ATLAS $e + e + \nu + j$ excess compared with CMS LQ1

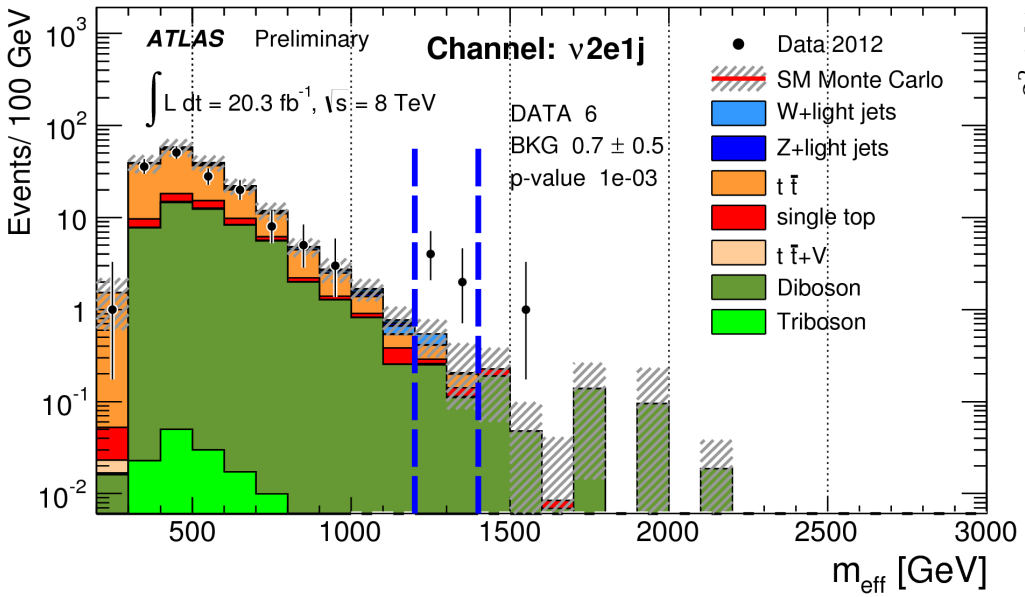
E. Berry[1], G. Landsberg[2]

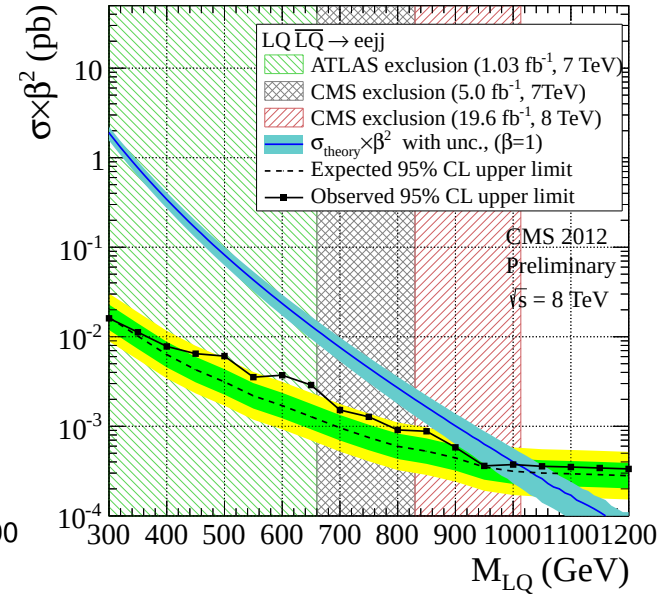
[1]Brown University

2014-02-11 Tue

ATLAS global search (ATLAS-CONF-2014-006)

- ATLAS released a global search for new phenomena:
- CDS Record: http://cds.cern.ch/record/1666536
- Contains dozens of event classes with varying final states
- Data is compared with SM Monte Carlo, except for fake
- Interesting events at high m_{eff} in the $e + e + \nu + j$ event class (left)
- How does this compare with CMS leptoquarks in $e + e + j + j$ (right)?





ATLAS selection (note section 4.2)

Object selection (excluding object ID/Iso):

- Electrons (e) with $p_T > 50$ GeV, $|\eta| < 2.5$
- Jets (j) are AK4 with $p_T > 50$ GeV, $|\eta| < 2.8$.
- Jets overlapping with electrons ($\Delta R(e,j) < 0.2$) are discarded
- After discarding jets overlapping with electrons, electrons close to jets ($\Delta R(e,j) < 0.4$) are discarded
- $m_{\text{eff}} = p_T(e_1) + p_T(e_2) + p_T(j) + \not{E}_T$

Event selection:

- Trigger on $\not{E}_T > 150 GeV$
- Usual offline event cleaning (PV requirement, detector noise, etc)
- Two electrons
- One jet
- $\not{E}_T > 150$ GeV
- $\not{E}_T / m_{\text{eff}} > 0.2$
- $\Delta\phi(j, \not{E}_T) > 0.4$

CMS selection

Object selection:

- Electrons (e) with $p_T > 45$ GeV, $|\eta| < 2.5$
- Jets (j) are AK5 with $p_T > 45$ GeV, $|\eta| < 2.4$.
- Jets overlapping with electrons ($\Delta R(e,j) < 0.3$) are discarded
- $S_T = p_T(e_1) + p_T(e_2) + p_T(j_1) + p_T(j_1)$

