Overview of searches for single production of vector-like top and bottom quarks with the ATLAS experiment at 13 TeV

Johannes Erdmann\(^1\) on behalf of the ATLAS Collaboration
\(^1\)TU Dortmund University
TOP2018, 16.-21.09.2018

Vector-like quarks
- Color-charged \(S = \frac{1}{2}\) fermions with SU(2) vector coupling
- Proposed in many SM extensions (Little Higgs, Composite Higgs, ...)

EW coupling / decays
- Preferred coupling to t & b: solution to hierarchy problem
- \(T \to Wb, T \to Zt, T \to Ht\)
- \(B \to Wc, B \to Zb, B \to Hb\)

Single production cross section
- Depends on mass and couplings
- May be larger than cross section for pair production if EW coupling large enough

More details: see poster by Anjishnu Bandopadhyay

ATLAS Preliminary
\(13 \text{ TeV, 36.1 fb}^{-1}\)

<table>
<thead>
<tr>
<th>(m_{Z'} [\text{GeV}])</th>
<th>(\sigma \times BR(\text{signal}) [\text{pb}])</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
<td>0.2</td>
</tr>
<tr>
<td>1000</td>
<td>0.4</td>
</tr>
<tr>
<td>1200</td>
<td>0.6</td>
</tr>
<tr>
<td>1400</td>
<td>0.8</td>
</tr>
<tr>
<td>1600</td>
<td>1.0</td>
</tr>
</tbody>
</table>

\[|\sin \theta| \approx 0.4\]

More details: see poster by Haga Vale

\[\text{Ref. [1]}\]: with \(B \to Hb \to \gamma\gamma b\)

\[\text{Ref. [2]}\]: with \(T \to Wb \to l\nu b\)

\[\text{Ref. [3]}\]: with \(T \to Zt \to l\nu ll'q'\)

\[\text{Ref. [5]}\]: O. Matsedonskyi et al., JHEP 12 (2014) 097