table.results.yields channel	SR1_FGD1_FHC	SR1_FGD1_RHC	SR1_FGD2_FHC	SR1_FGD2_RHC	All
Observed events	6	2	2	1	11
MC exp. SM events	5.44 ± 0.64	1.73 ± 0.23	5.07 ± 0.63	2.21 ± 0.28	14.45 ± 1.74
MC exp. nuEleElastic events	4.04 ± 0.43	1.50 ± 0.16	3.71 ± 0.42	1.91 ± 0.23	11.17 ± 1.20
MC exp. ccnue events	0.23 ± 0.04	0.00 ± 0.00	0.26 ± 0.09	0.00 ± 0.00	0.49 ± 0.13
MC exp. otherBG events	1.17 ± 0.26	0.23 ± 0.12	1.09 ± 0.21	0.30 ± 0.10	2.79 ± 0.67

Table 1: Signal region: . Fit results for the electron (top part) and muon (bottom part) channels, for an integrated luminosity of 1035ipb. The results are obtained from the control regions using the discovery fit (see text for details). The fit results of the loose-not-tight regions are not shown. Nominal MC expectations (normalised to MC cross-sections) are given for comparison. The Monte Carlo QCD estimates are provided for illustrational purposes only, and are not used in the fit. The errors shown are the statistical plus systematic uncertainties, except for the error on the background estimate in the signal region, which is the systematic uncertainty only. Uncertainties on the fitted yields are symmetric by construction, where the negative error is truncated when reaching to zero event yield.

$$\begin{aligned} L(\boldsymbol{n}, \boldsymbol{\theta^0} | \mu_{\text{sig}}, \boldsymbol{b}, \boldsymbol{\theta}) &= P_{SR} \times C_{\text{syst}} = \\ &= \prod_i P(n_i | \lambda_i(\mu_{\text{sig}}, \boldsymbol{b}, \boldsymbol{\theta})) \times C_{\text{syst}}(\boldsymbol{\theta^0}, \boldsymbol{\theta}) \end{aligned} \tag{1}$$

Uncertainty of channel	SR1_FGD1_FHC	SR1_FGD1_RHC	SR1_FGD2_FHC	SR1_FGD2_RHC
Total background expectation	5.44	1.73	5.07	2.21
Total statistical ($\sqrt{N_{\text{exp}}}$)	±2.33	±1.32	±2.25	±1.49
Total background systematic	±0.64 [11.77%]	±0.23 [13.51%]	±0.63 [12.44%]	±0.28 [12.80%]
Flux systematic unc.:				
alpha_flux_syst	±0.54 [10.0%]	±0.17 [10.0%]	±0.51 [10.0%]	±0.22 [10.0%]
Detector systematic unc.:				
alpha_nueoofv_fgd	±0.19 [3.5%]	±0.10 [5.7%]	±0.13 [2.6%]	±0.09 [4.0%]
alpha_tpc_angres_fgd	±0.18 [3.3%]	±0.09 [5.0%]	±0.27 [5.3%]	±0.10 [4.7%]
alpha_tpcpid_fgd	±0.15 [2.7%]	±0.05 [3.1%]	±0.11 [2.2%]	±0.07 [3.2%]
alpha_momresol_fgd	±0.05 [0.90%]	±0.04 [2.1%]	±0.04 [0.88%]	±0.00 [0.01%]
alpha_bfield_fgd	±0.04 [0.75%]	±0.00 [0.01%]	±0.03 [0.57%]	±0.00 [0.01%]
alpha_va_fgd	±0.04 [0.73%]	±0.00 [0.01%]	±0.10 [2.1%]	±0.01 [0.42%]
alpha_tpc_ecal_matcheff_fgd	±0.02 [0.43%]	±0.02 [1.3%]	±0.03 [0.64%]	±0.02 [0.97%]
alpha_tpctrackeff_fgd	±0.02 [0.43%]	±0.00 [0.01%]	±0.02 [0.31%]	±0.00 [0.01%]
alpha_ecal_pid_fgd	±0.00 [0.02%]	±0.00 [0.06%]	±0.03 [0.53%]	±0.01 [0.45%]
alpha_ecal_emscale_fgd	±0.00 [0.01%]	±0.00 [0.01%]	±0.06 [1.3%]	±0.04 [1.9%]
alpha_ecal_emresol_fgd	±0.00 [0.01%]	±0.00 [0.01%]	±0.05 [1.0%]	±0.03 [1.5%]
Limited MC statistics:				
gamma_stat_SR1_FGD1_FHC_selelec_mom_bin_0	±0.13 [2.4%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR1_FGD1_RHC_selelec_mom_bin_0	±0.00 [0.00%]	±0.04 [2.4%]	±0.00 [0.00%]	±0.00 [0.00%]
gamma_stat_SR1_FGD2_FHC_selelec_mom_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.13 [2.5%]	±0.00 [0.00%]
gamma_stat_SR1_FGD2_RHC_selelec_mom_bin_0	±0.00 [0.00%]	±0.00 [0.00%]	±0.00 [0.00%]	±0.06 [2.5%]

