| syst. source/bin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Jet energy scale | $\begin{array}{r} +2.9 \\ -2.9 \end{array}$ | $\begin{aligned} & +0.3 \\ & { }_{-1.4} \end{aligned}$ | $\begin{aligned} & +1.8 \\ & +0.5 \end{aligned}$ | $\begin{aligned} & +2.4 \\ & -0.4 \end{aligned}$ | $\begin{aligned} & -0.8 \\ & +1.1 \end{aligned}$ | $\begin{aligned} & -1.1 \\ & +1.5 \end{aligned}$ | $\begin{aligned} & -3.5 \\ & +1.3 \end{aligned}$ | $\begin{aligned} & +0.1 \\ & +2.0 \end{aligned}$ | $\begin{aligned} & -0.6 \\ & -0.5 \end{aligned}$ | $\begin{aligned} & +1.7 \\ & +0.5 \end{aligned}$ | $\begin{aligned} & -0.7 \\ & +0.6 \end{aligned}$ | $\begin{aligned} & +1.6 \\ & +1.2 \end{aligned}$ | +4.6 -2.1 | $\begin{aligned} & -0.5 \\ & -2.6 \end{aligned}$ | $\begin{aligned} & -0.7 \\ & -1.1 \end{aligned}$ | -1.7 -5.0 |
| Jet energy resolution | $\begin{aligned} & +0.7 \\ & +0.9 \end{aligned}$ | $\begin{aligned} & -0.4 \\ & -0.7 \end{aligned}$ | $\begin{aligned} & -0.3 \\ & -0.9 \end{aligned}$ | $\begin{aligned} & +3.2 \\ & +1.4 \end{aligned}$ | $\begin{aligned} & -1.4 \\ & -0.4 \end{aligned}$ | $\begin{aligned} & +0.8 \\ & +0.1 \end{aligned}$ | $\begin{aligned} & -1.3 \\ & -0.9 \end{aligned}$ | $\begin{aligned} & +0.6 \\ & +1.1 \end{aligned}$ | $\begin{aligned} & -0.3 \\ & -0.6 \end{aligned}$ | $\begin{aligned} & +1.7 \\ & +0.6 \end{aligned}$ | $\begin{aligned} & +1.1 \\ & +1.6 \end{aligned}$ | ${ }_{-0.8}^{+1.0}$ | +1.0 +0.7 | $\begin{aligned} & -4.4 \\ & +0.1 \end{aligned}$ | ${ }_{-0.0}^{+1.2}$ | $\begin{aligned} & -3.3 \\ & -0.3 \end{aligned}$ |
| Kin. reconstruction | $\begin{aligned} & +0.0 \\ & { }_{-0.0}^{+0} \end{aligned}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & +0.0 \\ & { }_{-0.0}^{+0} \end{aligned}$ | ${ }_{-0.0}^{+0.0}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & +0.0 \\ & { }_{-0.0} \end{aligned}$ | $\begin{aligned} & +0.0 \\ & -0.0 \end{aligned}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & +0.0 \\ & { }_{-0.0}^{+0} \end{aligned}$ | ${ }_{-0.0}^{+0.0}$ | ${ }_{-0.0}^{+0.0}$ | $\begin{aligned} & +0.0 \\ & -0.0 \end{aligned}$ |
