| syst. source / bin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Jet energy scale | ${ }_{-3}^{+1}$ | ${ }_{-2.5}^{+2.1}$ | ${ }_{-1.1}^{+1.7}$ | $\begin{array}{r} +1.1 \\ +1.1 \end{array}$ | $\begin{aligned} & +0.1 \\ & +3.0 \end{aligned}$ | $\begin{aligned} & -2.2 \\ & +1.2 \end{aligned}$ | $\begin{aligned} & -1.7 \\ & +2.7 \end{aligned}$ | -1.1 +0.2 | ${ }_{-0.1}^{0.5}$ | $\begin{aligned} & -0.4 \\ & +0.4 \\ & +0.4 \end{aligned}$ | $\begin{aligned} & -1.5 \\ & +0.3 \\ & \hline \end{aligned}$ | $\begin{aligned} & 2.1 \\ & 0.8 \end{aligned}$ | $\begin{aligned} & -0.4 \\ & -2.8 \end{aligned}$ | ${ }_{-0.6}^{+1.3}$ | ${ }_{-2.8}^{+3.2}$ | +0.5 +4.9 |
| Jet energy resolution | $\begin{aligned} & -0.0 . \\ & +0.1 \end{aligned}$ | +1.0 +0.7 | $\begin{aligned} & -0.3 \\ & -0.8 \end{aligned}$ | $\begin{array}{r} +0.3 \\ +0.5 \end{array}$ | ${ }_{-0.2}^{+1.0}$ | $\begin{aligned} & -0.7 \\ & -0.7 \\ & \end{aligned}$ | $\begin{aligned} & -0.2 \\ & -0.2 \end{aligned}$ | +0.3 +0.2 | ${ }_{-0.1}^{-0.6}$ | ${ }_{-0.5}^{0.1}$ | $\begin{aligned} & -0.3 \\ & -0.1 \end{aligned}$ | $\begin{aligned} & +2.8 \\ & +0.5 \end{aligned}$ | -0.4 +0.5 | $\begin{aligned} & -0.0 \\ & +1.1 \\ & +1.1 \end{aligned}$ | $\begin{aligned} & -1.1 \\ & -1.3 \end{aligned}$ | -3.6 +0.1 |
| Kin. reconstruction | $\begin{gathered} -0.0 \\ +0.0 \\ \hline \end{gathered}$ | ${ }_{-0.0}^{+0.0}$ | $\begin{gathered} -0.0 \\ +0.0 \end{gathered}$ | ${ }_{-0.0}^{+0.0}$ | ${ }_{-0.0}^{+0.0}$ | ${ }_{-0.0}^{+0.0}$ | $\begin{gathered} -0.0 \\ +0.0 \end{gathered}$ | ${ }_{-0.0}^{+0.0}$ | $\begin{gathered} -0.0 \\ +0.0 \end{gathered}$ | $\begin{aligned} & -0.0 \\ & +0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.0 \\ & +0.0 \end{aligned}$ | ${ }_{-0.0}^{+0.0}$ | ${ }_{-0.0}^{+0.0}$ | ${ }_{-0.0}^{+0.0}$ | ${ }_{-0.0}^{+0.0}$ |
| Pileup | ${ }_{-0.0}^{+0.1}$ | ${ }_{-0.2}^{+0.0}$ | ${ }_{-0.2}^{+0.1}$ | ${ }_{-0.7}^{0.4}$ | ${ }_{-0 .}^{0.1}$ | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | ${ }_{-0 .}^{+0.1}$ | $\begin{aligned} & -0.1 \\ & +0.3 \end{aligned}$ | $\begin{aligned} & -0.1 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.2 \\ & +0.2 \end{aligned}$ | ${ }_{-0.1}^{+0.1}$ | $\begin{aligned} & -0.1 \\ & +0.5 \end{aligned}$ | ${ }_{-0.0}^{-0.2}$ | $\begin{aligned} & -0.5 \\ & +0.5 \end{aligned}$ | ${ }_{-0.7}^{+0.5}$ | -0.8 +0.9 |