Table 2: Breakdown of the dominant systematic uncertainties on background estimates in the various signal regions. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Sample: *nuEleElasticBG*

Uncertainty of channel	SR1_FGD1_FHC	SR1_FGD1_RHC	SR1_FGD2_FHC	SR1_FGD2_RHC
Background expectation	4.04	1.50	3.71	1.91
Total detector systematic	±0.11 [2.67%]	±0.05 [3.16%]	±0.16 [4.33%]	±0.12 [6.07%]
tpc_angres	±0.08 [2.1%]	±0.04 [2.7%]	±0.13 [3.5%]	±0.09 [4.8%]
tpcpid	±0.06 [1.6%]	±0.01 [0.93%]	±0.05 [1.3%]	±0.04 [2.3%]
tpc_ecal_matcheff	±0.02 [0.56%]	±0.02 [1.4%]	±0.02 [0.46%]	±0.02 [0.88%]
ecal_emscale	±0.00 [0.01%]	±0.00 [0.01%]	±0.06 [1.7%]	±0.04 [2.2%]
ecal_emresol	±0.00 [0.01%]	±0.00 [0.01%]	±0.05 [1.4%]	±0.03 [1.8%]

Table 3: Breakdown of the dominant systematic uncertainties on background estimates in the various signal regions. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Sample: *otherBG*

Uncertainty of channel	SR1_FGD1_FHC	SR1_FGD1_RHC	SR1_FGD2_FHC	SR1_FGD2_RHC
Background expectation	1.17	0.23	1.09	0.30
Total detector systematic	±0.23 [19.53%]	±0.12 [53.68%]	±0.18 [16.35%]	±0.09 [31.17%]
nueoofv	±0.19 [16.3%]	±0.10 [43.5%]	±0.13 [11.9%]	±0.09 [29.2%]
tpcpid	±0.08 [7.1%]	±0.04 [17.4%]	±0.03 [3.1%]	±0.03 [8.7%]
tpc_angres	±0.06 [5.2%]	±0.05 [20.5%]	±0.07 [6.4%]	±0.01 [4.6%]
momresol	±0.05 [4.2%]	±0.04 [16.1%]	±0.04 [4.1%]	±0.00 [0.10%]
bfield	±0.04 [3.5%]	±0.00 [0.10%]	±0.03 [2.6%]	±0.00 [0.10%]
va	±0.02 [2.1%]	±0.00 [0.10%]	±0.07 [6.6%]	±0.01 [3.1%]
tpctrackeff	±0.02 [1.9%]	±0.00 [0.10%]	±0.00 [0.27%]	±0.00 [0.10%]
ecal_pid	±0.00 [0.10%]	±0.00 [0.48%]	±0.03 [2.5%]	±0.01 [3.3%]
tpc_ecal_matcheff	±0.00 [0.10%]	±0.00 [1.0%]	±0.01 [1.1%]	±0.00 [1.5%]

Table 4: Breakdown of the dominant systematic uncertainties on background estimates in the various signal regions. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

All background samples

Uncertainty of channel	SR1_FGD1_FHC	SR1_FGD1_RHC	SR1_FGD2_FHC	SR1_FGD2_RHC
Total background expectation	5.44	1.73	5.07	2.21
Total detector systematic	±0.33 [5.98%]	±0.17 [9.57%]	±0.36 [7.09%]	±0.18 [7.93%]
nueoofv	±0.19 [3.5%]	±0.10 [5.7%]	±0.13 [2.6%]	±0.09 [4.0%]
tpc_angres	±0.18 [3.3%]	±0.09 [5.0%]	±0.27 [5.3%]	±0.10 [4.7%]
tpcpid	±0.15 [2.7%]	±0.05 [3.1%]	±0.11 [2.2%]	±0.07 [3.2%]
momresol	±0.05 [0.90%]	±0.04 [2.1%]	±0.04 [0.88%]	±0.00 [0.01%]
bfield	±0.04 [0.75%]	±0.00 [0.01%]	±0.03 [0.57%]	±0.00 [0.01%]
va	±0.04 [0.73%]	±0.00 [0.01%]	±0.10 [2.1%]	±0.01 [0.42%]
tpc_ecal_matcheff	±0.02 [0.43%]	±0.02 [1.3%]	±0.03 [0.64%]	±0.02 [0.97%]
tpctrackeff	±0.02 [0.43%]	±0.00 [0.01%]	±0.02 [0.31%]	±0.00 [0.01%]
ecal_pid	±0.00 [0.02%]	±0.00 [0.06%]	±0.03 [0.53%]	±0.01 [0.45%]
ecal_emscale	±0.00 [0.01%]	±0.00 [0.01%]	±0.06 [1.3%]	±0.04 [1.9%]
ecal_emresol	±0.00 [0.01%]	±0.00 [0.01%]	±0.05 [1.0%]	±0.03 [1.5%]

Table 5: Breakdown of the dominant systematic uncertainties on background estimates in the various signal regions. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.