

Sources	Systematic uncertainty (%)				
	$\Delta\sigma_{\text{tt}\bar{c}\bar{c}}$	$\Delta\sigma_{\text{tt}\bar{b}\bar{b}}$	$\Delta\sigma_{\text{ttLL}}$	ΔR_c	ΔR_b
Jet energy scale	4.0	3.2	4.7	2.8	2.1
Jet energy resolution	2.3	1.0	0.9	2.5	1.3
c tagging calibration	7.0	3.2	2.5	7.3	3.5
Lepton identification and isolation	0.8	1.0	1.3	0.6	0.3
Trigger	2.0	2.0	2.0	< 0.1	< 0.1
Pileup	0.3	0.2	0.3	0.5	< 0.1
Total integrated luminosity	2.3	2.4	2.3	< 0.1	< 0.1
μ_R and μ_F scales in ME	3.3	6.2	2.1	3.8	6.8
PS scale	0.4	1.6	0.3	0.5	1.6
PDF	0.3	0.1	0.1	0.2	0.1
ME-PS matching	7.1	5.7	3.5	2.6	1.5
Underlying event	1.9	2.3	1.1	0.5	0.9
b fragmentation	0.4	1.9	0.8	0.3	2.4
c fragmentation	4.6	< 0.1	< 0.1	3.9	0.7
$\text{tt}\bar{b}\text{L}(\text{cL})/\text{tt}\bar{b}\bar{b}(\text{c}\bar{c})$ and $\text{tt}\bar{+}\text{other}/\text{ttLL}$	2.4	1.8	1.1	1.8	1.5
Efficiency (theoretical)	2.4	2.1	2.0	< 0.1	< 0.1
Simulated sample size	3.2	2.6	1.1	3.1	2.5
Background normalization	0.5	0.7	0.6	0.1	0.1
Total	13.7	11.4	8.2	10.9	9.2