



Search for Scalar Leptoquark Pair Production Decaying into Top-Quarks and Leptons at $\sqrt{s} = 13$ TeV with ATLAS detector

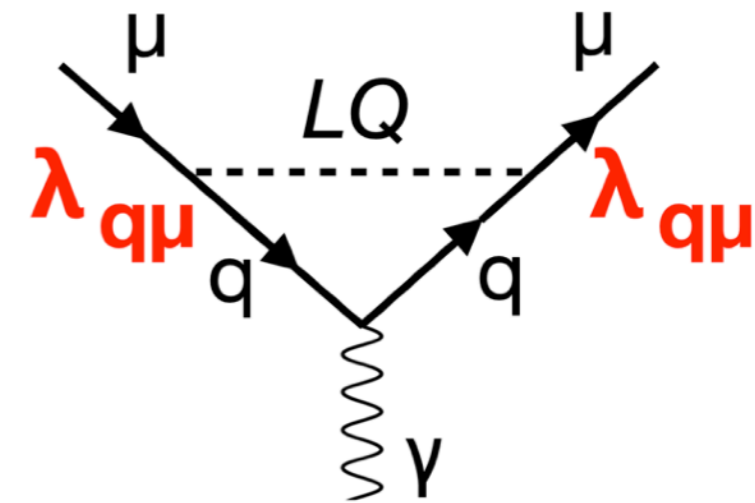
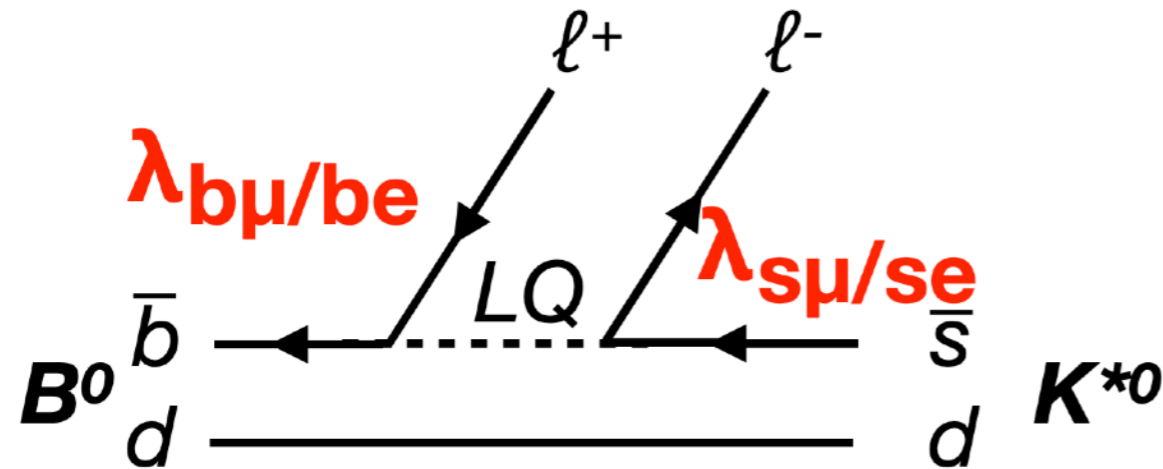
Beyond the Standard Model - Poster Session

