

| Year                                     | Value        | Effect                      | Affected processes      |
|------------------------------------------|--------------|-----------------------------|-------------------------|
| Experimental uncertainties               |              |                             |                         |
| Integrated luminosity                    | 1.6%         | norm                        | all except Z + jets     |
| e( $\mu$ ) efficiency                    | 3–10 (1–2)%  | norm                        | all except Z + jets     |
| e( $\mu$ ) energy scale                  | 0.15 (0.03)% | shape                       | mass convolution        |
| e( $\mu$ ) energy resolution             | 10 (3)%      | shape                       | mass convolution        |
| Jet energy scale                         | $\approx$ 1% | norm                        | all except Z + jets     |
| Jet energy resolution                    | $\approx$ 1% | norm                        | all except Z + jets     |
| Jet b tagging efficiency                 | 0.1%         | norm                        | all except Z + jets     |
| PU and L1 timing shift                   | 0–1%         | norm                        | all except Z + jets     |
| Z + jets estimation                      | 31%          | norm                        | Z + jets                |
| Theoretical uncertainties                |              |                             |                         |
| Branching fraction of $H \rightarrow ZZ$ | 2%           | norm                        | SM H                    |
| $\mu_R, \mu_F$ scales                    | 1–15%        | qqZZ: shape<br>others: norm | all except Z + jets     |
| PDF                                      | 0.1–7%       | qqZZ: shape<br>others: norm | all except Z + jets     |
| $\alpha_S$                               | 0.1–7%       | norm                        | all except Z + jets     |
| ISR, FSR scales                          | 0.4–10%      | norm                        | all except Z + jets     |
| Generator modeling                       | 2–10%        | shape                       | signal and interference |
| Interference modeling                    | 9–18%        | norm                        | interferences           |
| qqZZ $K$ factor                          | 0.1–30%      | shape                       | qqZZ                    |
| ggZZ $K$ factor                          | 10%          | norm                        | ggZZ                    |