

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
<b>1 : FSI_INEL_LO</b>	<b>0.41</b>	$\nu_\mu$ 1-Trk Wtr	-0.9	27316.74	0.7
		$\nu_\mu$ N-Trks	0.7	30904.32	-0.5
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.5	8414.09	0.4
		$\bar{\nu}_\mu$ RHC N-Trks	1.0	4724.34	-0.7
		$\nu_\mu$ RHC 1-Trk	-1.2	3022.10	0.9
		$\nu_\mu$ RHC N-Trks	0.5	4928.38	-0.4
		$\nu_\mu$ 1-Trk Air	-0.9	23605.76	0.7
		$\nu_\mu$ N-Trks	0.5	32304.13	-0.4
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.6	6767.65	0.5
		$\bar{\nu}_\mu$ RHC N-Trks	0.8	4544.65	-0.6
		$\nu_\mu$ RHC 1-Trk	-1.5	2067.37	1.4
		$\nu_\mu$ RHC N-Trks	0.6	4568.13	-0.7
<b>2 : FSI_INEL_HI</b>	<b>0.34</b>	$\nu_\mu$ 1-Trk Wtr	-0.2	27316.74	0.2
		$\nu_\mu$ N-Trks	-0.1	30904.32	0.2
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.1	8414.09	0.1
		$\bar{\nu}_\mu$ RHC N-Trks	-0.0	4724.34	0.1
		$\nu_\mu$ RHC 1-Trk	-0.4	3022.10	0.4
		$\nu_\mu$ RHC N-Trks	-0.1	4928.38	0.1
		$\nu_\mu$ 1-Trk Air	-0.2	23605.76	0.1
		$\nu_\mu$ N-Trks	-0.2	32304.13	0.2
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.1	6767.65	0.1
		$\bar{\nu}_\mu$ RHC N-Trks	-0.1	4544.65	0.1
		$\nu_\mu$ RHC 1-Trk	-0.2	2067.37	0.2
		$\nu_\mu$ RHC N-Trks	-0.1	4568.13	0.2

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
<b>3 : FSI_PI_PROD</b>	<b>0.50</b>	$\nu_\mu$ 1-Trk Wtr	-0.1	27316.74	0.1
		$\nu_\mu$ N-Trks	-0.0	30904.32	0.1
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.0	8414.09	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	0.1	4724.34	-0.0
		$\nu_\mu$ RHC 1-Trk	-0.1	3022.10	0.1
		$\nu_\mu$ RHC N-Trks	-0.1	4928.38	0.1
		$\nu_\mu$ 1-Trk Air	-0.0	23605.76	0.1
		$\nu_\mu$ N-Trks	-0.1	32304.13	0.1
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.0	6767.65	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	0.2	4544.65	-0.1
		$\nu_\mu$ RHC 1-Trk	-0.1	2067.37	0.1
		$\nu_\mu$ RHC N-Trks	-0.1	4568.13	0.1
<b>4 : FSI_PI_ABS</b>	<b>0.41</b>	$\nu_\mu$ 1-Trk Wtr	-0.7	27316.74	0.5
		$\nu_\mu$ N-Trks	0.6	30904.32	-0.5
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.6	8414.09	0.5
		$\bar{\nu}_\mu$ RHC N-Trks	1.0	4724.34	-0.8
		$\nu_\mu$ RHC 1-Trk	-1.0	3022.10	0.8
		$\nu_\mu$ RHC N-Trks	0.5	4928.38	-0.4
		$\nu_\mu$ 1-Trk Air	-0.7	23605.76	0.6
		$\nu_\mu$ N-Trks	0.6	32304.13	-0.4
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.7	6767.65	0.5
		$\bar{\nu}_\mu$ RHC N-Trks	0.9	4544.65	-0.7
		$\nu_\mu$ RHC 1-Trk	-0.9	2067.37	0.8
		$\nu_\mu$ RHC N-Trks	0.4	4568.13	-0.3