| Trigger | ${ }_{-0.2}^{+0.2}$ | ${ }_{-0.2}^{+0.2}$ | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | $\begin{aligned} & -0.5 \\ & +0.5 \end{aligned}$ | ${ }_{-0.2}^{+0.2}$ | ${ }_{-0.2}^{+0.2}$ | $\begin{aligned} & -0.0 \\ & +0.0 \\ & \hline 0.0 \end{aligned}$ | $\begin{array}{r} -0.3 \\ +0.3 \end{array}$ | ${ }_{-0 .}^{0.1}$ | ${ }_{-0.0}^{+0.0}$ | $\begin{aligned} & -1 \\ & +0 . \\ & +0 . \end{aligned}$ | $\begin{aligned} & -0.5 \\ & +0.5 \\ & \hline 0 \end{aligned}$ | ${ }_{-0.1}^{0.1}$ | ${ }_{-0.1}^{0.1}$ | ${ }_{-0.1}^{+0.1}$ | -0.1 +0.1 |
| Background Z | ${ }_{-0.1}^{+0.1}$ | -0.5 +0.5 | $\begin{aligned} & -1.1 \\ & +1.1 \end{aligned}$ | $\begin{array}{r} -0.9 \\ +1.0 \end{array}$ | ${ }_{-0.3}^{+0.3}$ | ${ }_{-0.2}^{+0.3}$ | ${ }_{-0 .}^{+0.0}$ | ${ }_{-0.3}^{+0.3}$ | ${ }_{-0.2}^{+0.2}$ | ${ }_{-0.4}^{0.4}$ | ${ }_{-0.0}^{+0.1}$ | $\begin{aligned} & -0.0 . \\ & +0.3 \end{aligned}$ | ${ }_{-0.3}^{+0.3}$ | ${ }_{-0 .}^{+0.2}$ | ${ }_{-0.6}^{+0.6}$ | ${ }_{-0.9}^{+0.8}$ |
| Background other | ${ }_{-0.3}^{+0.3}$ | ${ }_{-0.4}^{0.4}$ | ${ }_{-0.1}^{0.1}$ | ${ }_{-0.4}^{+0.4}$ | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | $\begin{aligned} & -0.2 \\ & +0.2 \end{aligned}$ | $\begin{aligned} & -0.2 \\ & +0.2 \end{aligned}$ | ${ }_{-0.1}^{+0.1}$ | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | ${ }_{-0 .}^{+0.1}$ | $\begin{aligned} & -0.3 \\ & +0.3 \\ & +0.3 \end{aligned}$ | $\begin{aligned} & -0.4 \\ & +0.3 \\ & +0.4 \end{aligned}$ | ${ }_{-0.1}^{0.1}$ | $\begin{aligned} & -0.2 \\ & +0.4 \end{aligned}$ | $\begin{aligned} & -0.0 \\ & -0.0 \end{aligned}$ | -0.5 +0.5 |
| b tagging | ${ }_{-0.7}^{+0.7}$ | ${ }_{-1.2}^{+1.1}$ | ${ }_{-1.2}^{+0.6}$ | ${ }_{-0.3}^{+0.8}$ | ${ }_{-0.4}^{+1.2}$ | ${ }_{-0.3}^{+0.7}$ | ${ }_{001}^{0.3}$ | ${ }_{-1.0}^{+0.4}$ | ${ }_{-0.3}^{+0.6}$ | ${ }_{-0.5}^{+0.9}$ | ${ }_{-0.5}^{+0.1}$ | ${ }_{-1.3}^{+0.4}$ | ${ }_{-2.2}^{+0.4}$ | ${ }_{-0.1}^{+0.2}$ | ${ }_{-1.2}^{+1.5}$ | ${ }_{-0.6}^{+0.5}$ |
| Int. luminosity | -0.0 +0.0 | $\begin{aligned} & -0.0 \\ & +0.0 \\ & +0.0 \end{aligned}$ | $\begin{aligned} & -0.4 \\ & +0.4 \end{aligned}$ | ${ }_{-0 .}^{+0.1}$ | ${ }_{-0.1}^{+0.1}$ | ${ }_{-0.1}^{0.1}$ | $\begin{aligned} & -0.1 \\ & +0.1 \end{aligned}$ | ${ }_{-0.4}^{0.4}$ | $\begin{aligned} & -0.2 \\ & +0.1 \end{aligned}$ | $\begin{aligned} & -0.2 \\ & +0.2 \end{aligned}$ | $\begin{aligned} & -0.3 \\ & +0.3 \end{aligned}$ | $\begin{aligned} & -0.3 \\ & +0.3 \end{aligned}$ | ${ }_{-0.1}^{0.1}$ | ${ }_{-0.1}^{0.1}$ | ${ }_{-0.2}^{+0.2}$ | ${ }_{-0.3}^{+0.3}$ |
