetflower 200 GeV are solved 300% for Liphetflower 200 GeV are solved 300\% f

excluded at 95% C L. 68 CHATRCHYAN 14R searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events for the first searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s$ 

 $^{50}$  CHATRCHYAN 144 searched in 19.5 km<sup>-1</sup> of pp collision at  $\sqrt{\sigma} = 8$  TeV for events with at least three lepsons (electrons, muons, taus) in the final state. No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in a sejence on NLPS simplified model (CMS9) where the decay  $\vec{a} - q^{-2}\vec{c} \cdot \vec{c}$  takes place with a branching ratio of 100%, see Fig. 0. Significant the standard Model expectations is observed. Limits are to the significant excess above the Standard Model expectations is observed. Limits are to make the standard Model expectations in soberved. Limits are to make the standard Model expectations in soberved. Limits are store to the gluino excess above the Standard Model expectations in soberved. Limits are store to the gluino excess above the Standard Model expectations in soberved. Limits are store to the gluino excess above the Standard Model expectations in soberved. Limits are store to the gluino excess above the Standard Model expectations in soberved. Limits are store to the gluino excess above the Standard Model expectations in soberved. Limits are store to the gluino excess above the standard Model excess above the Model excess above the Standard Model excess above the Model excess above the Standard Model excess above the Model excess above the Standard Model excess above the Standard Model excess above the Model excess above the Standard Model excess above the Standard Model excess above the Mod

mass in a simplified model where the decay  $\widetilde{g} \to t t \widetilde{t} \widetilde{\chi}_1^0$  takes place with a branching

To below the range  $\pi_{\rm F}$  is 36.1 km ^{-1} of pp collisions at  $\sqrt{r}=13$  TeV for events with a 18 at two in the scale large matrix the transfer momentum. Selected events are further classified based on the presence of targe F-jets are just at a large two in the Standard Model expectitions is observed. Limits are were for pMSSM models with  $M_{\rm f}=60$  GeV,  ${\rm tar}(\beta)=10, \mu<0$  waving the soft-basising parameters  $M_{\rm g}$  and  $\mu=0$  Select events  $M_{\rm g}$  and  $\mu=0$  GeV. TeV ( $\beta=0$ 

Figure 6a and text for details on the model. <sup>1</sup>KHACHATRYAN 16AV searched in 2.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events

KHALHAI KYAN IAW searched in 2.3 to  $^{-1}$  of pp collisions at  $\sqrt{s} = 13$  leV for events with one isolated high transverse momentum lepton (e or  $\mu$ ), hadronic jets of which at least one is identified as coming from a b-guark, and large  $E_{T}$ . No significant excess above the Standard Model expectations is observed. Limits are set on the gluion mass in the Tglu3A simplified model, see Fig. 10, and in the Tglu3B model, see Fig. 11.

In the regists simplified model, see rig. 10, and in the regists model, see rig. 11.  $^{12}$  KHACHATRYAN 168T performed a global Bayesian analysis of a wide range of CMS results obtained with data samples corresponding to 5.0 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} =$ 

7 TeV and in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV. The set of searches cons

ratio of 100%, see Fig. 11.

100% branching ratio, see Fig. 7c, or via  $\tilde{g} \rightarrow q \overline{q} W/Z \tilde{\chi}_{0}^{0}$ , see Fig. 7d. <sup>66</sup> CHATRCHYAN 14N searched in 19.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events AABOUD 16N searched in 3.2 fb<sup>-1</sup> of p p collisions at  $\sqrt{s} = 13$  TeV for events containing hadronic jets, large Er, and no electronic so muons. No significant excess above the Standard Model expectations is observed. Gluino masses below 1510 GeV are excluded at the 95% C.L. in a significant conduction only gluinos and the lightest neutralino. See their Fig. 7b.

