# Search for squarks and gluinos with the ATLAS detector in final states with jets and transverse missing momentum using 2015 data

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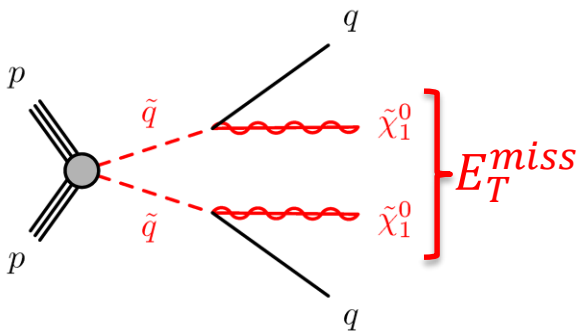
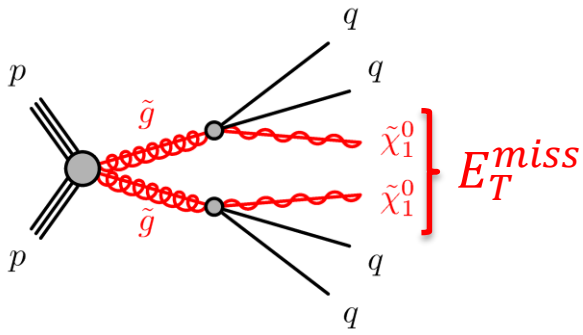
for the ATLAS collaboration

# Introduction

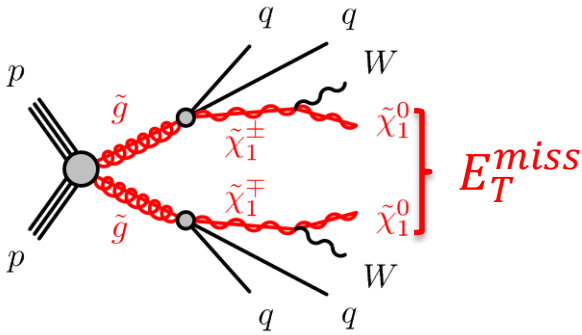
- Target signal has a few assumptions :
  1. R-parity conservation
  2. The lightest neutralino ($\tilde{\chi}_1^0$) is the lightest supersymmetric particle (LSP) .




**Squark-pair production direct decay**




**Gluino-pair production direct decay**



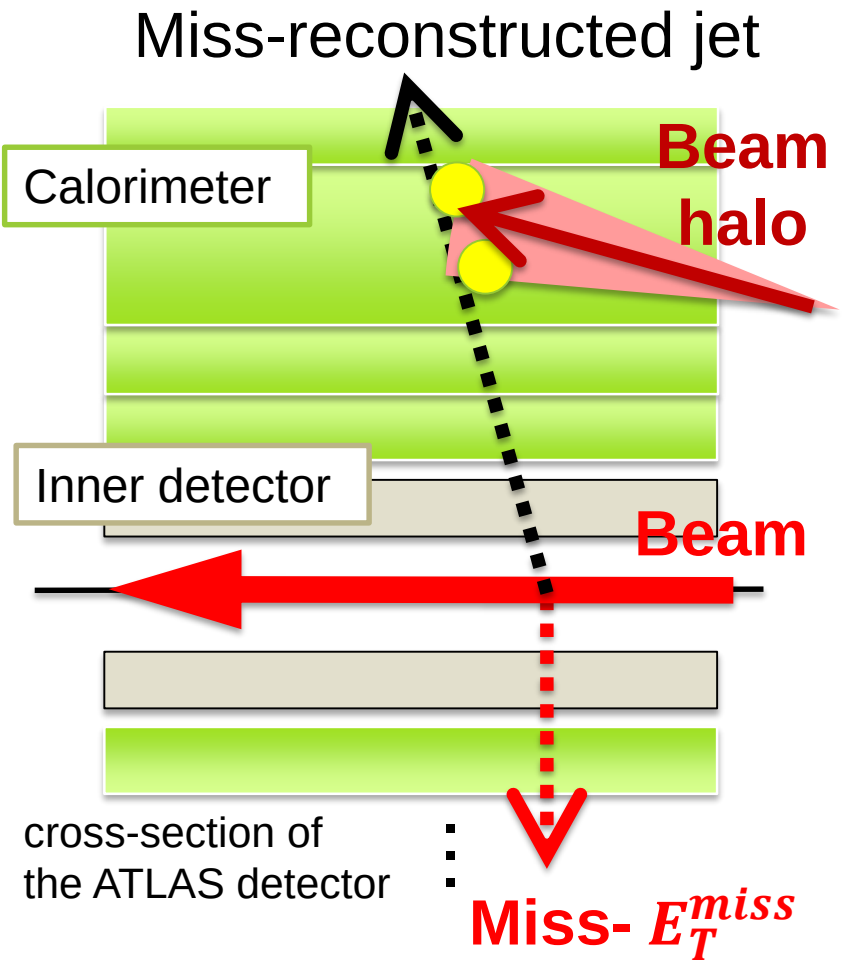

**Gluino-pair production one-step decay**

The final state with (2—6) **jet**s and **transverse missing momentum ( $E_T^{miss}$ )**

*All hadronic decay. No lepton ($\mu$ or $e$).

This poster shows a important result for SUSY search, using **3.2 fb$^{-1}$** full p-p collision data recorded with the ATLAS detector in 2015.

