Update on Monotop (Muon Channel)

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Samples Info

- Snowmass background samples with HT binning
  - /Snowmass/HTBinned/Delphes-3.0.9.1/NoPileUp/
- No PileUp scenario, √s = 14 TeV

<table>
<thead>
<tr>
<th>BB-4p HT-bin</th>
<th>X-Sec. (pb)</th>
<th>BJ-4p HT-bin</th>
<th>X-Sec. (pb)</th>
<th>tt-4p HT-bin</th>
<th>X-Sec. (pb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-300</td>
<td>249.97710</td>
<td>0-300</td>
<td>34409.92339</td>
<td>0-600</td>
<td>530.89358</td>
</tr>
<tr>
<td>300-700</td>
<td>35.23062</td>
<td>300-600</td>
<td>2642.85309</td>
<td>600-1100</td>
<td>42.55351</td>
</tr>
<tr>
<td>700-1300</td>
<td>4.13743</td>
<td>600-1100</td>
<td>294.12311</td>
<td>1100-1700</td>
<td>4.48209</td>
</tr>
<tr>
<td>1300-2100</td>
<td>0.41702</td>
<td>1100-1800</td>
<td>25.95000</td>
<td>1700-2500</td>
<td>0.52795</td>
</tr>
<tr>
<td>2100-100000</td>
<td>0.04770</td>
<td>1800-2700</td>
<td>2.42111</td>
<td>2500-100000</td>
<td>0.05449</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2700-3700</td>
<td>0.22690</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3700-100000</td>
<td>0.02767</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Selection Criteria

- **Pre-Selections**
  - Exactly one tight muon with $p_T > 20$ GeV, $|\eta| < 2.1$
  - Veto on other loose muons with $p_T > 10$ GeV, $|\eta| < 2.1$
  - Veto on electrons with $p_T > 10$ GeV, $|\eta| < 2.1$
  - At least one jet with $p_T > 70$ GeV, $|\eta| < 2.4$
  - $m_T^W > 40$ GeV

- **Signal Selections**
  - Exactly one tight jet with $p_T > 70$ GeV, $|\eta| < 2.4$
  - Veto on other loose jets with $p_T > 30$ GeV, $|\eta| < 2.4$
  - b-tag requirement on the tight jet
  - $W p_T > 50$ GeV
  - $\Delta\phi(\mu, \text{jet})| < 1.7$
  - MET > 100 GeV

In sync with CMS
AN-2014-279

24/03/2016
Kinematic Distributions After Pre-selections

Normalized to 1

Normalized to $\sigma*L$

24/03/2016
Kinematic Distributions After Pre-selections

Normalized to 1

Normalized to $\sigma \times L$

24/03/2016
Kinematic Distributions After Pre-selections

PHENO Preliminary 2016 \( \sqrt{s} = 14 \text{ TeV} \)

Normalized to 1

Normalized to \( \sigma^*L \)

24/03/2016
Kinematic Distributions After Pre-selections

Normalized to 1

Normalized to $\sigma^* L$

24/03/2016
# Cut Flow Efficiency Table

**Efficiency (in %)**

<table>
<thead>
<tr>
<th>Bkg.</th>
<th>Lead $\mu$</th>
<th>Loose $\mu$-Veto</th>
<th>Loose e-Veto</th>
<th>Lead Jet</th>
<th>W Mt &gt; 40 GeV</th>
<th>1 Tight Jet</th>
<th>b-tagged jet</th>
<th>W Pt &gt; 50 GeV</th>
<th>DelP $\phi$ ($\mu$,jet)</th>
<th>MET &gt; 100 GeV</th>
</tr>
</thead>
<tbody>
<tr>
<td>BB-4p</td>
<td>7.27 ± 0.01</td>
<td>95.63 ± 0.14</td>
<td>93.61 ± 0.14</td>
<td>84.71 ± 0.13</td>
<td>64.61 ± 0.12</td>
<td>14.40 ± 0.06</td>
<td>2.55 ± 0.06</td>
<td>95.58 ± 3.27</td>
<td>6.72 ± 0.65</td>
<td>52.68 ± 8.47</td>
</tr>
<tr>
<td>tt-4p</td>
<td>10.97 ± 0.01</td>
<td>98 ± 0.11</td>
<td>91.40 ± 0.11</td>
<td>96.02 ± 0.12</td>
<td>69.93 ± 0.09</td>
<td>2.24 ± 0.016</td>
<td>16.71 ± 0.30</td>
<td>91.96 ± 2.24</td>
<td>9.77 ± 0.58</td>
<td>57.78 ± 5.38</td>
</tr>
<tr>
<td>BJ-4p</td>
<td>3.25 ± 0.01</td>
<td>97.79 ± 0.14</td>
<td>99.84 ± 0.14</td>
<td>97.26 ± 0.14</td>
<td>62.88 ± 0.11</td>
<td>10.65 ± 0.04</td>
<td>2.11 ± 0.06</td>
<td>97.76 ± 3.80</td>
<td>2.44 ± 0.44</td>
<td>12.5 ± 6.63</td>
</tr>
</tbody>
</table>

24/03/2016
Summary

- A study of kinematic distributions using Snowmass HT-binned background samples at $\sqrt{s} = 14$ TeV is performed.

- Synchronized the selections cuts in reference to CMS Analysis Note: CMS-AN-2014-279.

- Investigation of monotop signal samples is in progress.
  - Once ready, will study its kinematic distributions & cut flow efficiency table.

24/03/2016