<sup>39</sup> AABOUD 16N searched in 3.2 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events containing hadronic jets, large  $E_T$ , and no electrons or muons. No significant excess above the Standard Model expectations is observed. Gluino masses below 1500 GeV are excluded at the 95% C.L. in a simplified model with gluinos decaying via an intermediate  $\widetilde{\chi}_1^\pm$  to

two quarks, a W boson and a  $\tilde{\chi}^0_1,$  for  $m_{\tilde{\chi}^0_1}=$  200 GeV. See their Fig 8.

<sup>40</sup> AAD 16AD searched in 3.2 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events contain And both searched in 3.2 in our pp consists at  $\sqrt{s} = 15$  for events containing as everal energetic jets, of which at least three must be identified as b-jets, large  $E_T$  and no electrons or muons. No significant excess above the Standard Model expectations is observed. For  $\tilde{\chi}_1^0$  below 800 GeV, gluino masses below 1780 GeV are excluded at 95% C.L. for gluinos decaving via bottom squarks. See their Fig. 7a.

AAD 16AD searched in 3.2  $\text{fb}^{-1}$  of pp collisions at  $\sqrt{s} = 13$  TeV for events containing several energetic jets, of which at least three must be identified as *b*-jets, large  $\mathcal{L}_T$  and one electron or muon. Large-radius jets with a high mass are also used to identify highly hoosted ton quarks. No significant excess above the Standard Model expectations observed. For  $\overline{\chi}_1^0$  below 700 GeV, gluino masses below 1760 GeV are excluded at 95%

CLL for the Alternative two two programs. See their Fig. 7. The wave section of a 50 m H  $_{\rm A}$  for the sector of the anti-sector sector and the sector based of the anti-sector sector and the sector based of the sector base

43 AAD 166c searched in 3.2 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV in final states with one isolated electron or muon, hadronic jets, and  $E_{P-}$ . The data agree with the SM background expectation in the six signal selections defined in the search, and the largest background expectation in the six signal selections denote in the select, and the argest deviation is a 2.1 standard deviation excess. Gluinos are excluded at 95% C.L. up to 1600 GeV assuming they decay via the lightest charging to the lightest neutralino as in the model Tglu1B for  $m_{\chi_1^0} = 100$  GeV, assuming  $m_{\chi_1^\pm} = (m_{\chi_1^\pm} + m_{\chi_1^0})/2$ . See their Fig. 6.

<sup>44</sup> AAD 16V searched in 3.2 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events with  $E_T$ various hadronic jet multiplicities from  $\geq 7$  to  $\geq 10$  and with various b-jet multiplicity requirements. No significant excess over the Standard Model expectation is found. Exclusion limits at 95% CL are set on the gluino mass in one simplified model (TgluE) and a pMSSM-inspired model. See their Fig. 5. <sup>45</sup> KHACHATRYAN 16AM searched in 19.7 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for ex-

THALLALI ITAM IDAM MARCHED II JV. 10  $^{-1}$  of pp collisions at  $\chi_{2} = 6$  fev to events with high boosted W-boost and b-jets, using the razor variables (Mg and R<sup>2</sup>) to discriminate between signal and background processes. No significant excess above the Standard Model expectations is observed. Limits are set on the gluid can be figured for the figure discriminate the figure discriminate the standard Model expectations is observed. Limits are set on the gluid C and TguidB simplified models, see Fig. 12. def KHACHARTRAN IEGS searched in 2.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events with two isolated same-sign dileptons and jets in the final state. No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass above the Standard Model expectations in solared.

in the following simplified models: Tglu3A and Tglu3D, see Fig. 4, Tglu3B and Tglu3C see Fig. 5, and Tglu1B, see Fig. 7.

