| Cut | 300 GeV, 100 cm, region 2017 | | |
|---|---|---|---|
| | $\epsilon_i^{\mathrm{CMS}}$ | $\epsilon_i^{\mathrm{sim}}$, MLM | $\epsilon_i^{\mathrm{sim}}$, MLM, no pileup |
| total | $1.0^{+0.00}_{-0.00}$ | $1.0^{+0.00}_{-0.00}$ | $1.0^{+0.00}_{-0.00}$ |
| trigger | $1.4^{+0.02}_{-0.02} \times 10^{-1}$ | $8.4^{+0.09}_{-0.09} \times 10^{-2}$ | $8.1^{+0.09}_{-0.09} \times 10^{-2}$ |
| passes $p_{\mathrm{T}}^{\mathrm{miss}}$ filters | $1.4^{+0.02}_{-0.02} \times 10^{-1}$ | $8.4^{+0.09}_{-0.09} \times 10^{-2}$ | $8.1^{+0.09}_{-0.09} \times 10^{-2}$ |
| $p_{\mathrm{T}}^{\mathrm{miss}} > 120\,\mathrm{GeV}$ | $1.4^{+0.02}_{-0.02} \times 10^{-1}$ | $8.4^{+0.09}_{-0.09} \times 10^{-2}$ | $8.1^{+0.09}_{-0.09} \times 10^{-2}$ |
| $\geq 1$ jet with $p_{\mathrm{T}} > 110\,\mathrm{GeV}$ and $\lvert\eta\rvert < 2.4$ | $8.5^{+0.13}_{-0.13} \times 10^{-2}$ | $5.6^{+0.08}_{-0.08} \times 10^{-2}$ | $5.5^{+0.07}_{-0.07} \times 10^{-2}$ |
| ==0 pairs of jets with $\Delta\phi_{\mathrm{jet,\ jet}} > 2.5$ | $7.4^{+0.12}_{-0.12} \times 10^{-2}$ | $5.0^{+0.07}_{-0.07} \times 10^{-2}$ | $4.7^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\lvert\Delta\phi(\text{leading jet}, \vec{p}_{\mathrm{T}}^{\mathrm{miss}})\rvert > 0.5$ | $7.4^{+0.12}_{-0.12} \times 10^{-2}$ | $4.9^{+0.07}_{-0.07} \times 10^{-2}$ | $4.7^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\geq 1$ track with $\lvert\eta\rvert < 2.1$ | $7.4^{+0.12}_{-0.12} \times 10^{-2}$ | $4.9^{+0.07}_{-0.07} \times 10^{-2}$ | $4.7^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\geq 1$ track with $p_{\mathrm{T}} > 55\,\mathrm{GeV}$ | $5.9^{+0.11}_{-0.11} \times 10^{-2}$ | $4.6^{+0.07}_{-0.07} \times 10^{-2}$ | $4.3^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\geq 1$ track passing fiducial selections | $4.2^{+0.09}_{-0.09} \times 10^{-2}$ | $3.8^{+0.06}_{-0.06} \times 10^{-2}$ | $3.6^{+0.06}_{-0.06} \times 10^{-2}$ |
| $\geq 1$ track with $\geq 4$ pixel hits | $2.9^{+0.08}_{-0.08} \times 10^{-2}$ | $2.7^{+0.05}_{-0.05} \times 10^{-2}$ | $2.5^{+0.05}_{-0.05} \times 10^{-2}$ |
| $\geq 1$ track with no missing inner hits | $2.9^{+0.08}_{-0.08} \times 10^{-2}$ | $2.1^{+0.05}_{-0.05} \times 10^{-2}$ | $1.9^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with no missing middle hits | $2.7^{+0.07}_{-0.07} \times 10^{-2}$ | $2.1^{+0.05}_{-0.05} \times 10^{-2}$ | $1.9^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with relative track isolation $< 5\%$ | $2.2^{+0.07}_{-0.07} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\lvert d_{\mathrm{xy}}\rvert < 0.02\,\mathrm{cm}$ | $2.2^{+0.07}_{-0.07} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\lvert d_z\rvert < 0.5\,\mathrm{cm}$ | $2.2^{+0.07}_{-0.07} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \text{jet}) > 0.5$ | $2.2^{+0.07}_{-0.07} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \text{electron}) > 0.15$ | $2.1^{+0.07}_{-0.07} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \text{muon}) > 0.15$ | $1.9^{+0.06}_{-0.06} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \tau_{\mathrm{h}}) > 0.15$ | $1.9^{+0.06}_{-0.06} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $E_{\mathrm{calo}} < 10\,\mathrm{GeV}$ | $1.9^{+0.06}_{-0.06} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\geq 3$ missing outer hits | $1.1^{+0.05}_{-0.05} \times 10^{-2}$ | $7.8^{+0.29}_{-0.29} \times 10^{-3}$ | $8.0^{+0.29}_{-0.29} \times 10^{-3}$ |