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
5 : FSI_CEX_LO	0.57	$\nu_\mu$ 1-Trk Wtr	0.3	27316.74	-0.2
		$\nu_\mu$ N-Trks	-0.3	30904.32	0.2
		$\bar{\nu}_\mu$ RHC 1-Trk	0.2	8414.09	-0.1
		$\bar{\nu}_\mu$ RHC N-Trks	-0.2	4724.34	0.2
		$\nu_\mu$ RHC 1-Trk	0.4	3022.10	-0.3
		$\nu_\mu$ RHC N-Trks	-0.3	4928.38	0.2
		$\nu_\mu$ 1-Trk Air	0.3	23605.76	-0.2
		$\nu_\mu$ N-Trks	-0.3	32304.13	0.2
		$\bar{\nu}_\mu$ RHC 1-Trk	0.2	6767.65	-0.1
		$\bar{\nu}_\mu$ RHC N-Trks	-0.3	4544.65	0.3
		$\nu_\mu$ RHC 1-Trk	0.2	2067.37	-0.2
		$\nu_\mu$ RHC N-Trks	-0.1	4568.13	0.1
6 : FSI_CEX_HI	0.28	$\nu_\mu$ 1-Trk Wtr	-0.0	27316.74	0.0
		$\nu_\mu$ N-Trks	-0.0	30904.32	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.0	8414.09	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4724.34	-0.0
		$\nu_\mu$ RHC 1-Trk	-0.1	3022.10	0.1
		$\nu_\mu$ RHC N-Trks	-0.0	4928.38	0.0
		$\nu_\mu$ 1-Trk Air	-0.0	23605.76	0.0
		$\nu_\mu$ N-Trks	-0.1	32304.13	0.1
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.0	6767.65	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4544.65	-0.0
		$\nu_\mu$ RHC 1-Trk	-0.0	2067.37	0.0
		$\nu_\mu$ RHC N-Trks	-0.0	4568.13	0.0

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
<b>7 : MAQE</b>	<b>0.03</b>	$\nu_\mu$ 1-Trk Wtr	-0.8	27316.74	0.8
		$\nu_\mu$ N-Trks	-0.4	30904.32	0.4
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.7	8414.09	0.7
		$\bar{\nu}_\mu$ RHC N-Trks	-0.2	4724.34	0.3
		$\nu_\mu$ RHC 1-Trk	-0.9	3022.10	0.9
		$\nu_\mu$ RHC N-Trks	-0.4	4928.38	0.4
		$\nu_\mu$ 1-Trk Air	-0.8	23605.76	0.8
		$\nu_\mu$ N-Trks	-0.5	32304.13	0.5
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.7	6767.65	0.7
		$\bar{\nu}_\mu$ RHC N-Trks	-0.2	4544.65	0.3
		$\nu_\mu$ RHC 1-Trk	-0.9	2067.37	0.9
		$\nu_\mu$ RHC N-Trks	-0.4	4568.13	0.4
<b>8 : pF_C</b>	<b>0.06</b>	$\nu_\mu$ 1-Trk Wtr	0.8	27316.74	-0.7
		$\nu_\mu$ N-Trks	0.0	30904.32	-0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.7	8414.09	-0.7
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4724.34	-0.0
		$\nu_\mu$ RHC 1-Trk	0.4	3022.10	-0.4
		$\nu_\mu$ RHC N-Trks	0.0	4928.38	-0.0
		$\nu_\mu$ 1-Trk Air	1.1	23605.76	-1.0
		$\nu_\mu$ N-Trks	0.0	32304.13	-0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	1.2	6767.65	-1.1
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4544.65	-0.0
		$\nu_\mu$ RHC 1-Trk	0.7	2067.37	-0.7
		$\nu_\mu$ RHC N-Trks	0.0	4568.13	-0.0