<sup>47</sup> KHACHATRYAN 16BS searched in 2.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 13$  TeV for events With at least one energetic jet, no isolatel legitors, and significant  $\mathcal{E}_{\mathcal{T}}$ , using the transverse mass variable  $M_{\mathcal{T}_2}$  to discriminate between signal and background processes. No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in the Tglu1A, Tglu2A and Tglu3A simplified models, see Fig. 10 and Table 3

both individually and in combination, includes those with all-hadronic final states, same-sign and opposite-sign dileptons, and multi-lepton final states. An interpretation was given in a scan of the 19-parameter pMSSM. No scan points with a gluino mass less than 500 GeV survived and 96% of models with a squark mass less than 300 GeV were

, excluded. <sup>3</sup> KHACHATRYAN 168x searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events

 $^{-3}$  KHACHATEVAN 160x searched in 105 km  $^{-1}$  of pz collisions at  $\sqrt{z}$  = 8 TeV for events containing 4 laptons coming from R-patrix-violating decays  $\sqrt{3}_{12}^{-1} - \ell\ell v$  models and  $\delta_{121} \neq 0$  or  $\lambda_{122} \neq 0$ . No excess over the expected background is observed. Limits are derived  $^{-2}$  AAD 15kB unschle for the decay of memory  $^{-1}$  associated and the second cross section × branching ratio for the decay  $\tilde{g} \rightarrow \tilde{S}g$ , as a function of the singlino proper lifetime (cr). See their Fig. 10(f)

proper litetime (cr). See their Fig. 10(1) Fig.2Ab 154s section in 20 h<sup>-1</sup> of p collisions at  $\sqrt{s} = 8$  TeV for events containing at least one isolated lepton (electron or muon), jets, and large missing transverse momen-tum. No excess of events above the expected level of Standard Model background was found. Exclusion limits at 95% CL. are set on the gluino mass in the CMSSM/mSUGRA, see Fig. 15, in the NUHMG, see Fig. 16, and in various simplified models, see Fig.

18-22. 6 AAD 15CB searched for events containing at least one long-lived particle that decays at DO has two long-lived particle that decays at <sup>78</sup> AAD 35:05 successfor for events containing at least one long-level particle that decays at againstant distance from its production point (diplayde vertes, DV) into two leastess or into five or more charged particle in 20.3 h<sup>-1</sup> of pp collisions at  $\sqrt{n} = 0$  TeV. The Forum alignet in a bate two least two leasts to a least two leasts the least t a significant distance from its production point (displaced vertex, DV) into two le

AAU 14AA searched in 20.1 fb  $^{-1}$  of pp coulsions at  $\sqrt{s} = 0$  lev for the strong production of supersymmetric particles in vents containing either zero or at last one high high-pp lepton, large missing transverse momentum, high jet multiplicity and at least three jets identified as originating from *b*-quarks. No excess over the expected SM background is observed. Limits are derived in mSUGRA/CMSSM models with tand = 30,  $A_0 = -2m_0$ 

<sup>48</sup> KHACHATRYAN 168x searched in 19.5 fb<sup>-1</sup> of pp collisions at √s = 8 TeV for events containing 0 or 1 leptons and b-tagged jets, coming from R-parity-violating decays of supersymmetric particles. No excess over the expected background is observed. Limits LEY LAB are drived on the gluino mass, assuming the RFV  $\tilde{g} \rightarrow trb \delta cars, see Fig. 7 and 10.$ 6% HAACHATKYNA 160° searched in 23 h<sup>-1</sup> of*a* $pollision at <math>\sqrt{-2}$  a Ta V for eversity with two copposite-sign, same-flavour leptons, jets, and missing transverse momentum. No significant excess above the Standard Model expectations is observed. Limits are set in the Tabac2 simplified model, see Fig. 5. 50 HAACHATKYNA 110° searched 12 3 h<sup>-1</sup> of *a* pollisions at  $\sqrt{-2}$  as 13 TaV for eversity with at least four energicic jets and significant  $E_{T}$ , no identified isolated electron or muon or charged track. No significant texes above the Standard Model expectations is observed. Limits are set on the Builano mass in the Tabul X, Tglu Z, Tglu Z, and Tglu X 51 ADD 150°, searched in 23 h<sup>-1</sup> of *a* pollisions at  $\sqrt{-2}$  = 8 TaV (or events with 51 ADD 150°, searched in 20 h<sup>-1</sup> of *a* pollisions t,  $\sqrt{-2}$  = 15 W/ (or events with 51 ADD 150°, searched in 20 h<sup>-1</sup> of *a* pollisions t,  $\sqrt{-2}$  = 15 W/ (or events with are derived on the gluino mass, assuming the RPV  $\tilde{g} \rightarrow tbs$  decay, see Fig. 7 and 10.

