$$L(\{N_{\varpi}^{\mathrm{SS,obs}}\}|\{\xi(\eta,p_{\mathrm{T}})\}) = \prod_{\varpi} \mathcal{P}\left(N_{\varpi}^{\mathrm{SS,obs}}|w_{\mathrm{flip}}(\xi(\eta_1,p_{\mathrm{T},1}),\xi(\eta_2,p_{\mathrm{T},2})) \times N_{\varpi}^{\mathrm{OS+SS,obs}}\right) \tag{1}$$

$$\begin{pmatrix} n_{\mathrm{T}} \\ n_{\mathrm{L}} \end{pmatrix} = \begin{pmatrix} \varepsilon_r & \varepsilon_f \\ 1-\varepsilon_r & 1-\varepsilon_f \end{pmatrix} \begin{pmatrix} n_{\mathrm{R}} \\ n_{\mathrm{F}} \end{pmatrix} \tag{2}$$

$$\varepsilon_f = \frac{n_{\mathrm{signal}}^{\mathrm{data}} - n_{\mathrm{signal}}^{\mathrm{MC}}}{n_{\mathrm{baseline}}^{\mathrm{data}} - n_{\mathrm{baseline}}^{\mathrm{MC}}}$$

$$\varepsilon_r = \frac{n_{\mathrm{signal}}^{\mathrm{data}}}{n_{\mathrm{baseline}}^{\mathrm{data}} - n_{\mathrm{baseline}}^{\mathrm{BKG}}}$$

$10 < p_{\mathrm{T}} < 12$	$12 < p_{\mathrm{T}} < 14$	$14 < p_{\mathrm{T}} < 17$	$17 < p_{\mathrm{T}} < 20$
$0.10 \pm 0.01 \pm 0.00$	$0.10 \pm 0.01 \pm 0.01$	$0.12 \pm 0.01 \pm 0.01$	$0.08 \pm 0.02 \pm 0.00$
$20 < p_{\mathrm{T}} < 25$	$25 < p_{\mathrm{T}} < 30$	$30 < p_{\mathrm{T}} < 40$	$40 > p_{\mathrm{T}}$
$0.07 \pm 0.02 \pm 0.01$	$0.11 \pm 0.03 \pm 0.01$	$0.20 \pm 0.07 \pm 0.03$	$0.25 \pm 0.10 \pm 0.05$

Table 1: Electron fake rate measured in data and the associated statistical uncertainty. The systematic uncertainty originating from the subtraction of "backgrounds" with only prompt leptons is also displayed.

$10 < p_{\mathrm{T}} < 12$ GeV		$12 < p_{\mathrm{T}} < 14$	
$\lvert\eta\rvert < 2.3$	$\lvert\eta\rvert > 2.3$	$\lvert\eta\rvert < 2.3$	$\lvert\eta\rvert > 2.3$
$0.14 \pm 0.01 \pm 0.00$	$0.22 \pm 0.05 \pm 0.00$	$0.11 \pm 0.01 \pm 0.00$	$0.24 \pm 0.06 \pm 0.00$
$14 < p_{\mathrm{T}} < 17$		$17 < p_{\mathrm{T}} < 20$ GeV	
$\lvert\eta\rvert < 2.3$	$\lvert\eta\rvert > 2.3$	$\lvert\eta\rvert < 2.3$	$\lvert\eta\rvert > 2.3$
$0.12 \pm 0.01 \pm 0.00$	$0.09 \pm 0.05 \pm 0.00$	$0.09 \pm 0.01 \pm 0.00$	$0.21 \pm 0.07 \pm 0.00$
$20 < p_{\mathrm{T}} < 30$	$30 < p_{\mathrm{T}} < 40$	$40 < p_{\mathrm{T}} < 60$	$p_{\mathrm{T}} > 60$
$0.07 \pm 0.02 \pm 0.00$	$0.12 \pm 0.05 \pm 0.01$	$0.16 \pm 0.09 \pm 0.04$	$0.49 \pm 0.10 \pm 0.07$

Table 2: Muon fake rate measured in data and the associated statistical uncertainty. The systematic uncertainty originating from the subtraction of "backgrounds" with only prompt leptons is also displayed.

