**Benchmark Mass Spectrum**

\[
\begin{align*}
M(\text{gluino}) &= 649.78 \text{ GeV} & \alpha &= 4.5 \\
M(\text{squarkL}) &= 650.52 \text{ GeV} & \tan\beta &= 30. \\
M(\text{sbottom1}) &= 520.46 \text{ GeV} & m_{3/2} &= 14000. \text{ GeV} \\
M(\text{stop1}) &= 338.55 \text{ GeV} & n_M &= 0. \\
M(\text{neutralino2}) &= 338.21 \text{ GeV} & n_H &= 0.5 \\
M(\text{stau1}) &= 315.08 \text{ GeV} \\
M(\text{neutralino1}) &= 286.21 \text{ GeV}
\end{align*}
\]

Total cross section = 24780 fb

luminosity = 400 fb\(^{-1}\)
mJetTauTau-end vs M(squarkL)
mJetTauTau-end vs M(neutralino2)

mJetTauTauEnd Vs mNeutralino2

- Green line: Theoretical formula
- Red line: Experiment simulation
- Purple line: Pure simulation (true tau)
- Blue line: Pure simulation (visible tau)
- Pink square: Reference point
mJetTauTau-end vs M(neutralino1)

mJetTauTauEnd Vs mNeutralino1

- Theoretical formula
- Experiment simulation
- Pure simulation (true tau)
- Pure simulation (visible tau)
- Reference point
10 GeV / Bin

benchmark: 50 previous events

Visible jet-tau-tau mass
- $M_{j\ell\ell}$ for the same event
- $M_{j\ell\ell}$ for the bi-event
- $M_{j\ell\ell}$ after subtraction

scaleFactor = 0.782103
End = $273.9 \pm 0.581$ GeV

Counts / 10 GeV

Counts / 50 GeV

30 GeV / Bin

Visible jet-tau-tau mass
- $M_{j\ell\ell}$ for the same event
- $M_{j\ell\ell}$ for the bi-event
- $M_{j\ell\ell}$ after subtraction

scaleFactor = 0.782103
End = $281 \pm 0.519$ GeV

Counts / 30 GeV

Counts / 50 GeV

20 GeV / Bin
Visible jet-tau-tau mass

- $M_{j\tau\tau}$ for the same event
- $M_{j\tau\tau}$ for the bi-event
- $M_{j\tau\tau}$ after subtraction

scaleFactor = 0.785483
End = 246.5 ± 0.699 GeV

scaleFactor = 0.785483
End = 261.4 ± 3.04 GeV

Counts / 10 GeV

Counts / 30 GeV

M_{j\tau\tau} (GeV)

M_{j\tau\tau} (GeV)

10 GeV / Bin

20 GeV / Bin

50 previous events
Visible jet-tau-tau mass
- \( M_{\text{jet}} \) for the same event
- \( M_{\text{jet}} \) for the bi-event
- \( M_{\text{jet}} \) after subtraction

scaleFactor = 0.793769
End = 253.4 ± 1.52 GeV

Counts / 10 GeV

Counts / 50 GeV

30 GeV / Bin

20 GeV / Bin

Visible jet-tau-tau mass
- \( M_{\text{jet}} \) for the same event
- \( M_{\text{jet}} \) for the bi-event
- \( M_{\text{jet}} \) after subtraction

scaleFactor = 0.793769
End = 251.1 ± 0.47 GeV

Counts / 30 GeV
Visible jet-tau-tau mass

scaleFactor = 0.785151
End = 270.8 ± 0.626 GeV

Counts / 10 GeV

M_{j\tau\tau} (GeV)

Visible jet-tau-tau mass

scaleFactor = 0.785151
End = 274.8 ± 0.1 GeV

Counts / 50 GeV

M_{j\tau\tau} (GeV)
Visible jet-tau-tau mass

- $M_{j\tau\tau}$ for the same event
- $M_{j\tau\tau}$ for the bi-event
- $M_{j\tau\tau}$ after subtraction

scaleFactor = 0.860419
End = 287.2 ± 1.4 GeV

Counts / 10 GeV

Counts / 50 GeV

30 GeV / Bin

20 GeV / Bin

Visible jet-tau-tau mass

- $M_{j\tau\tau}$ for the same event
- $M_{j\tau\tau}$ for the bi-event
- $M_{j\tau\tau}$ after subtraction

scaleFactor = 0.860419
End = 285 ± 0.044 GeV

0510A40: SquarkL = 690.78 GeV
50 previous events
23D20: Neutralino1 = 267.25 GeV

scaleFactor = 0.74638
End = 326.1 ± 1.32 GeV

scaleFactor = 0.74638
End = 328.2 ± 0.502 GeV

scaleFactor = 0.74638
End = 327.4 ± 0.877 GeV
Visible jet-tau-tau mass

- $M_{J\ell\ell}$ for the same event
- $M_{J\ell\ell}$ for the bi-event
- $M_{J\ell\ell}$ after subtraction

