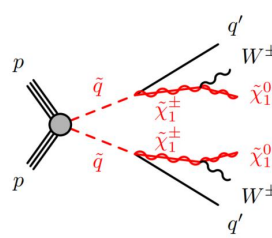
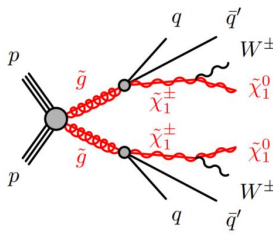




This poster presents recent ATLAS results of the search for gluino and squark pair production with one lepton, jets and missing transverse momentum based on 139fb^{-1} of $\sqrt{s}=13\text{TeV}$ proton – proton collision data collected by ATLAS detector.

SUSY signal



2 types of mass spectra:

$$\text{Case1: } x = \frac{m(\tilde{\chi}_1^+) - m(\tilde{\chi}_1^0)}{m(\tilde{g}) - m(\tilde{\chi}_1^0)} = 0.5$$

$$\text{Case2: } m(\tilde{\chi}_1^0) = 60 \text{ GeV}$$

Event selection

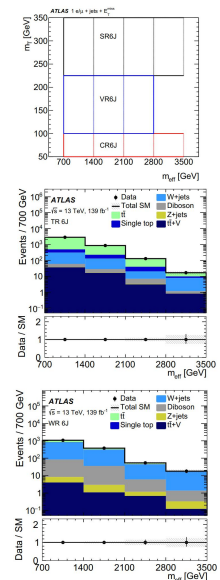
SR	2J	4J high-x	4J low-x	6J
N_{ℓ}	= 1	= 1	= 1	= 1
p_T^{ℓ} [GeV]	> 7(6) for $e(\mu)$ and < min($10 \cdot N_{jet}, 25$)	> 25	> 25	> 25
N_{jet}	≥ 2	4-5	4-5	≥ 6
E_T^{miss} [GeV]	≥ 30	> 30	> 30	≥ 6
m_T [GeV]	> 100	> 520	150-520	> 300
Aplanarity	-	> 0.01	> 0.01	> 0.05
E_T^{miss}/m_{eff}	> 0.25	> 0.2	> 0.2	-
N_{b-jet} (excl)	= 0 for the b-veto SR, ≥ 1 for the b-tag SR	= 0 for the b-veto SR, ≥ 1 for the b-tag SR	= 0 for the b-veto SR, ≥ 1 for the b-tag SR	= 0 for the b-veto SR, ≥ 1 for the b-tag SR
m_{eff} (excl)	3 bins $\in [700, 2800+]$	3 bins $\in [700, 2800+]$	3 bins $\in [1000, 2800+]$	4 bins $\in [700, 3500+]$
N_{b-jet} (disc)	> 1900 (1300) for gluino (squark)	> 2200	> 2200	> 2800 (2100) for gluino (squark)

Background estimation

CR	2J	4J	6J
N_{ℓ}	= 1	= 1	= 1
p_T^{ℓ} [GeV]	> 7(6) for $e(\mu)$ and < min($10 \cdot N_{jet}, 25$)	> 25	> 25
N_{jet}	≥ 2	4-5	≥ 6
E_T^{miss} [GeV]	> 400	> 300	> 250
m_T [GeV]	50-80	50-80	50-100
Aplanarity	-	> 0.01	> 0.05
E_T^{miss}/m_{eff}	> 0.25	> 0.2	-
m_{eff} [GeV]	3 bins $\in [700, 2500+]$	3 bins $\in [1000, 2800+]$	4 bins $\in [700, 3500+]$
N_{b-jet}	≥ 1 for the top CR; = 0 for the W-jets CR	≥ 1 for the top CR; = 0 for the W-jets CR	≥ 1 for the top CR; = 0 for the W-jets CR

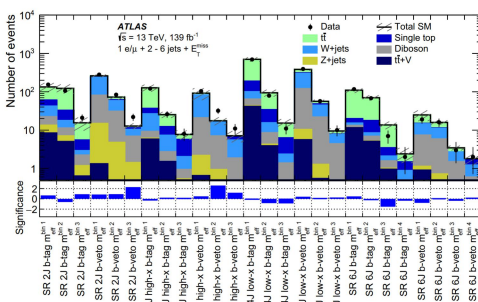
VR	2J	4J	6J
N_{ℓ}	= 1	= 1	= 1
p_T^{ℓ} [GeV]	> 7(6) for $e(\mu)$ and < min($10 \cdot N_{jet}, 25$)	> 25	> 25
N_{jet}	≥ 2	4-5	≥ 6
E_T^{miss} [GeV]	> 400	> 300	> 250
m_T [GeV]	80-100	90-150	100-225
Aplanarity	-	> 0.01	> 0.05
E_T^{miss}/m_{eff}	> 0.25	> 0.2	-
m_{eff} [GeV]	3 bins $\in [700, 2500+]$	3 bins $\in [1000, 2800+]$	3 bins $\in [700, 3500+]$
N_{b-jet}	≥ 1 for the top VR; = 0 for the W-jets VR	≥ 1 for the top VR; = 0 for the W-jets VR	≥ 1 for the top VR; = 0 for the W-jets VR

6J case as an example

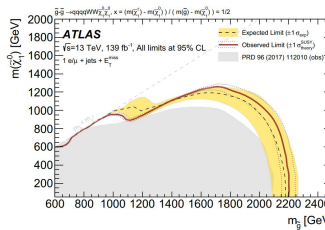


- Dedicated CRs are designed for dominant background (ttbar, singleTop and Wjets).
- A simultaneous fit with SRs and CRs is performed.
- VRs are designed correspondingly for each Njet case.

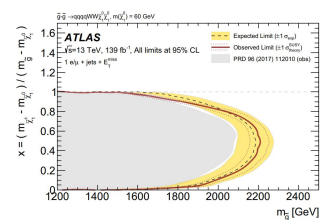
Results



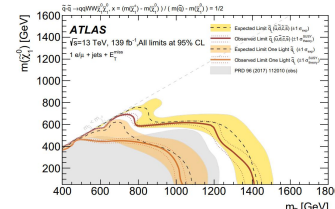
No significant excess beyond the Standard Model expectation is found



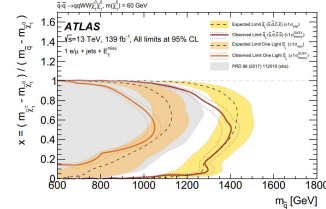
$\tilde{g}\tilde{g} \rightarrow qqWW\tilde{\chi}_1^0\tilde{\chi}_1^0$ && Case1



$\tilde{g}\tilde{g} \rightarrow qqWW\tilde{\chi}_1^0\tilde{\chi}_1^0$ && Case2



$\tilde{q}\tilde{q} \rightarrow qqWW\tilde{\chi}_1^0\tilde{\chi}_1^0$ && Case1



$\tilde{q}\tilde{q} \rightarrow qqWW\tilde{\chi}_1^0\tilde{\chi}_1^0$ && Case2

Gluino (Squark) masses up to around 2.2(1.4) TeV are excluded for a mass of $\tilde{\chi}_1^0$ lower than 200GeV.