| $m_{\mathrm{t}}$ | -2.6 +2.4 | -2.2 +1.9 | $\begin{aligned} & -2.4 \\ & +2.0 \end{aligned}$ | $\begin{aligned} & -2.8 \\ & +2.0 \end{aligned}$ | $\begin{aligned} & +0.2 \\ & +0.9 \\ & +0.9 \end{aligned}$ | $\begin{aligned} & -0.2 \\ & +0.2 \\ & +0.2 \end{aligned}$ | $\begin{array}{r} +0.3 \\ +0.3 \\ +0.3 \end{array}$ | ${ }_{-1.0}^{+0.9}$ | ${ }_{-1.1}^{+1.0}$ | ${ }_{-1.4}^{+0.5}$ | ${ }_{-0.6}^{+1.2}$ | ${ }_{-1.7}^{+2.1}$ | ${ }_{-2.5}^{+2.2}$ | ${ }_{-2.3}^{+3.3}$ | ${ }_{-2.9}^{+3.6}$ | +5.3 |
| $\mu_{\mathrm{f}}, \mu_{\mathrm{r}}$ | $\begin{aligned} & -1.7 \\ & +3.3 \end{aligned}$ | $\begin{aligned} & -1.2 \\ & +0.3 \end{aligned}$ | ${ }_{-1.5}^{+2.0}$ | ${ }_{-0.0}^{+2.3}$ | ${ }_{-1 .}^{+1.3}$ | ${ }_{-1.9}^{+0.9}$ | $\begin{aligned} & -3.1 \\ & +0.1 \end{aligned}$ | $\begin{array}{r} +3.4 \\ +0.9 \end{array}$ | ${ }_{-4.2}^{+0.6}$ | $\begin{aligned} & -0.4 \\ & -1.3 \end{aligned}$ | $\begin{aligned} & -1.2 \\ & +0.6 \end{aligned}$ | $\begin{aligned} & -4.2 \\ & +5.9 \end{aligned}$ | $\begin{aligned} & -3.2 \\ & -0.4 \end{aligned}$ | $\begin{aligned} & -1.2 \\ & +2.5 \end{aligned}$ | $\begin{aligned} & +5.5 .5 \\ & +7.8 \end{aligned}$ | -7.9 -2.6 |
| Matching threshold | +1.7 +3.0 | -2.7 -1.1 | $\begin{aligned} & -0.5 \\ & +3.4 \end{aligned}$ | $\begin{array}{r} -0.3 \\ +1.0 \\ \hline 10 \end{array}$ | $\begin{aligned} & -0.1 \\ & +0.5 \end{aligned}$ | -0.4 -0.2 | ${ }_{-0.2}^{+1.6}$ | ${ }_{-2.0}^{+1.3}$ | ${ }_{-1.2}^{+0.0}$ | $\begin{aligned} & -1 . \\ & -0.1 \\ & \hline 0 . \end{aligned}$ | ${ }_{-1.3}^{+1.0}$ | $\begin{aligned} & -0.8 \\ & +2.0 \end{aligned}$ | -2.0 -3.1 | ${ }_{-0.4}^{-0.6}$ | ${ }_{-1.1}^{+8.2}$ | -0.7 +1.8 |
| PDFs | ${ }_{-0 .}^{0.1}$ | ${ }_{-0.3}^{+0.3}$ | ${ }_{-0.7}^{+0.7}$ | ${ }_{-0 .}^{+0.2}$ | ${ }_{-0.1}^{+0.1}$ | ${ }_{-0.2}^{+0.2}$ | ${ }_{-0 .}^{0.0 .3}$ | ${ }_{-0.1}^{+0.1}$ | ${ }_{-0.2}^{+0.2}$ | ${ }_{-0 .}^{+0.1}$ | ${ }_{-0.4}^{+0.5}$ | ${ }_{-0.6}^{+0.6}$ | ${ }_{-0 .}^{0.1}$ | ${ }_{-0.3}^{+0.2}$ | ${ }_{-0.3}^{+0.3}$ | ${ }_{-1.0}^{+1.0}$ |
| Hadronization | -3.8 | +0.1 | +3.3 | -0.1 | +3.7 | -4.4 | -1.3 | +4.7 | +0.8 | -1.0 | -0.9 | +5.7 | -2.7 | -0.6 | +4.7 | 18.8 |
| Hard scattering | -0.2 | -1.6 | -1.0 | 0.0 | 3.8 | 0.1 | -0.5 | -0.2 | 1.3 | 1. | 4.2 | 1.9 | -0.3 | 1.0 | 3.4 | 7.9 |