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
9 : pF_O	0.06	$\nu_\mu$ 1-Trk Wtr	0.4	27316.74	-0.4
		$\nu_\mu$ N-Trks	0.0	30904.32	-0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.5	8414.09	-0.5
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4724.34	-0.0
		$\nu_\mu$ RHC 1-Trk	0.3	3022.10	-0.3
		$\nu_\mu$ RHC N-Trks	0.0	4928.38	-0.0
		$\nu_\mu$ 1-Trk Air	0.0	23605.76	-0.0
		$\nu_\mu$ N-Trks	0.0	32304.13	-0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.0	6767.65	-0.0
		$\bar{\nu}_\mu$ RHC N-Trks	-0.0	4544.65	-0.0
		$\nu_\mu$ RHC 1-Trk	-0.0	2067.37	0.0
		$\nu_\mu$ RHC N-Trks	0.0	4568.13	-0.0
10 : 2p2h_norm_nu	1.00	$\nu_\mu$ 1-Trk Wtr	-8.9	27316.74	8.9
		$\nu_\mu$ N-Trks	-3.0	30904.32	3.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.1	8414.09	0.1
		$\bar{\nu}_\mu$ RHC N-Trks	-0.2	4724.34	0.2
		$\nu_\mu$ RHC 1-Trk	-9.0	3022.10	9.0
		$\nu_\mu$ RHC N-Trks	-2.6	4928.38	2.6
		$\nu_\mu$ 1-Trk Air	-8.1	23605.76	8.1
		$\nu_\mu$ N-Trks	-3.3	32304.13	3.3
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.1	6767.65	0.1
		$\bar{\nu}_\mu$ RHC N-Trks	-0.2	4544.65	0.2
		$\nu_\mu$ RHC 1-Trk	-8.6	2067.37	8.6
		$\nu_\mu$ RHC N-Trks	-2.8	4568.13	2.8
Table 1: Event rate broken by sample for one $\sigma$ variation of each parameter.					

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
11 : 2p2h_norm_nubar	1.00	$\nu_\mu$ 1-Trk Wtr	-0.0	27316.74	0.0
		$\nu_\mu$ N-Trks	-0.0	30904.32	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-9.3	8414.09	9.3
		$\bar{\nu}_\mu$ RHC N-Trks	-2.1	4724.34	2.1
		$\nu_\mu$ RHC 1-Trk	-0.2	3022.10	0.2
		$\nu_\mu$ RHC N-Trks	-0.0	4928.38	0.0
		$\nu_\mu$ 1-Trk Air	-0.0	23605.76	0.0
		$\nu_\mu$ N-Trks	-0.0	32304.13	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-8.9	6767.65	8.9
		$\bar{\nu}_\mu$ RHC N-Trks	-2.2	4544.65	2.2
		$\nu_\mu$ RHC 1-Trk	-0.3	2067.37	0.3
		$\nu_\mu$ RHC N-Trks	-0.0	4568.13	0.0
12 : 2p2h_normCtoO	0.20	$\nu_\mu$ 1-Trk Wtr	-0.6	27316.74	0.6
		$\nu_\mu$ N-Trks	-0.2	30904.32	0.2
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.8	8414.09	0.8
		$\bar{\nu}_\mu$ RHC N-Trks	-0.2	4724.34	0.2
		$\nu_\mu$ RHC 1-Trk	-0.8	3022.10	0.8
		$\nu_\mu$ RHC N-Trks	-0.2	4928.38	0.2
		$\nu_\mu$ 1-Trk Air	-0.0	23605.76	0.0
		$\nu_\mu$ N-Trks	-0.0	32304.13	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.0	6767.65	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	-0.0	4544.65	0.0
		$\nu_\mu$ RHC 1-Trk	-0.0	2067.37	0.0
		$\nu_\mu$ RHC N-Trks	-0.0	4568.13	0.0

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
<b>13 : 2p2h_shape_C</b>	<b>2.00</b>	$\nu_\mu$ 1-Trk Wtr	3.8	27316.74	0.0
		$\nu_\mu$ N-Trks	-1.1	30904.32	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.2	8414.09	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	-0.8	4724.34	0.0
		$\nu_\mu$ RHC 1-Trk	4.3	3022.10	0.0
		$\nu_\mu$ RHC N-Trks	-0.8	4928.38	0.0
		$\nu_\mu$ 1-Trk Air	5.7	23605.76	0.0
		$\nu_\mu$ N-Trks	-1.5	32304.13	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.2	6767.65	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	-1.1	4544.65	0.0
		$\nu_\mu$ RHC 1-Trk	8.1	2067.37	0.0
		$\nu_\mu$ RHC N-Trks	-1.4	4568.13	0.0
<b>14 : 2p2h_shape_O</b>	<b>2.00</b>	$\nu_\mu$ 1-Trk Wtr	2.1	27316.74	0.0
		$\nu_\mu$ N-Trks	-0.5	30904.32	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.1	8414.09	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	-0.5	4724.34	0.0
		$\nu_\mu$ RHC 1-Trk	3.2	3022.10	0.0
		$\nu_\mu$ RHC N-Trks	-0.6	4928.38	0.0
		$\nu_\mu$ 1-Trk Air	0.0	23605.76	0.0
		$\nu_\mu$ N-Trks	-0.0	32304.13	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.0	6767.65	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4544.65	0.0
		$\nu_\mu$ RHC 1-Trk	0.0	2067.37	0.0
		$\nu_\mu$ RHC N-Trks	-0.0	4568.13	0.0