| Pileup | $\begin{aligned} & +0.4 \\ & { }_{-0.6} \end{aligned}$ | $\begin{aligned} & -0.3 \\ & +0.2 \end{aligned}$ | ${ }_{-0.1}^{+0.1}$ | $\begin{aligned} & +0.6 \\ & { }_{-0.7}^{+0} \end{aligned}$ | $\begin{aligned} & +0.0 \\ & { }_{-0.1}^{+0} \end{aligned}$ | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | $\begin{aligned} & +0.2 \\ & { }_{-0.1}^{+} \end{aligned}$ | $\begin{aligned} & -0.3 \\ & +0.6 \end{aligned}$ | $\begin{aligned} & -0.3 \\ & +0.3 \end{aligned}$ | $\begin{aligned} & -0.4 \\ & +0.6 \end{aligned}$ | ${ }_{-0.2}^{+0.2}$ | ${ }_{-0.7}^{+0.5}$ | $\begin{aligned} & -0.0 \\ & -0.0 \end{aligned}$ | ${ }_{-0.3}^{+0.2}$ | $\begin{aligned} & -0.4 \\ & +0.3 \end{aligned}$ | $\begin{aligned} & -0.4 \\ & +0.5 \end{aligned}$ |
| Trigger | ${ }_{-0.3}^{+0.2}$ | $\begin{aligned} & +0.1 \\ & -0.1 \end{aligned}$ | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | $\begin{aligned} & -0.9 \\ & +1.0 \end{aligned}$ | ${ }_{-0.2}^{+0.2}$ | $\begin{aligned} & +0.1 \\ & { }_{-0.1}^{+} \end{aligned}$ | ${ }_{-0.0}^{+0.0}$ | $\begin{aligned} & -0.3 \\ & +0.3 \end{aligned}$ | $\begin{aligned} & +0.0 \\ & { }_{-0.0} \end{aligned}$ | $\begin{aligned} & +0.1 \\ & -0.1 \end{aligned}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.3 \\ & +0.3 \end{aligned}$ | $\begin{aligned} & +0.2 \\ & { }_{-0.2} \end{aligned}$ | ${ }_{-0.2}^{+0.2}$ | ${ }_{-0.0}^{+0.0}$ | $\begin{aligned} & -0.2 \\ & +0.2 \end{aligned}$ |
| Background $\mathrm{Z} / \gamma^{*}$ | $\begin{aligned} & +0.2 \\ & { }_{-0.2}^{+} \end{aligned}$ | $\begin{aligned} & -0.8 \\ & +0.8 \end{aligned}$ | $\begin{aligned} & -0.7 \\ & +0.6 \end{aligned}$ | $\begin{aligned} & -0.7 \\ & +1.0 \end{aligned}$ | $\begin{aligned} & +0.2 \\ & -0.3 \end{aligned}$ | $\begin{aligned} & +0.2 \\ & -0.2 \end{aligned}$ | $\begin{aligned} & +0.3 \\ & { }_{-0.3}^{+0} \end{aligned}$ | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | $\begin{aligned} & +0.2 \\ & { }_{-0.3} \end{aligned}$ | $\begin{aligned} & +0.2 \\ & -0.2 \end{aligned}$ | $\begin{aligned} & +0.3 \\ & { }_{-0.3}^{+} \end{aligned}$ | $\begin{aligned} & -0.4 \\ & +0.4 \end{aligned}$ | $\begin{aligned} & +0.4 \\ & -0.4 \end{aligned}$ | $\begin{aligned} & +0.3 \\ & { }_{-0.4}^{+} \end{aligned}$ | $\begin{aligned} & +0.3 \\ & { }_{-0.3}^{+0} \end{aligned}$ | $\begin{aligned} & +0.4 \\ & -0.4 \end{aligned}$ |
| Background othe | $\begin{aligned} & +0.3 \\ & { }_{-0.3} \end{aligned}$ | ${ }_{-0.2}^{+0.2}$ | $\begin{aligned} & +0.4 \\ & { }_{-0.4}^{+} \end{aligned}$ | $\begin{aligned} & +0.3 \\ & { }_{-0.3}^{+0} \end{aligned}$ | $\begin{aligned} & -0.1 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.2 \\ & +0.2 \end{aligned}$ | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | ${ }_{-0.0}^{+0.0}$ | $\begin{aligned} & +0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.3 \\ & +0.3 \end{aligned}$ | $\begin{aligned} & -0.2 \\ & +0.1 \end{aligned}$ | $\begin{aligned} & -0.1 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.3 \\ & +0.3 \end{aligned}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & +0.4 \\ & { }_{-0.4}^{+} \end{aligned}$ | $\begin{aligned} & -0.1 \\ & +0.2 \end{aligned}$ |
| b tagging | $\begin{aligned} & +0.9 \\ & -0.9 \end{aligned}$ | $\begin{aligned} & +1.3 \\ & -0.9 \end{aligned}$ | $\begin{aligned} & +0.6 \\ & { }_{-1.0}^{+0} \end{aligned}$ | $\begin{aligned} & +0.7 \\ & { }_{-0.6}^{+0} \end{aligned}$ | $\begin{aligned} & +2.0 \\ & { }_{-0.8}^{+} \end{aligned}$ | $\begin{aligned} & +0.7 \\ & { }_{-0.2}^{+0} \end{aligned}$ | $\begin{aligned} & +0.5 \\ & { }_{-0.5}^{+} \end{aligned}$ | $\begin{aligned} & +0.4 \\ & { }_{-0.8}^{+} \end{aligned}$ | $\begin{aligned} & +0.5 \\ & { }_{-0.5}^{+0} \end{aligned}$ | $\begin{aligned} & +1.1 \\ & { }_{-0.2}^{+} \end{aligned}$ | $\begin{aligned} & +1.1 \\ & -0.9 \end{aligned}$ | $\begin{aligned} & +0.2 \\ & { }_{-0.8}^{+0} \end{aligned}$ | $\begin{aligned} & +0.4 \\ & { }_{-0.3}^{+0} \end{aligned}$ | $\begin{aligned} & +0.9 \\ & { }_{-5.0}^{+0} \end{aligned}$ | $\begin{aligned} & +0.6 \\ & { }_{-0.3}^{+} \end{aligned}$ | $\begin{aligned} & +0.7 \\ & { }_{-0.4}^{+} \end{aligned}$ |
| Int. luminosity | ${ }_{-0.0}^{+0.0}$ | -0.1 +0.1 | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | ${ }_{-0.1}^{+0.1}$ | ${ }_{-0.2}^{+0.2}$ | ${ }_{-0.0}^{+0.0}$ | ${ }_{-0.0}^{+0.0}$ | ${ }_{-0.2}^{+0.2}$ | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | $\begin{aligned} & -0.2 \\ & +0.2 \end{aligned}$ | -0.2 +0.2 | -0.2 +0.2 | ${ }_{-0.1}^{+0.1}$ | $\begin{aligned} & +0.1 \\ & { }_{-0.1} \end{aligned}$ | $\begin{aligned} & +0.1 \\ & -0.1 \end{aligned}$ | ${ }_{-0.1}^{+0.1}$ |
| $m_{\mathrm{t}}$ | $\begin{aligned} & -2.5 \\ & +3.2 \end{aligned}$ | $\begin{aligned} & -2.1 \\ & +1.4 \end{aligned}$ | $\begin{aligned} & -2.5 \\ & +1.5 \end{aligned}$ | $\begin{aligned} & -2.7 \\ & +2.3 \end{aligned}$ | ${ }_{-0.3}^{+0.4}$ | $\begin{aligned} & +0.3 \\ & +0.5 \end{aligned}$ | $\begin{aligned} & -0.5 \\ & +0.3 \end{aligned}$ | ${ }_{-0.0}^{+0.6}$ | +1.2 -2.2 | ${ }_{-1.2}^{+1.7}$ | $\begin{aligned} & +1.6 \\ & -1.0 \end{aligned}$ | ${ }_{-0.5}^{+0.3}$ | ${ }_{-3.5}^{+4.1}$ | $\begin{aligned} & +3.6 \\ & { }_{-3.1}^{+} \end{aligned}$ | $\begin{aligned} & +2.4 \\ & -2.0 \end{aligned}$ | $\begin{aligned} & +1.0 \\ & -2.6 \end{aligned}$ |