Region	Matrix method	Template method	Retained estimate
Rpc2L0bH	$0.83 \pm 0.56 \pm 0.74$	$1.00 \pm 0.96 \pm 0.81$	$0.87 \pm 0.48 \pm 0.76$
Rpc2L0bS	$1.51 \pm 0.60 \pm 0.66$	$1.68 \pm 1.02 \pm 1.26$	$1.55 \pm 0.52 \pm 0.81$
Rpc2L1bH	$3.54 \pm 1.62 \pm 3.12$	$2.07 \pm 0.63 \pm 1.56$	$2.26 \pm 0.59 \pm 1.76$
Rpc2L1bS	$2.65 \pm 1.21 \pm 1.89$	$2.33 \pm 1.17 \pm 2.10$	$2.48 \pm 0.84 \pm 2.00$
Rpc2L2bH	$-0.11 \pm 0.11 \pm 0.18$	< 0.5	$0.15 \pm 0.15 \pm 0.00$
Rpc2L2bS	$1.31 \pm 1.07 \pm 1.65$	$0.41 \pm 0.33 \pm 0.45$	$0.49 \pm 0.32 \pm 0.55$
Rpc2Lsoft1b	$4.75 \pm 1.42 \pm 2.64$	$2.48 \pm 1.32 \pm 1.86$	$3.53 \pm 0.97 \pm 2.22$
Rpc2Lsoft2b	$1.91 \pm 1.18 \pm 1.63$	$1.66 \pm 0.66 \pm 1.28$	$1.72 \pm 0.58 \pm 1.36$
Rpc3L0bH	$-0.01 \pm 0.11 \pm 0.10$	< 0.5	$0.15 \pm 0.15 \pm 0.00$
Rpc3L0bS	$2.31 \pm 1.50 \pm 2.63$	$0.21 \pm 0.15 \pm 0.16$	$0.23 \pm 0.15 \pm 0.18$
Rpc3L1bH	$0.57 \pm 0.43 \pm 0.50$	$0.42 \pm 0.29 \pm 0.32$	$0.47 \pm 0.24 \pm 0.38$
Rpc3L1bS	$4.94 \pm 1.83 \pm 2.96$	$3.55 \pm 1.80 \pm 2.76$	$4.23 \pm 1.28 \pm 2.86$
Rpc3LSS1b	$-0.18 \pm 1.24 \pm 2.85$	$0.90 \pm 0.14 \pm 0.69$	$0.89 \pm 0.14 \pm 0.72$

Table 3: Expected yields for background processes with fake leptons, in the signal regions shown for 36 fb^{-1}. Estimates from the matrix method and the MC template method are shown along with the retained estimates. Uncertainties include all statistical and systematic sources for the nominal estimate.