40th International Conference on High Energy Physics

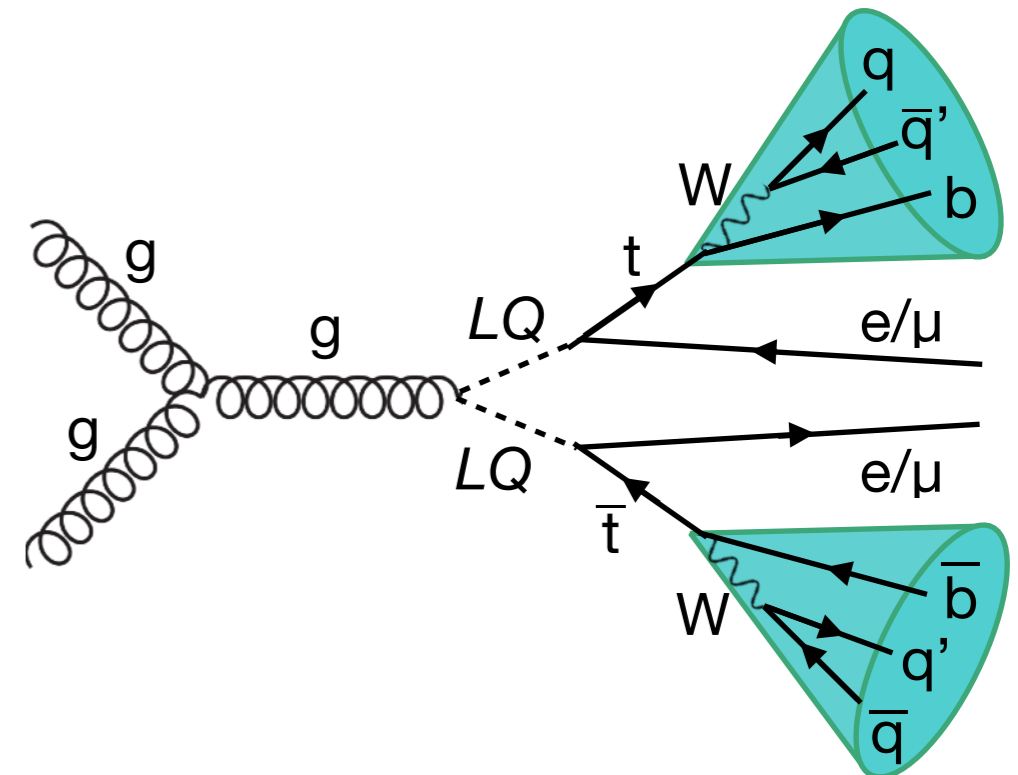
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Vincent Wong, on behalf of the ATLAS Collaboration

- LQ appears in many **GUT models**, like SU(5) & Pati-Salam model
- Hints of **lepton universality violation** in **FCNC B-meson decays**
- Long standing **3.3 σ** deviation of **(g-2) $_{\mu}$** measurement by E821