| $\mu_{\mathrm{f}}, \mu_{\mathrm{r}}$ | $\begin{aligned} & -5.0 \\ & +4.7 \end{aligned}$ | $\begin{aligned} & +0.4 \\ & { }_{-1.0} \end{aligned}$ | $\begin{aligned} & +1.7 \\ & -1.9 \end{aligned}$ | $\begin{aligned} & -4.0 \\ & +4.6 \end{aligned}$ | $\begin{aligned} & -0.1 \\ & -3.3 \end{aligned}$ | ${ }_{-1.1}^{+2.1}$ | $\begin{aligned} & +2.0 \\ & +1.4 \end{aligned}$ | $\begin{aligned} & +7.4 \\ & +0.7 \end{aligned}$ | $\begin{aligned} & -7.2 \\ & -0.3 \end{aligned}$ | ${ }_{-06}^{+1.5}$ | $\begin{aligned} & +0.4 \\ & -0.4 \end{aligned}$ | -5.1 +2.8 | $\begin{aligned} & +1.3 \\ & +8.4 \end{aligned}$ | $\begin{aligned} & +0.8 \\ & +1.5 \end{aligned}$ | $\begin{aligned} & -0.1 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -2.9 \\ & -6.3 \end{aligned}$ |
| Matching threshold | +2.4 +2.3 | $\begin{aligned} & -3.5 \\ & +1.2 \end{aligned}$ | $\begin{aligned} & +1.3 \\ & { }_{-0.8}^{+} \end{aligned}$ | $\begin{aligned} & -1.4 \\ & +0.3 \end{aligned}$ | $\begin{aligned} & -1.4 \\ & +0.4 \end{aligned}$ | -0.5 -1.0 | $\begin{aligned} & +1.5 \\ & +0.2 \end{aligned}$ | $\begin{aligned} & +1.3 \\ & +1.0 \end{aligned}$ | $\begin{aligned} & -0.6 \\ & -1.4 \end{aligned}$ | $\begin{aligned} & +1.4 \\ & { }_{-2.3} \end{aligned}$ | $\begin{aligned} & -1.1 \\ & +3.1 \end{aligned}$ | $\begin{aligned} & +3.6 \\ & -0.3 \end{aligned}$ | -1.0 -2.0 | $\begin{aligned} & +1.6 \\ & +1.9 \end{aligned}$ | $\begin{aligned} & +4.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -6.3 \\ & -4.5 \end{aligned}$ |
| PDFs | $\begin{aligned} & +1.0 \\ & -1.1 \end{aligned}$ | ${ }_{-0.3}^{+0.2}$ | ${ }_{-0.7}^{+0.7}$ | $\begin{aligned} & +1.1 \\ & { }_{-1.1}^{+} \end{aligned}$ | ${ }_{-0.2}^{+0.2}$ | $\begin{aligned} & +0.1 \\ & { }_{-0.2} \end{aligned}$ | $\begin{aligned} & +0.2 \\ & -0.2 \end{aligned}$ | ${ }_{-0.3}^{+0.2}$ | $\begin{aligned} & +0.2 \\ & -0.2 \end{aligned}$ | ${ }_{-0.2}^{+0.2}$ | +0.3 -0.3 | +0.4 -0.4 | +0.5 -0.5 | ${ }_{-0.2}^{+0.2}$ | ${ }_{-0.3}^{+0.3}$ | ${ }_{-0.2}^{+0.2}$ |
| Hadronization | -6.0 | +1.4 | -0.6 | +0.7 | +3.7 | $-0.7$ | $-0.8$ | +7.2 | +0.6 | -3.6 | -3.2 | $+6.7$ | -1.6 | +2.6 | -3.3 | -3.9 |
| Hard scattering | +3.2 | $-2.9$ | $+0.7$ | +2.1 | -6.3 | +0.1 | +1.6 | -1.5 | -0.2 | +3.7 | +4.1 | +0.7 | 16.5 | +1.1 | -2.2 | -8.1 |