<sup>51</sup>AAD 158G searched in 20.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events with

AAD 1986 searched in 203 hb<sup>-4</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events with first, missing  $E_{\gamma}$  and how opposited by sums flavor indicated leptons fractioning either how events that the starting either the start of ermediate states, see Fig. 13.

Intermediate states, see Fig. 13. SAD 159: vummarized and extended ATLAS searches for gluinos and first- and second-generation squarks in final states containing jets and missing transverse momentum, with or without hybrinor or byless in the  $\sqrt{s} = 10^{-1}$  Vd das at collocited in 2012. The published analyses, as well as new analyses. Exclusion limits at 95% C.L. are set on the gluinor mass neveral Prapiry conserving models, leading to a generalized constraint on gluinor masses exceeding 1150 GeV conserving models. Reading to a generalized constraint 100 GeV. See their Figs. 10. 19, 20, 21. 23, 25, 26, 29.37.

from previous collider searches, precision measurements, cold dark matter energy den troit prevous colleder sain-thes, precision measurements, coll dara matter energy denses as achies on the sagare was presented, considering the fraction of model points surviving, after projection into two-dimensional spaces of sparticle masses. Good complementarity is observed between different ATLAS analyses, with lances all showing regions of unique sensitivity. ATLAS sarches have good sensitivity at LSP mass below 800 GeV. SAAD ISCA sensitivity at LSP mass below 800 GeV.

more photons, hadronic jets or *b*-jets and  $\mathcal{U}_T$ . No significant excess above the Standard Model expectations is observed. Limits are set on gluino masses in the general gauge-mediated SUSY breaking model (GGM), for bino-like or higgsino-bino admixtures NLSP. see Fig. 8, 10, 11 55 KHACHATRYAN 15AF searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events

with at least two energetic jets and significant  $L_T$ , using the transverse mass variable  $M_{T2}$  to discriminate between signal and background processes. No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in simplified models where the decay  $\tilde{g} \rightarrow q \bar{q} \chi_1^0$  takes place with a branching ratio of 100%, see Fig. 13(a), or where the decay  $\tilde{g} \rightarrow b \overline{b} \overline{\chi}_1^0$  takes place with a branching ratio

of 100%, see Fig. 13(b), or where the decay  $\vec{g} \to t \vec{t} \tilde{\chi}_1^0$  takes place with a branching ratio of 100%, see Fig. 13(c). See also Table 5. Exclusions in the CMSSM, assuming  $\tan \beta = 30$ ,  $A_0 = -2 \max(m_0, m_{1/2})$  and  $\mu > 0$ , are also presented, see Fig. 15.

and  $\mu > 0$ , see their Fig. 14. Also, exclusion limits in simplified models containing gluinos and scalar top and bottom quarks are set see their Figures 12-13. <sup>81</sup>AAD 14E searched in 20.3 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for strongly produced

supersymmetric particles in events containing jets and two same-sign leptons or three leptons. The search also utilises jets originating from *b*-quarks, missing transverse mo-mentum and other variables. No excess over the expected SM background is observed. Exclusion limits are derived in simplified models containing gluinos and squarks, see Figures 5 and 6. In the  $\bar{g} \rightarrow q q' \bar{\chi}_1^{\pm}, \bar{\chi}_1^{\pm} \rightarrow W^{(*)\pm} \bar{\chi}_2^0, \bar{\chi}_2^0 \rightarrow Z^{(*)} \bar{\chi}_1^0$  simplified model, the following assumptions have been made:  $m_{\chi_1^{\pm}} = 0.5 m_{\chi_1^0} + m_{\tilde{g}}, m_{\chi_2^0} = 0.5 m_{\chi_1^0} + m_{\chi_2^0} + m$  $0.5 \ (m_{\widetilde{\chi}^0_1} + m_{\widetilde{\chi}^\pm_1}), \ m_{\widetilde{\chi}^0_1} < 520 \ \text{GeV. In the } \widetilde{g} \rightarrow \ q q' \widetilde{\chi}^\pm_1, \ \widetilde{\chi}^\pm_1 \rightarrow \ \ell^\pm \nu \widetilde{\chi}^0_1 \text{ or } \widetilde{g} \rightarrow \ \ell^\pm \nu \widetilde{\chi}^0_1$ 