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
15 : BeRPA_A	0.12	$\nu_\mu$ 1-Trk Wtr	-5.1	27316.74	5.1
		$\nu_\mu$ N-Trks	-0.3	30904.32	0.3
		$\bar{\nu}_\mu$ RHC 1-Trk	-4.7	8414.09	4.7
		$\bar{\nu}_\mu$ RHC N-Trks	-0.2	4724.34	0.2
		$\nu_\mu$ RHC 1-Trk	-3.5	3022.10	3.5
		$\nu_\mu$ RHC N-Trks	-0.1	4928.38	0.1
		$\nu_\mu$ 1-Trk Air	-5.1	23605.76	5.1
		$\nu_\mu$ N-Trks	-0.3	32304.13	0.3
		$\bar{\nu}_\mu$ RHC 1-Trk	-4.6	6767.65	4.6
		$\bar{\nu}_\mu$ RHC N-Trks	-0.1	4544.65	0.1
		$\nu_\mu$ RHC 1-Trk	-3.7	2067.37	3.7
		$\nu_\mu$ RHC N-Trks	-0.2	4568.13	0.2
16 : BeRPA_B	0.21	$\nu_\mu$ 1-Trk Wtr	-3.4	27316.74	3.4
		$\nu_\mu$ N-Trks	-0.6	30904.32	0.6
		$\bar{\nu}_\mu$ RHC 1-Trk	-2.6	8414.09	2.6
		$\bar{\nu}_\mu$ RHC N-Trks	-0.2	4724.34	0.2
		$\nu_\mu$ RHC 1-Trk	-3.1	3022.10	3.1
		$\nu_\mu$ RHC N-Trks	-0.4	4928.38	0.4
		$\nu_\mu$ 1-Trk Air	-3.3	23605.76	3.3
		$\nu_\mu$ N-Trks	-0.6	32304.13	0.6
		$\bar{\nu}_\mu$ RHC 1-Trk	-2.5	6767.65	2.5
		$\bar{\nu}_\mu$ RHC N-Trks	-0.2	4544.65	0.2
		$\nu_\mu$ RHC 1-Trk	-3.0	2067.37	3.0
		$\nu_\mu$ RHC N-Trks	-0.5	4568.13	0.5
Table 1: Event rate broken by sample for one $\sigma$ variation of each parameter.					



Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
17 : BeRPA_D	0.17	$\nu_\mu$ 1-Trk Wtr	-1.3	27316.74	1.3
		$\nu_\mu$ N-Trks	-1.0	30904.32	1.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-1.0	8414.09	1.0
		$\bar{\nu}_\mu$ RHC N-Trks	-0.5	4724.34	0.5
		$\nu_\mu$ RHC 1-Trk	-1.7	3022.10	1.7
		$\nu_\mu$ RHC N-Trks	-0.9	4928.38	0.9
		$\nu_\mu$ 1-Trk Air	-1.1	23605.76	1.1
		$\nu_\mu$ N-Trks	-0.9	32304.13	0.9
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.9	6767.65	0.9
		$\bar{\nu}_\mu$ RHC N-Trks	-0.4	4544.65	0.4
		$\nu_\mu$ RHC 1-Trk	-1.4	2067.37	1.4
		$\nu_\mu$ RHC N-Trks	-0.9	4568.13	0.9
18 : BeRPA_E	0.35	$\nu_\mu$ 1-Trk Wtr	-0.1	27316.74	0.1
		$\nu_\mu$ N-Trks	-0.0	30904.32	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.1	8414.09	0.1
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4724.34	-0.0
		$\nu_\mu$ RHC 1-Trk	-0.1	3022.10	0.1
		$\nu_\mu$ RHC N-Trks	-0.0	4928.38	0.0
		$\nu_\mu$ 1-Trk Air	-0.1	23605.76	0.1
		$\nu_\mu$ N-Trks	-0.0	32304.13	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.1	6767.65	0.1
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4544.65	0.0
		$\nu_\mu$ RHC 1-Trk	-0.1	2067.37	0.1
		$\nu_\mu$ RHC N-Trks	-0.0	4568.13	0.0