| $\geq 1$ track with number of tracker layers with measurement == 4 | $2.3^{+0.22}_{-0.22} \times 10^{-3}$ | $1.2^{+0.11}_{-0.11} \times 10^{-3}$ | $1.4^{+0.12}_{-0.12} \times 10^{-3}$ |
| $\geq 1$ track with number of tracker layers with measurement == 5 | $2.1^{+0.20}_{-0.20} \times 10^{-3}$ | $1.2^{+0.11}_{-0.11} \times 10^{-3}$ | $1.4^{+0.12}_{-0.12} \times 10^{-3}$ |
| $\geq 1$ track with number of tracker layers with measurement $\geq 6$ | $7.1^{+0.38}_{-0.38} \times 10^{-3}$ | $5.3^{+0.24}_{-0.24} \times 10^{-3}$ | $5.1^{+0.23}_{-0.23} \times 10^{-3}$ |

Table 1: Cutflow comparison for 300 GeV, 100 cm, region 2017

| Cut | 300 GeV, 100 cm, region 2018A | | |
|---|---|---|---|
| | $\epsilon_i^{\mathrm{CMS}}$ | $\epsilon_i^{\mathrm{sim}}$, MLM | $\epsilon_i^{\mathrm{sim}}$, MLM, no pileup |
| total | $1.0^{+0.00}_{-0.00}$ | $1.0^{+0.00}_{-0.00}$ | $1.0^{+0.00}_{-0.00}$ |
| trigger | $9.5^{+0.14}_{-0.14} \times 10^{-2}$ | $8.4^{+0.09}_{-0.09} \times 10^{-2}$ | $8.1^{+0.09}_{-0.09} \times 10^{-2}$ |
| passes $p_{\mathrm{T}}^{\mathrm{miss}}$ filters | $9.5^{+0.14}_{-0.14} \times 10^{-2}$ | $8.4^{+0.09}_{-0.09} \times 10^{-2}$ | $8.1^{+0.09}_{-0.09} \times 10^{-2}$ |
| $p_{\mathrm{T}}^{\mathrm{miss}} > 120\,\mathrm{GeV}$ | $9.3^{+0.14}_{-0.14} \times 10^{-2}$ | $8.4^{+0.09}_{-0.09} \times 10^{-2}$ | $8.1^{+0.09}_{-0.09} \times 10^{-2}$ |
| $\geq 1$ jet with $p_{\mathrm{T}} > 110\,\mathrm{GeV}$ and $\lvert\eta\rvert < 2.4$ | $8.2^{+0.13}_{-0.13} \times 10^{-2}$ | $5.6^{+0.08}_{-0.08} \times 10^{-2}$ | $5.5^{+0.07}_{-0.07} \times 10^{-2}$ |
| ==0 pairs of jets with $\Delta\phi_{\mathrm{jet,\ jet}} > 2.5$ | $7.1^{+0.12}_{-0.12} \times 10^{-2}$ | $5.0^{+0.07}_{-0.07} \times 10^{-2}$ | $4.7^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\lvert\Delta\phi(\text{leading jet}, \vec{p}_{\mathrm{T}}^{\mathrm{miss}})\rvert > 0.5$ | $7.1^{+0.12}_{-0.12} \times 10^{-2}$ | $4.9^{+0.07}_{-0.07} \times 10^{-2}$ | $4.7^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\geq 1$ track with $\lvert\eta\rvert < 2.1$ | $7.0^{+0.12}_{-0.12} \times 10^{-2}$ | $4.9^{+0.07}_{-0.07} \times 10^{-2}$ | $4.7^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\geq 1$ track with $p_{\mathrm{T}} > 55\,\mathrm{GeV}$ | $5.5^{+0.11}_{-0.11} \times 10^{-2}$ | $4.6^{+0.07}_{-0.07} \times 10^{-2}$ | $4.3^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\geq 1$ track passing fiducial selections | $3.8^{+0.09}_{-0.09} \times 10^{-2}$ | $3.8^{+0.06}_{-0.06} \times 10^{-2}$ | $3.6^{+0.06}_{-0.06} \times 10^{-2}$ |
| $\geq 1$ track with $\geq 4$ pixel hits | $2.5^{+0.07}_{-0.07} \times 10^{-2}$ | $2.7^{+0.05}_{-0.05} \times 10^{-2}$ | $2.5^{+0.05}_{-0.05} \times 10^{-2}$ |