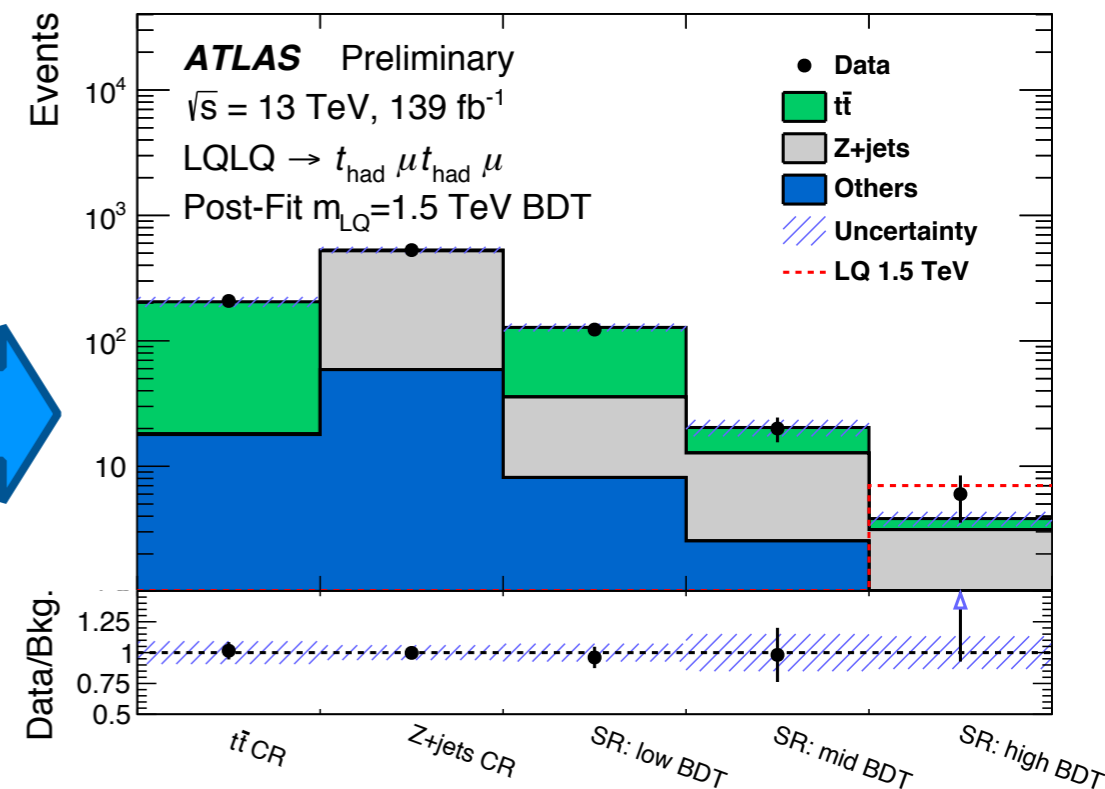
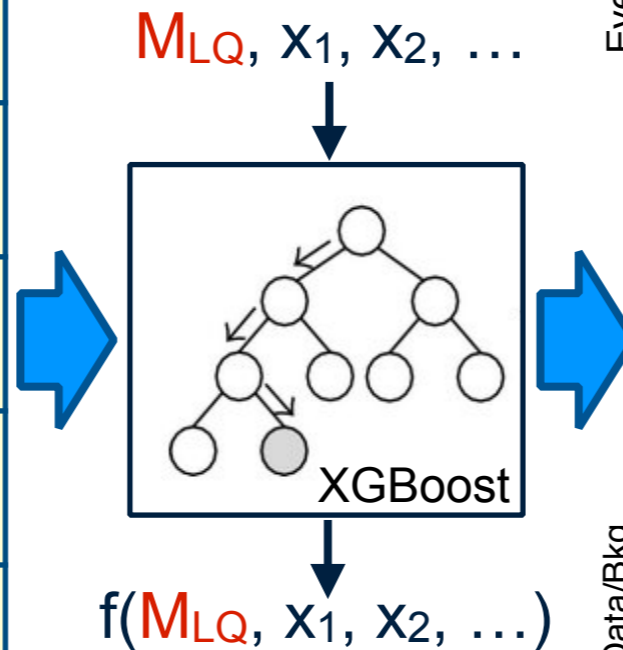


- Focusing on **LQ pair production** decaying to **$t\bar{t}$** final state, where $\ell=e/\mu$
- We target the **hadronic** decay channel in the **boosted** regime
- **First top-philic cross-generational LQ** search in ATLAS