**Counts / 10 GeV**

- Scale Factor = 0.809693
- End = $285.6 \pm 4.46$ GeV

**Counts / 50 GeV**

- Scale Factor = 0.809693
- End = $280.9 \pm 0.609$ GeV

**10 GeV / Bin**

**20 GeV / Bin**

**30 GeV / Bin**

**Visible jet-tau-tau mass**

- $M_{J\ell\ell}$ for the same event
- $M_{J\ell\ell}$ for the bi-event
- $M_{J\ell\ell}$ after subtraction

**Counts / 30 GeV**

- Scale Factor = 0.809693
- End = $285.7 \pm 0.285$ GeV
23A10: Neutralino1 = 295.50 GeV
50 previous events

Visible jet-tau-tau mass
- $M_{\tau\tau}$ for the same event
- $M_{\tau\tau}$ for the bi-event
- $M_{\tau\tau}$ after subtraction

scaleFactor = 0.79037
End = 231.2 ± 0.546 GeV

Counts / 10 GeV

Counts / 50 GeV

30 GeV / Bin

Visible jet-tau-tau mass
- $M_{\tau\tau}$ for the same event
- $M_{\tau\tau}$ for the bi-event
- $M_{\tau\tau}$ after subtraction

scaleFactor = 0.79037
End = 229.9 ± 0.649 GeV

Counts / 30 GeV

Counts / 50 GeV

20 GeV / Bin
23A20: Neutralino1 = 304.54 GeV

Counts / 10 GeV

Visible jet-tau-tau mass
- $M_{j\tau\tau}$ for the same event
- $M_{j\tau\tau}$ for the bi-event
- $M_{j\tau\tau}$ after subtraction

scaleFactor = 0.804726
End = 218.3 ± 0.776 GeV

30 GeV / Bin

Counts / 30 GeV

Visible jet-tau-tau mass
- $M_{j\tau\tau}$ for the same event
- $M_{j\tau\tau}$ for the bi-event
- $M_{j\tau\tau}$ after subtraction

scaleFactor = 0.804726
End = 220.2 ± 0.716 GeV

20 GeV / Bin

50 previous events

Counts / 50 GeV

Visible jet-tau-tau mass
- $M_{j\tau\tau}$ for the same event
- $M_{j\tau\tau}$ for the bi-event
- $M_{j\tau\tau}$ after subtraction

scaleFactor = 0.804726
End = 224.5 ± 0.27 GeV
24D17: Neutralino2 = 323.83 GeV

Visible jet-tau-tau mass
- $M_{j\tau\tau}$ for the same event
- $M_{j\tau\tau}$ for the bi-event
- $M_{j\tau\tau}$ after subtraction

scaleFactor = 0.793719

10 GeV / Bin

30 GeV / Bin

20 GeV / Bin

50 previous events
24D10: Neutralino2 = 329.77 GeV

Counts / 10 GeV

Visible jet-tau-tau mass
- $M_{j\tau\tau}$ for the same event
- $M_{j\tau\tau}$ for the bi-event
- $M_{j\tau\tau}$ after subtraction

scaleFactor = 0.794347
End = 249.4 ± 1.04 GeV

Counts / 50 GeV

Visible jet-tau-tau mass
- $M_{j\tau\tau}$ for the same event
- $M_{j\tau\tau}$ for the bi-event
- $M_{j\tau\tau}$ after subtraction

scaleFactor = 0.794347

Counts / 30 GeV

Visible jet-tau-tau mass
- $M_{j\tau\tau}$ for the same event
- $M_{j\tau\tau}$ for the bi-event
- $M_{j\tau\tau}$ after subtraction

scaleFactor = 0.794347
End = 255.5 ± 0.198 GeV
Visible jet-tau-tau mass

- $M_{J\tau\tau}$ for the same event
- $M_{J\tau\tau}$ for the bi-event
- $M_{J\tau\tau}$ after subtraction

scaleFactor = 0.737332
End = 276.7 $\pm$ 0.546 GeV

Counts / 10 GeV

30 GeV / Bin

Counts / 30 GeV

scaleFactor = 0.737332
End = 284.4 $\pm$ 0.215 GeV

Counts / 50 GeV

20 GeV / Bin

10 GeV / Bin

24A12: Neutralino2 = 348.21 GeV

50 previous events
24A24: Neutralino2 = 358.02 GeV

Visible jet-tau-tau mass
\( M_{j\tau\tau} \) for the same event
\( M_{j\tau\tau} \) for the bi-event
\( M_{j\tau\tau} \) after subtraction

scaleFactor = 0.730527
End = 292.9 \pm 1.21 GeV

Counts / 10 GeV

Counts / 50 GeV

30 GeV / Bin

20 GeV / Bin

Visible jet-tau-tau mass
\( M_{j\tau\tau} \) for the same event
\( M_{j\tau\tau} \) for the bi-event
\( M_{j\tau\tau} \) after subtraction

scaleFactor = 0.730527
End = 292.5 \pm 1.27 GeV

Counts / 30 GeV