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
19 : BeRPA_U	0.10	$\nu_\mu$ 1-Trk Wtr	0.7	27316.74	-0.7
		$\nu_\mu$ N-Trks	0.1	30904.32	-0.1
		$\bar{\nu}_\mu$ RHC 1-Trk	0.6	8414.09	-0.5
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4724.34	-0.0
		$\nu_\mu$ RHC 1-Trk	0.7	3022.10	-0.6
		$\nu_\mu$ RHC N-Trks	0.1	4928.38	-0.1
		$\nu_\mu$ 1-Trk Air	0.7	23605.76	-0.6
		$\nu_\mu$ N-Trks	0.1	32304.13	-0.1
		$\bar{\nu}_\mu$ RHC 1-Trk	0.5	6767.65	-0.5
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4544.65	-0.0
		$\nu_\mu$ RHC 1-Trk	0.7	2067.37	-0.6
		$\nu_\mu$ RHC N-Trks	0.1	4568.13	-0.1
20 : CA5	0.15	$\nu_\mu$ 1-Trk Wtr	-3.4	27316.74	3.9
		$\nu_\mu$ N-Trks	-4.4	30904.32	5.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-2.7	8414.09	3.4
		$\bar{\nu}_\mu$ RHC N-Trks	-4.7	4724.34	5.8
		$\nu_\mu$ RHC 1-Trk	-4.5	3022.10	5.2
		$\nu_\mu$ RHC N-Trks	-4.1	4928.38	4.7
		$\nu_\mu$ 1-Trk Air	-2.9	23605.76	3.3
		$\nu_\mu$ N-Trks	-4.6	32304.13	5.2
		$\bar{\nu}_\mu$ RHC 1-Trk	-2.5	6767.65	3.1
		$\bar{\nu}_\mu$ RHC N-Trks	-4.9	4544.65	6.1
		$\nu_\mu$ RHC 1-Trk	-3.8	2067.37	4.4
		$\nu_\mu$ RHC N-Trks	-4.3	4568.13	5.0

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
<b>21 : MARES</b>	<b>0.16</b>	$\nu_\mu$ 1-Trk Wtr	-2.1	27316.74	1.9
		$\nu_\mu$ N-Trks	-4.8	30904.32	5.1
		$\bar{\nu}_\mu$ RHC 1-Trk	-1.6	8414.09	1.6
		$\bar{\nu}_\mu$ RHC N-Trks	-4.8	4724.34	5.8
		$\nu_\mu$ RHC 1-Trk	-3.1	3022.10	2.9
		$\nu_\mu$ RHC N-Trks	-4.8	4928.38	5.3
		$\nu_\mu$ 1-Trk Air	-1.7	23605.76	1.5
		$\nu_\mu$ N-Trks	-4.6	32304.13	4.9
		$\bar{\nu}_\mu$ RHC 1-Trk	-1.4	6767.65	1.5
		$\bar{\nu}_\mu$ RHC N-Trks	-4.8	4544.65	5.9
		$\nu_\mu$ RHC 1-Trk	-2.5	2067.37	2.3
		$\nu_\mu$ RHC N-Trks	-4.7	4568.13	5.2
<b>22 : ISO_BKG</b>	<b>0.31</b>	$\nu_\mu$ 1-Trk Wtr	-1.1	27316.74	1.8
		$\nu_\mu$ N-Trks	-2.4	30904.32	3.7
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.8	8414.09	1.3
		$\bar{\nu}_\mu$ RHC N-Trks	-3.1	4724.34	4.8
		$\nu_\mu$ RHC 1-Trk	-1.7	3022.10	2.5
		$\nu_\mu$ RHC N-Trks	-2.5	4928.38	3.8
		$\nu_\mu$ 1-Trk Air	-1.1	23605.76	1.6
		$\nu_\mu$ N-Trks	-2.4	32304.13	3.6
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.7	6767.65	1.1
		$\bar{\nu}_\mu$ RHC N-Trks	-3.0	4544.65	4.5
		$\nu_\mu$ RHC 1-Trk	-1.6	2067.37	2.4
		$\nu_\mu$ RHC N-Trks	-2.4	4568.13	3.7