Signal Region	**Rpc2L2bS**	**Rpc2L2bH**	**Rpc2Lsoft1b**	**Rpc2Lsoft2b**	**Rpc2L0bS**	**Rpc2L0bH**
Total background expectation	3.35	1.08	5.78	3.80	6.02	2.35
Total statistical	10.56%	15.67%	16.93%	15.61%	9.08%	20.87%
Total background systematic	30.41%	29.97%	43.10%	41.79%	30.51%	42.39%
Fake/non-prompt	15.46%	0.00%	38.39%	35.75%	13.46%	32.31%
Charge-flip	0.06%	0.00%	0.35%	0.53%	0.17%	0.00%
Jet Energy Scale	15.19%	11.37%	5.27%	9.28%	17.28%	8.11%
Other Jet Unc.	2.09%	2.71%	0.80%	0.99%	2.31%	3.42%
Flavor Tagging	6.27%	5.55%	0.81%	3.96%	3.33%	3.27%
Electrons	1.20%	1.72%	0.51%	0.51%	0.76%	0.74%
Muons	0.90%	1.39%	0.35%	0.51%	0.83%	0.93%
Missing transverse momentum	2.24%	1.68%	0.85%	1.50%	0.65%	0.54%
Diboson Th. Unc.	1.07%	1.39%	1.07%	0.50%	17.68%	13.54%
ttV Th. Unc.	7.33%	8.86%	5.01%	4.48%	4.06%	2.44%
Rare Th. Unc.	15.18%	19.67%	6.28%	9.75%	3.89%	5.87%
PDF	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Signal Region	**Rpc3L0bS**	**Rpc3L0bH**	**Rpc3L1bS**	**Rpc3L1bH**	**Rpc2L1bS**	**Rpc2L1bH**	**Rpc3LSS1b**
Total background expectation	11.02	3.31	17.33	3.90	9.88	9.75	1.62
Total statistical	2.57%	6.05%	7.66%	7.70%	9.59%	6.65%	9.15%
Total background systematic	27.37%	25.40%	24.22%	24.02%	29.19%	26.52%	46.79%
Fake/non-prompt	1.63%	0.00%	16.50%	9.73%	19.93%	18.05%	44.45%
Charge-flip	0.00%	0.00%	0.00%	0.00%	0.40%	0.41%	4.32%
Jet Energy Scale	9.78%	8.98%	5.54%	4.20%	11.71%	10.40%	0.02%
Other Jet Unc.	3.41%	2.55%	0.70%	2.30%	1.42%	1.46%	0.20%
Flavor Tagging	2.79%	2.93%	2.22%	2.82%	1.32%	1.38%	0.32%
Electrons	1.78%	2.16%	1.66%	2.47%	0.67%	0.89%	0.41%
Muons	1.73%	2.12%	1.25%	1.79%	0.80%	0.92%	0.41%
Missing transverse momentum	0.78%	0.53%	0.38%	0.59%	1.70%	1.06%	0.00%
Diboson Th. Unc.	24.28%	21.58%	2.57%	3.78%	1.87%	2.50%	0.00%
ttV Th. Unc.	1.49%	1.76%	5.34%	5.56%	6.96%	5.72%	0.00%
Rare Th. Unc.	4.02%	5.02%	13.19%	18.11%	12.68%	13.16%	10.49%
PDF	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Signal Region	**Rpc2L2bS**	**Rpc2L2bH**	**Rpc2Lsoft1b**	**Rpc2Lsoft2b**	**Rpc2L0bS**	**Rpc2L0bH**
Total Background	3.3 ± 1.0	1.08 ± 0.32	5.8 ± 2.5	3.8 ± 1.6	6.0 ± 1.8	2.4 ± 1.0
Observed	3	0	4	5	7	3
S_{obs}^{95}	5.5	3.6	6.3	7.7	8.3	6.1
p_0 (Z)	0.71 (–)	0.91 (–)	0.69 (–)	0.30 (0.5σ)	0.36 (0.4σ)	0.35 (0.4σ)

Signal Region	**Rpc3L0bS**	**Rpc3L0bH**	**Rpc3L1bS**	**Rpc3L1bH**	**Rpc2L1bS**	**Rpc2L1bH**	**Rpc3LSS1b**
Total Background	11.0 ± 3.0	3.3 ± 0.8	17 ± 4	3.9 ± 0.9	9.8 ± 2.9	9.8 ± 2.6	1.6 ± 0.8
Observed	9	3	20	4	14	13	1
S_{obs}^{95}	8.3	5.4	14.7	6.1	13.7	12.4	3.9
p_0 (Z)	0.72 (–)	0.85 (–)	0.32 (0.5σ)	0.46 (0.1σ)	0.17 (1.0σ)	0.21 (0.8σ)	0.56 (–)

Table 4: Numbers of events observed in the signal regions compared with the expected backgrounds. The table shows the 95% confidence level (CL) upper limits on the observed and expected numbers of BSM events S_{obs}^{95} and S_{exp}^{95}, the 95% CL upper limits on the visible cross-section (σ_{vis}), the p-values (p_0), and the number of equivalent Gaussian standard deviations (Z). Background categories with yields shown as a "–" do not contribute to a given region (e.g. charge flips in three-lepton regions).