# Non-collision background



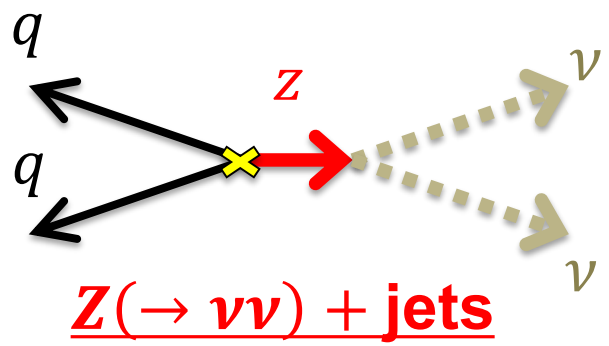

Non-collision background is a potentially dangerous background for this analysis :

- Miss-reconstructed jet makes also miss-$E_T^{miss}$ on the opposite direction.
  ⇒ **Similar to signal characteristics**
  (jet + $E_T^{miss}$)
- It **cannot be reproduced by Monte-Carlo**.

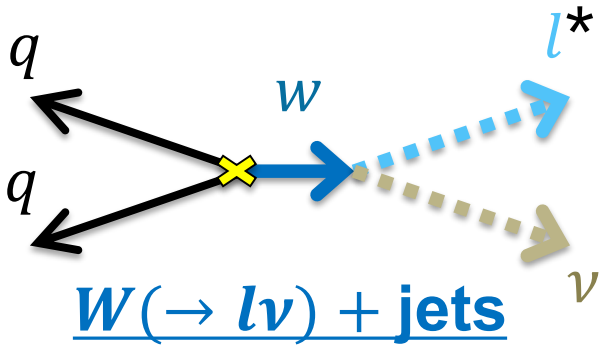
At first, we need to reject the **non-collision background** to **the negligible level**.

# Standard model background

There are **4 kinds** of **standard model background**.

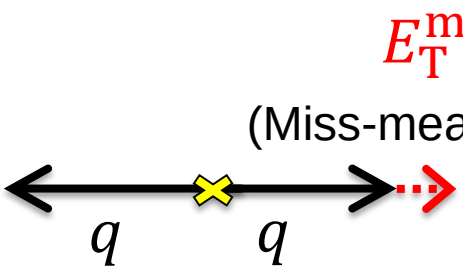



$Z(\rightarrow \nu\nu) + \text{jets}$

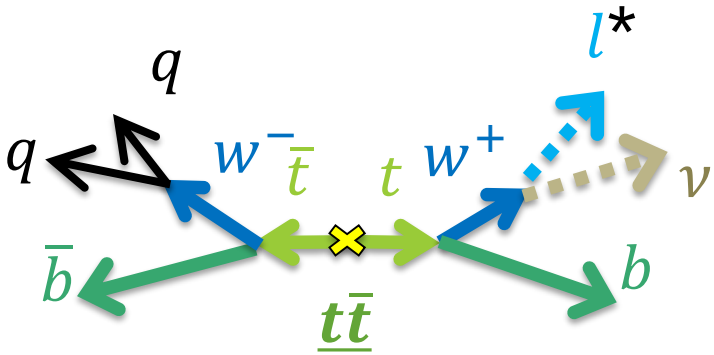



$W(\rightarrow l\nu) + \text{jets}$

* Lepton is missed, or it's a hadronically decaying tau



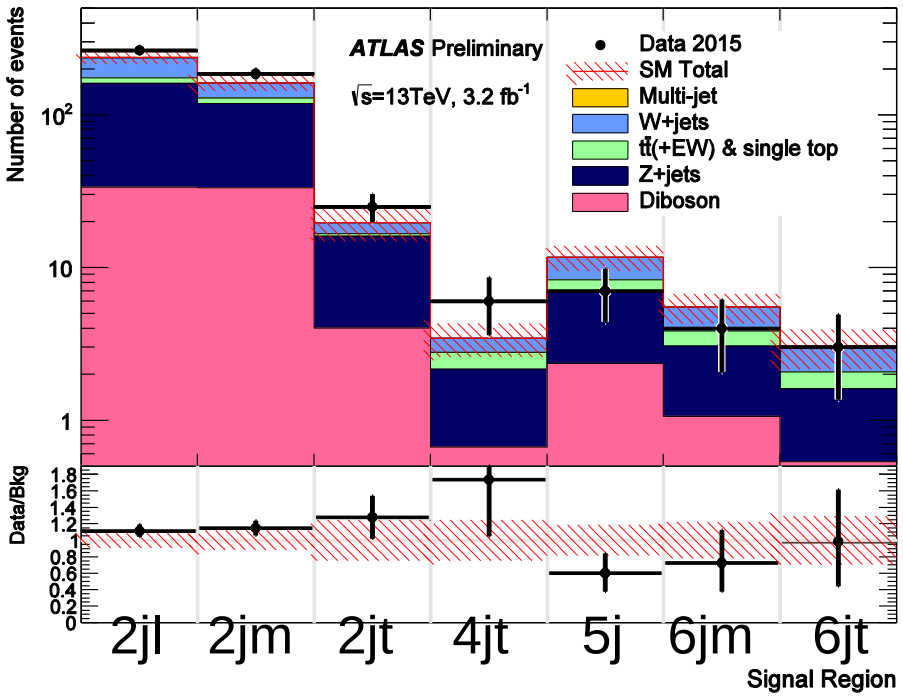

**Multi-jets**




$t\bar{t}$

- Background is estimated by Monte-Carlo.
- The normalisation of the MC is estimated in 4 dedicated control regions, each dominated by a specific SM process.

# Result




- 2/4/5/6 is the minimum number of jets
- l/m/t : Loose/Medium/Tight selection

**7 signal-rich regions** are prepared to
**2jl/2jm/2jt 4jt 5j 6jm/6jt**
cover large mass-range of squark and gluino.

The comparison (counting) between **data** and **expected background** in each **signal region** is shown in each bin.

There is no significance excess.

# Please come to listen to more detail!

- How to reduce non-collision background
- Selection of control regions
- **Limit plot of squark / gluino mass**