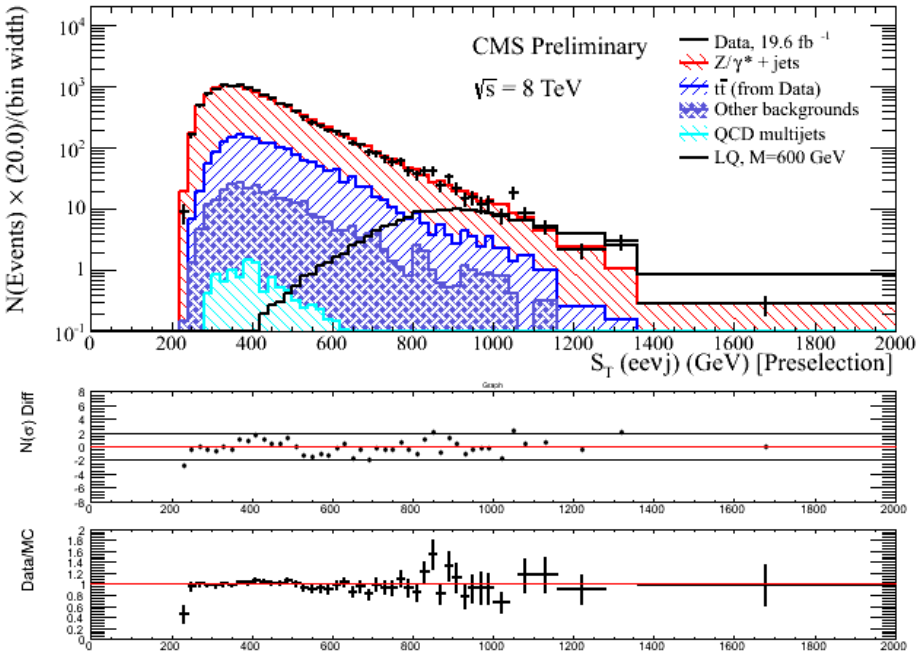
Event selection:

- Trigger on $p_T(e) > 30$ GeV + $p_T(j_1) > 100$ GeV + $p_T(j_2) > 25$ GeV
- Usual offline event cleaning (PV requirement, detector noise, etc)
- Two electrons
- At least two jets
- $m_{ee} > 50$ GeV
- $S_T = p_T(e_1) + p_T(e_2) + p_T(j_1) + p_T(j_2) > 300$ GeV
- Trigger on $\not{E}_T > 150 GeV$

Differences from ATLAS marked in red

Events with high m_{eff} in the CMS LQ $eejj$ excess?

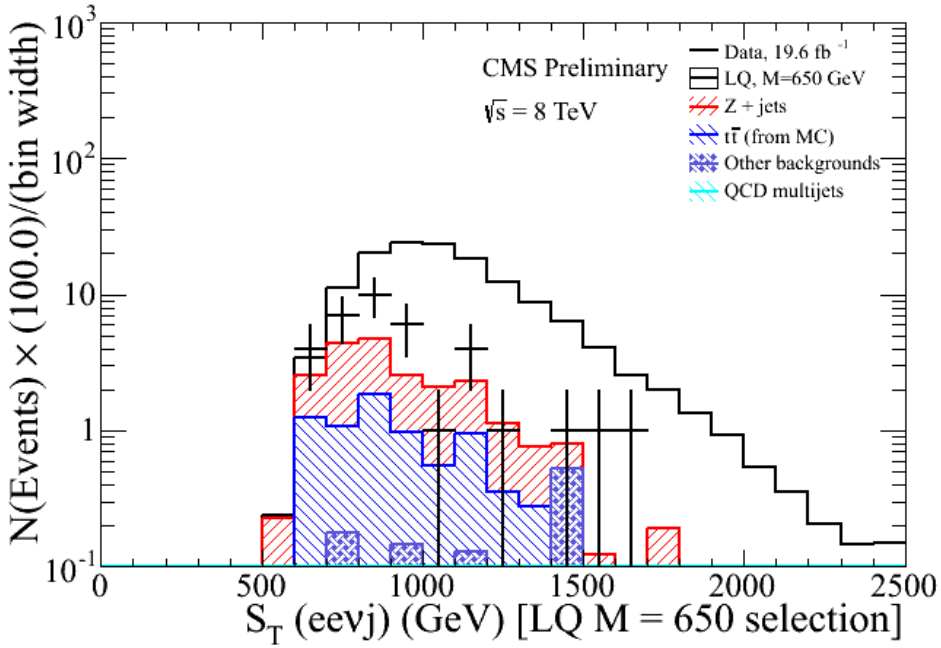
m_{eff} at $eejj$ preselection, as defined in the CMS LQ analysis



- No sign of an excess seen at preselection
- $\not{E}_T/m_{\text{eff}} > 0.2$ and $\not{E}_T/m_{\text{eff}} > 0.2$ not applied

Events with high m_{eff} in the CMS LQ *eejj* excess?

m_{eff} at *eejj* final selection for M(LQ) > 650 GeV



- For whole selection, predict 20.5 ± 1.2 (stat). Observe 36.
- In region $1200 < m_{\text{eff}} < 1400$, predict 1.9 ± 0.5 (stat) events. Observe 1.

Conclusion:

- ATLAS excess in $e + e + \nu + j$ events is not related to CMS excess in $e + e + j + j$ events.
- To do:
  - Reproduce ATLAS cuts explicitly