 $\begin{array}{cccc} \chi_1 & \chi_$  $\begin{array}{l} \max_{\alpha} \mathcal{L}_{\chi_{1}^{\pm}}^{2} = \mathcal{L}_{\chi_{0}^{2}}^{2} = 0.5 \left( \frac{i}{m_{\chi_{1}^{0}}} + m_{\widetilde{g}} \right), \ m_{\chi_{1}^{0}}^{2} < 660 \ \text{GeV. Limits are also derived in} \\ \text{the mSUGRA/CMSSM, bRPV and GMSB models, see their Fig. 8.} \end{array}$ 

<sup>82</sup>CHATRCHYAN 14H searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events with two isolated same-sign dileptons and jets in the final state. No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in simplified models where the decay  $\widetilde{g} \rightarrow t \, \overline{t} \, \widetilde{\chi}_1^0$  takes place with a branching ratio of 100%, or where the decay  $\tilde{g} \rightarrow \tilde{t}t$ ,  $\tilde{t} \rightarrow t\tilde{\chi}_1^0$  takes place with a branching ratio of 100%, with varying mass of the  $\tilde{\chi}_1^0$ , or where the decay  $\tilde{g} \rightarrow \tilde{b}b$ ,  $\tilde{b} \rightarrow t \tilde{\chi}_1^{\pm}$ ,  $\tilde{\chi}_1^{\pm} \rightarrow t \tilde{\chi}_1^{\pm}$  $W^{\pm}\tilde{\chi}_1^0$  takes place with a branching ratio of 100%, with varying mass of the  $\tilde{\chi}_1^{\pm}$ , see Fig 5

<sup>83</sup>CHATRCHYAN 14H searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events with two isolated same-sign dileptons and jets in the final state. No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in simplified models where the decay  $\tilde{g} \rightarrow q q' \tilde{\chi}_1^{\pm}, \tilde{\chi}_1^{\pm} \rightarrow W^{\pm} \tilde{\chi}_1^0$  takes place with a branching ratio of 100%, with varying mass of the  $\tilde{\chi}_1^{\pm}$  and  $\tilde{\chi}_1^0$ , see Fig. 7.

<sup>84</sup>CHATRCHYAN 14H searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events with two isolated same-sign dileptons and jets in the final state. No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in simplified models where the decay  $\tilde{g} \rightarrow b \bar{t} \tilde{\chi}_1^{\pm}, \tilde{\chi}_1^{\pm} \rightarrow W^{\pm} \tilde{\chi}_1^0$  takes place with a branching ratio of 100%, for two choices of  $m_{\tilde{\chi}_1^\pm}^1$  and fixed  $m_{\tilde{\chi}_1^0}$ , see Fig. 6.

<sup>85</sup>CHATRCHYAN 14H searched in 19.5 fb<sup>-1</sup> of pp collisions at  $\sqrt{s} = 8$  TeV for events with two isolated same-sign dileptons and jets in the final state. No significant excess above the Standard Model expectations is observed. Limits are set on the gluino mass in simplified models where the R-parity violating decay  $\tilde{g} \rightarrow tbs$  takes place with a branching ratio of 100%, see Fig. 8.





The encoders, overseer, and I have had lots of discussions about improved handling of supersymmetry listings. Including list of simplified models at front, and radical removing "older" papers.

Also discussed at a workshop here.

They have also met separately from me.

But the complexities are major.

We will continue to seek ways to make the supersymmetry listings more useable.

Discovery would help.