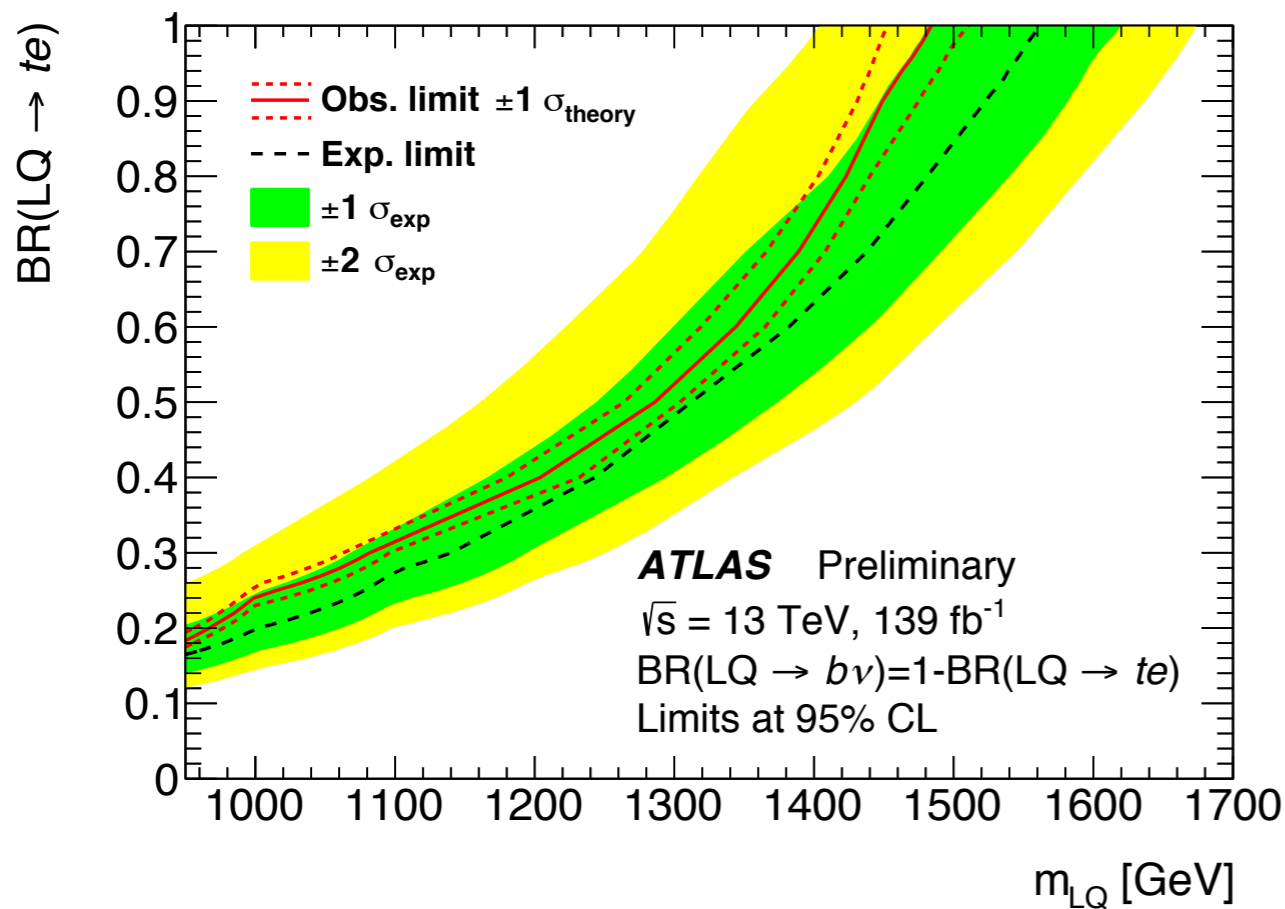


- Simple **5-bin final discriminant**, individually for electron and muon channel:
 - Signal region optimized using a **parameterized BDT**, which can provide discrimination across a range of LQ masses.
 - **$t\bar{t}$ and Z+jets backgrounds normalization** fitted with control regions.
- Construct a physics-motivated basis of kinematics based on hypotheses of LQ and major backgrounds.