| $\geq 1$ track with no missing inner hits | $2.5^{+0.07}_{-0.07} \times 10^{-2}$ | $2.1^{+0.05}_{-0.05} \times 10^{-2}$ | $1.9^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with no missing middle hits | $2.2^{+0.07}_{-0.07} \times 10^{-2}$ | $2.1^{+0.05}_{-0.05} \times 10^{-2}$ | $1.9^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with relative track isolation $< 5\%$ | $1.8^{+0.06}_{-0.06} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\lvert d_{\mathrm{xy}}\rvert < 0.02\,\mathrm{cm}$ | $1.8^{+0.06}_{-0.06} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\lvert d_z\rvert < 0.5\,\mathrm{cm}$ | $1.8^{+0.06}_{-0.06} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \text{jet}) > 0.5$ | $1.8^{+0.06}_{-0.06} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \text{electron}) > 0.15$ | $1.7^{+0.06}_{-0.06} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \text{muon}) > 0.15$ | $1.6^{+0.06}_{-0.06} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \tau_{\mathrm{h}}) > 0.15$ | $1.6^{+0.06}_{-0.06} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $E_{\mathrm{calo}} < 10\,\mathrm{GeV}$ | $1.6^{+0.06}_{-0.06} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\geq 3$ missing outer hits | $8.8^{+0.42}_{-0.42} \times 10^{-3}$ | $7.8^{+0.29}_{-0.29} \times 10^{-3}$ | $8.0^{+0.29}_{-0.29} \times 10^{-3}$ |
| $\geq 1$ track with number of tracker layers with measurement == 4 | $1.7^{+0.19}_{-0.19} \times 10^{-3}$ | $1.2^{+0.11}_{-0.11} \times 10^{-3}$ | $1.4^{+0.12}_{-0.12} \times 10^{-3}$ |
| $\geq 1$ track with number of tracker layers with measurement == 5 | $1.6^{+0.18}_{-0.18} \times 10^{-3}$ | $1.2^{+0.11}_{-0.11} \times 10^{-3}$ | $1.4^{+0.12}_{-0.12} \times 10^{-3}$ |
| $\geq 1$ track with number of tracker layers with measurement $\geq 6$ | $5.7^{+0.34}_{-0.34} \times 10^{-3}$ | $5.3^{+0.24}_{-0.24} \times 10^{-3}$ | $5.2^{+0.23}_{-0.23} \times 10^{-3}$ |

Table 2: Cutflow comparison for 300 GeV, 100 cm, region 2018A

| Cut | 300 GeV, 100 cm, region 2018B | | |
|---|---|---|---|
| | $\epsilon_i^{\text{CMS}}$ | $\epsilon_i^{\text{sim}}$, MLM | $\epsilon_i^{\text{sim}}$, MLM, no pileup |
| total | $1.0^{+0.00}_{-0.00}$ | $1.0^{+0.00}_{-0.00}$ | $1.0^{+0.00}_{-0.00}$ |
| trigger | $9.5^{+0.14}_{-0.14} \times 10^{-2}$ | $8.4^{+0.09}_{-0.09} \times 10^{-2}$ | $8.1^{+0.09}_{-0.09} \times 10^{-2}$ |
| passes $p_{\text{T}}^{\text{miss}}$ filters | $9.5^{+0.14}_{-0.14} \times 10^{-2}$ | $8.4^{+0.09}_{-0.09} \times 10^{-2}$ | $8.1^{+0.09}_{-0.09} \times 10^{-2}$ |
| $p_{\text{T}}^{\text{miss}} > 120\,\text{GeV}$ | $9.3^{+0.14}_{-0.14} \times 10^{-2}$ | $8.4^{+0.09}_{-0.09} \times 10^{-2}$ | $8.1^{+0.09}_{-0.09} \times 10^{-2}$ |
| $\geq 1$ jet with $p_{\text{T}} > 110\,\text{GeV}$ and $\lvert\eta\rvert < 2.4$ | $8.2^{+0.13}_{-0.13} \times 10^{-2}$ | $5.6^{+0.08}_{-0.08} \times 10^{-2}$ | $5.5^{+0.07}_{-0.07} \times 10^{-2}$ |