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	$-1\sigma$ (%)	nominal	$+1\sigma$ (%)
23 : nue_numu	0.03	$\nu_\mu$ 1-Trk Wtr	0.0	27316.74	0.0
		$\nu_\mu$ N-Trks	0.0	30904.32	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.0	8414.09	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4724.34	0.0
		$\nu_\mu$ RHC 1-Trk	0.0	3022.10	0.0
		$\nu_\mu$ RHC N-Trks	0.0	4928.38	0.0
		$\nu_\mu$ 1-Trk Air	0.0	23605.76	0.0
		$\nu_\mu$ N-Trks	0.0	32304.13	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.0	6767.65	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4544.65	0.0
		$\nu_\mu$ RHC 1-Trk	0.0	2067.37	0.0
		$\nu_\mu$ RHC N-Trks	0.0	4568.13	0.0
24 : nuebar_numubar	0.03	$\nu_\mu$ 1-Trk Wtr	0.0	27316.74	0.0
		$\nu_\mu$ N-Trks	0.0	30904.32	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.0	8414.09	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4724.34	0.0
		$\nu_\mu$ RHC 1-Trk	0.0	3022.10	0.0
		$\nu_\mu$ RHC N-Trks	0.0	4928.38	0.0
		$\nu_\mu$ 1-Trk Air	0.0	23605.76	0.0
		$\nu_\mu$ N-Trks	0.0	32304.13	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.0	6767.65	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	0.0	4544.65	0.0
		$\nu_\mu$ RHC 1-Trk	0.0	2067.37	0.0
		$\nu_\mu$ RHC N-Trks	0.0	4568.13	0.0
Table 1: Event rate broken by sample for one $\sigma$ variation of each parameter.					

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
<b>25 : CC_DIS</b>	<b>0.40</b>	$\nu_\mu$ 1-Trk Wtr	-0.4	27316.74	0.4
		$\nu_\mu$ N-Trks	-4.2	30904.32	4.2
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.3	8414.09	0.3
		$\bar{\nu}_\mu$ RHC N-Trks	-4.3	4724.34	4.3
		$\nu_\mu$ RHC 1-Trk	-0.7	3022.10	0.7
		$\nu_\mu$ RHC N-Trks	-4.4	4928.38	4.4
		$\nu_\mu$ 1-Trk Air	-0.3	23605.76	0.3
		$\nu_\mu$ N-Trks	-3.9	32304.13	3.9
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.2	6767.65	0.2
		$\bar{\nu}_\mu$ RHC N-Trks	-4.2	4544.65	4.2
		$\nu_\mu$ RHC 1-Trk	-0.6	2067.37	0.6
		$\nu_\mu$ RHC N-Trks	-4.1	4568.13	4.1
<b>26 : CC_Coh_C</b>	<b>0.30</b>	$\nu_\mu$ 1-Trk Wtr	-0.1	27316.74	0.1
		$\nu_\mu$ N-Trks	-0.2	30904.32	0.2
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.1	8414.09	0.1
		$\bar{\nu}_\mu$ RHC N-Trks	-0.4	4724.34	0.4
		$\nu_\mu$ RHC 1-Trk	-0.1	3022.10	0.1
		$\nu_\mu$ RHC N-Trks	-0.2	4928.38	0.2
		$\nu_\mu$ 1-Trk Air	-0.1	23605.76	0.1
		$\nu_\mu$ N-Trks	-0.3	32304.13	0.3
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.2	6767.65	0.2
		$\bar{\nu}_\mu$ RHC N-Trks	-0.6	4544.65	0.6
		$\nu_\mu$ RHC 1-Trk	-0.2	2067.37	0.2
		$\nu_\mu$ RHC N-Trks	-0.3	4568.13	0.3