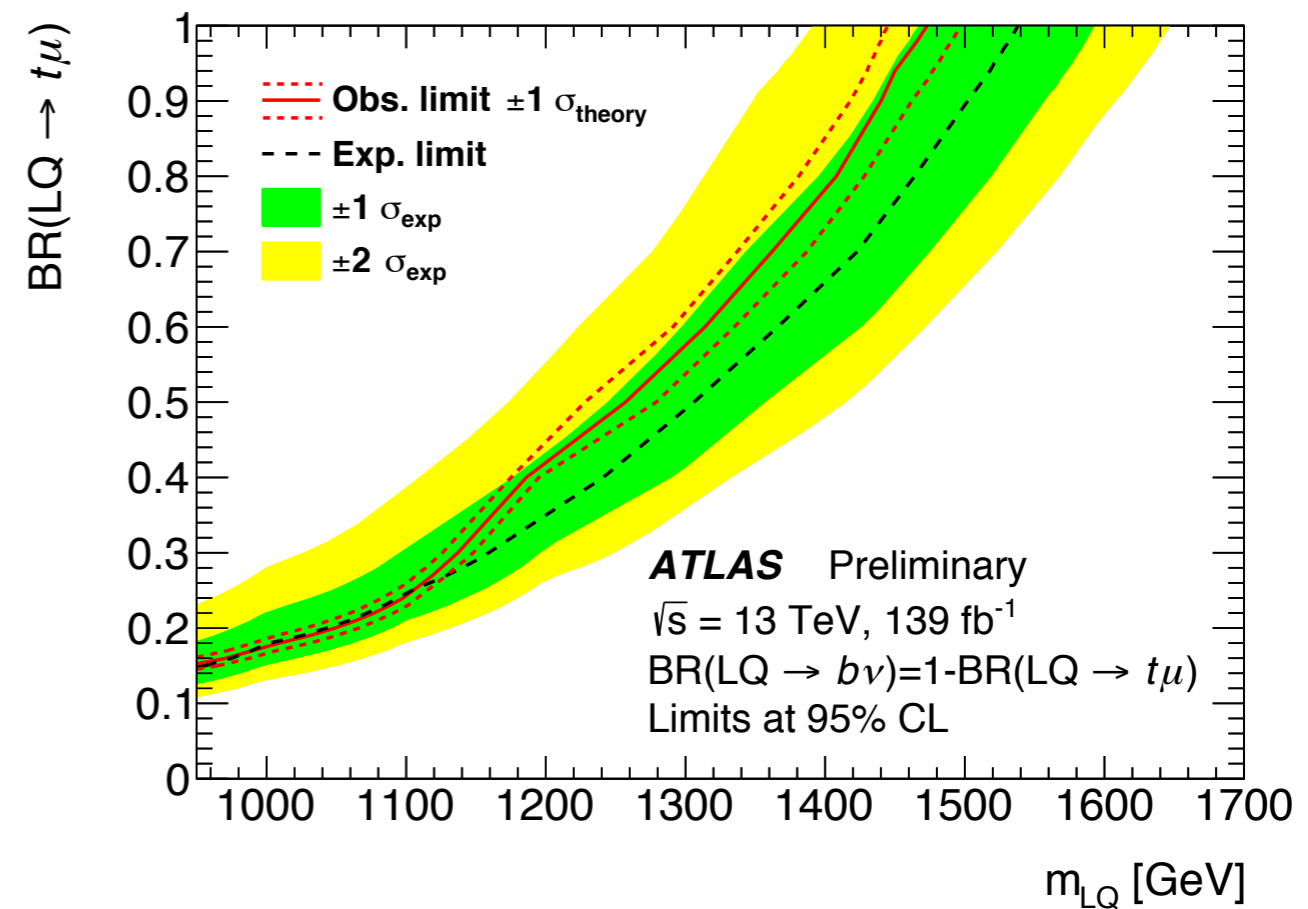
Input variable	
LQ hypo.	$m_{\ell 1, J 1}^{\max}, m_{\ell 2, J 2}^{\min}, m_{\ell 1, J 2}, m_{\ell 2, J 1}, E_{1}^{\text{LQ}}, E_{2}^{\text{LQ}} \dots$
dileptonic $t\bar{t}$ hypo.	$m_{\text{top}1}, m_{\text{top}2}, m_{W1}, m_{W2}, E_{12}^{W2}, E_{11}^{W1} \dots$
$Z \rightarrow \ell\ell$ hypo.	$m_{\ell\ell}, pT_Z^{\text{LAB}}$
LAB frame	$L_T, H_T, S_T, E_{T}^{\text{miss}}, E_{T}^{\text{miss sig.}}$
substructure variables	$\sqrt{d_{23}}, \tau_{32}, Q_W$
MVA parameterization	test mass point $m_{\text{LQ}, \text{hypo}}$



- **No significant excess** observed.
- LQ masses below **1480 GeV** and **1470 GeV** are **excluded** for **BR(LQ → tℓ[±])=1.0** at 95% confidence level for **electron** and **muon** channels.



Electron channel



Muon channel