| ==0 pairs of jets with $\Delta\phi_{\text{jet, jet}} > 2.5$ | $7.1^{+0.12}_{-0.12} \times 10^{-2}$ | $5.0^{+0.07}_{-0.07} \times 10^{-2}$ | $4.7^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\lvert\Delta\phi(\text{leading jet}, \vec{p}_{\text{T}}^{\text{miss}})\rvert > 0.5$ | $7.1^{+0.12}_{-0.12} \times 10^{-2}$ | $4.9^{+0.07}_{-0.07} \times 10^{-2}$ | $4.7^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\geq 1$ track with $\lvert\eta\rvert < 2.1$ | $7.0^{+0.12}_{-0.12} \times 10^{-2}$ | $4.9^{+0.07}_{-0.07} \times 10^{-2}$ | $4.7^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\geq 1$ track with $p_{\text{T}} > 55\,\text{GeV}$ | $5.5^{+0.10}_{-0.10} \times 10^{-2}$ | $4.6^{+0.07}_{-0.07} \times 10^{-2}$ | $4.3^{+0.07}_{-0.07} \times 10^{-2}$ |
| $\geq 1$ track passing fiducial selections | $3.8^{+0.09}_{-0.09} \times 10^{-2}$ | $3.8^{+0.06}_{-0.06} \times 10^{-2}$ | $3.6^{+0.06}_{-0.06} \times 10^{-2}$ |
| $\geq 1$ track with $\geq 4$ pixel hits | $2.5^{+0.07}_{-0.07} \times 10^{-2}$ | $2.7^{+0.05}_{-0.05} \times 10^{-2}$ | $2.5^{+0.05}_{-0.05} \times 10^{-2}$ |
| $\geq 1$ track with no missing inner hits | $2.5^{+0.07}_{-0.07} \times 10^{-2}$ | $2.1^{+0.05}_{-0.05} \times 10^{-2}$ | $1.9^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with no missing middle hits | $2.2^{+0.07}_{-0.07} \times 10^{-2}$ | $2.1^{+0.05}_{-0.05} \times 10^{-2}$ | $1.9^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with relative track isolation $< 5\%$ | $1.8^{+0.06}_{-0.06} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\lvert d_{\text{xy}}\rvert < 0.02\,\text{cm}$ | $1.8^{+0.06}_{-0.06} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\lvert d_z\rvert < 0.5\,\text{cm}$ | $1.8^{+0.06}_{-0.06} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \text{jet}) > 0.5$ | $1.7^{+0.06}_{-0.06} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \text{electron}) > 0.15$ | $1.7^{+0.06}_{-0.06} \times 10^{-2}$ | $1.5^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \text{muon}) > 0.15$ | $1.6^{+0.06}_{-0.06} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\Delta R(\text{track}, \tau_{\text{h}}) > 0.15$ | $1.6^{+0.06}_{-0.06} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $E_{\text{calo}} < 10\,\text{GeV}$ | $1.5^{+0.06}_{-0.06} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ | $1.4^{+0.04}_{-0.04} \times 10^{-2}$ |
| $\geq 1$ track with $\geq 3$ missing outer hits | $8.8^{+0.42}_{-0.42} \times 10^{-3}$ | $7.8^{+0.29}_{-0.29} \times 10^{-3}$ | $8.0^{+0.29}_{-0.29} \times 10^{-3}$ |
| $\phi(p_{\text{T}}^{\text{miss}}) < -1.6$ or $\phi(p_{\text{T}}^{\text{miss}}) > -0.6$ | $7.8^{+0.39}_{-0.39} \times 10^{-3}$ | $6.4^{+0.26}_{-0.26} \times 10^{-3}$ | $6.7^{+0.26}_{-0.26} \times 10^{-3}$ |
| $\geq 1$ track with number of tracker layers with measurement == 4 | $1.4^{+0.17}_{-0.17} \times 10^{-3}$ | $1.0^{+0.10}_{-0.10} \times 10^{-3}$ | $1.1^{+0.11}_{-0.11} \times 10^{-3}$ |
| $\geq 1$ track with number of tracker layers with measurement == 5 | $1.4^{+0.17}_{-0.17} \times 10^{-3}$ | $9.0^{+0.98}_{-0.98} \times 10^{-4}$ | $1.2^{+0.11}_{-0.11} \times 10^{-3}$ |
| $\geq 1$ track with number of tracker layers with measurement $\geq 6$ | $5.2^{+0.32}_{-0.32} \times 10^{-3}$ | $4.4^{+0.22}_{-0.22} \times 10^{-3}$ | $4.3^{+0.21}_{-0.21} \times 10^{-3}$ |

Table 3: Cutflow comparison for 300 GeV, 100 cm, region 2018B