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
27 : CC_Coh_O	0.30	$\nu_\mu$ 1-Trk Wtr	-0.0	27316.74	0.0
		$\nu_\mu$ N-Trks	-0.1	30904.32	0.1
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.1	8414.09	0.1
		$\bar{\nu}_\mu$ RHC N-Trks	-0.2	4724.34	0.2
		$\nu_\mu$ RHC 1-Trk	-0.1	3022.10	0.1
		$\nu_\mu$ RHC N-Trks	-0.1	4928.38	0.1
		$\nu_\mu$ 1-Trk Air	-0.0	23605.76	0.0
		$\nu_\mu$ N-Trks	-0.0	32304.13	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.0	6767.65	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	-0.0	4544.65	0.0
		$\nu_\mu$ RHC 1-Trk	-0.0	2067.37	0.0
		$\nu_\mu$ RHC N-Trks	-0.0	4568.13	0.0
28 : NC_Coh	0.30	$\nu_\mu$ 1-Trk Wtr	-0.0	27316.74	0.0
		$\nu_\mu$ N-Trks	-0.0	30904.32	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.0	8414.09	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	-0.0	4724.34	0.0
		$\nu_\mu$ RHC 1-Trk	-0.0	3022.10	0.0
		$\nu_\mu$ RHC N-Trks	-0.0	4928.38	0.0
		$\nu_\mu$ 1-Trk Air	-0.0	23605.76	0.0
		$\nu_\mu$ N-Trks	-0.0	32304.13	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.0	6767.65	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	-0.0	4544.65	0.0
		$\nu_\mu$ RHC 1-Trk	-0.0	2067.37	0.0
		$\nu_\mu$ RHC N-Trks	-0.0	4568.13	0.0

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter	1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)
<b>29 : NC_1gamma</b>	<b>1.00</b>	$\nu_\mu$ 1-Trk Wtr	-0.0	27316.74	0.0
		$\nu_\mu$ N-Trks	-0.0	30904.32	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.0	8414.09	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	-0.0	4724.34	0.0
		$\nu_\mu$ RHC 1-Trk	0.0	3022.10	0.0
		$\nu_\mu$ RHC N-Trks	0.0	4928.38	0.0
		$\nu_\mu$ 1-Trk Air	-0.0	23605.76	0.0
		$\nu_\mu$ N-Trks	0.0	32304.13	0.0
		$\bar{\nu}_\mu$ RHC 1-Trk	0.0	6767.65	0.0
		$\bar{\nu}_\mu$ RHC N-Trks	-0.0	4544.65	0.0
		$\nu_\mu$ RHC 1-Trk	0.0	2067.37	0.0
		$\nu_\mu$ RHC N-Trks	0.0	4568.13	0.0
<b>30 : NC_other_near</b>	<b>0.30</b>	$\nu_\mu$ 1-Trk Wtr	-0.1	27316.74	0.1
		$\nu_\mu$ N-Trks	-0.6	30904.32	0.6
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.2	8414.09	0.2
		$\bar{\nu}_\mu$ RHC N-Trks	-1.9	4724.34	1.9
		$\nu_\mu$ RHC 1-Trk	-0.2	3022.10	0.2
		$\nu_\mu$ RHC N-Trks	-0.8	4928.38	0.8
		$\nu_\mu$ 1-Trk Air	-0.1	23605.76	0.1
		$\nu_\mu$ N-Trks	-0.6	32304.13	0.6
		$\bar{\nu}_\mu$ RHC 1-Trk	-0.3	6767.65	0.3
		$\bar{\nu}_\mu$ RHC N-Trks	-1.8	4544.65	1.8
		$\nu_\mu$ RHC 1-Trk	-0.2	2067.37	0.2
		$\nu_\mu$ RHC N-Trks	-0.8	4568.13	0.8

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.

Parameter		1 $\sigma$ value	Sample	-1 $\sigma$ (%)	nominal	+1 $\sigma$ (%)	
31 : NC	other	far	0.30	$\nu_\mu$ 1-Trk Wtr	-0.1	27316.74	0.1
				$\nu_\mu$ N-Trks	-0.4	30904.32	0.4
				$\bar{\nu}_\mu$ RHC 1-Trk	-0.1	8414.09	0.1
				$\bar{\nu}_\mu$ RHC N-Trks	-1.2	4724.34	1.2
				$\nu_\mu$ RHC 1-Trk	-0.1	3022.10	0.1
				$\nu_\mu$ RHC N-Trks	-0.5	4928.38	0.5
				$\nu_\mu$ 1-Trk Air	-0.1	23605.76	0.1
				$\nu_\mu$ N-Trks	-0.6	32304.13	0.6
				$\bar{\nu}_\mu$ RHC 1-Trk	-0.3	6767.65	0.3
				$\bar{\nu}_\mu$ RHC N-Trks	-1.8	4544.65	1.8
				$\nu_\mu$ RHC 1-Trk	-0.2	2067.37	0.2
				$\nu_\mu$ RHC N-Trks	-0.8	4568.13	0.8

**Table 1:** Event rate broken by sample for one  $\sigma$  variation of each parameter.