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Nitrogen cross sections and dilution factor for $1.0 < Q^2 < 4.0$ (GeV/c)^2

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Abstract

The polarized ^{3}He target contains a small amount of nitrogen as a buffering gas. Before applying radiative corrections to our ^{3}He cross sections, the nitrogen elastic tail and inelastic cross sections must be subtracted from the raw cross sections. To this end, nitrogen data were taken at almost every E01-012 kinematics with a reference cell. In this note, a detailed study of the nitrogen analysis for the experiment E01-012 is presented.

1 Introduction

Experiment E01-012 measured asymmetries and cross section differences from inclusive electron scattering on polarized ^{3}He. The polarized target is based on spin exchange between optically pumped rubidium and ^{3}He. About 1% of nitrogen is added to the target cell in order to quench unwanted photon emissions which could cause depolarization. The dilution factor is determined from nitrogen data measured in a reference cell with characteristics very close to the polarized target cell.

2 Nitrogen cross sections

The unpolarized cross section is defined as follows:

$$\sigma_0 = \frac{N_{det} \cdot V_{acc}}{N_{inc} \cdot \rho_N \cdot LT \cdot \epsilon_{det}} - \sigma_0^{el.tail} + RC \tag{1}$$

where N_{det} is the number of good electrons selected by specific software cuts, N_{inc} is the number of incident electrons, ρ_N is the target density (in amagats $\propto$ number of nucleus per cm^3), LT and ϵ_{det} are corrections for the data acquisition deadtime and for the detector efficiencies respectively, and V_{acc} is the correction for the acceptance "volume" as defined in [2]. Before applying radiative corrections (RC), the nitrogen elastic tail ($\sigma_0^{el.tail}$) should be subtracted.

An identical analysis as for polarized ^{3}He cross sections was done for the nitrogen cross sections. The same PID [1] and acceptance [2] cuts were applied and detector efficiencies were studied for each run.

2.1 Target density

The pressure of nitrogen gas in the reference cell was written in the target logbook at the beginning and the end of each run. In general, nitrogen runs lasted about 10 min.

The density of N_2 at 30° is extracted from the pressure readback P(psig)*:

$$\rho_{N_2}(\text{amg}) = (\text{P(psig)} + 14.7) \times 6.134 \times 10^{-2} \quad (2)$$

Table 1 gives the nitrogen pressure and density for each run.

Table 1: nitrogen density for each run

kin#	E (GeV)	θ	P_0 (GeV)	run#	P_{start}	P_{stop} (psig)	P_{avg}	ρ_{N_2} (amg)	δP (%)
3.6	3.028		1.987	1937/20937	147.0	147.0	147.0	9.92	1.0
3.7			2.150	1915/20915	147.5	147.5	147.5	9.95	1.0
4.2	4.018		1.840	1253/20253	148.0	130.0	139.0	9.43	6.6
4.3			2.000	1273/20273	147.0	138.0	142.5	9.64	3.3
4.4			2.170	1284/20284	147.0	138.0	142.5	9.64	3.3
4.5			2.350	20296	147.0	130.0	138.5	9.40	6.2
4.7			2.760	20338	147.0	130.0	138.5	9.40	6.2
5.1	5.009		3.200	20390	146.0	133.0	139.5	9.47	4.8
				20456	145.0	128.0	136.5	9.27	6.3
5.2			2.957	20483	147.0	136.0	141.5	9.58	4.0
5.3			2.732	20566	146.0	139.0	142.5	9.64	2.7
5.5			2.333	20642	147.0	134.0	140.5	9.52	4.7
6.1	5.009	32°	2.625	1456	145.0	128.0	136.5	9.27	6.3
6.2			2.575	1483	147.0	136.0	141.5	9.58	4.0
				1566	146.0	139.0	142.5	9.64	2.7
				1642	147.0	134.0	140.5	9.52	4.7
6.3			2.379	1941/20941	147.0	147.0	147.0	9.92	1.0
6.4			2.199	1759/20759	147.0	141.0	144.0	9.73	2.3
				1760/20760	147.0	138.0	142.5	9.64	3.3
6.5			2.031	1682/20682	146.0	137.0	141.5	9.58	3.3

ρ_{N_2} is the density of nitrogen molecules. Therefore this number is multiplied by 2 to get the density of nitrogen atoms (ρ_N) needed in the cross section analysis.

*First, we convert the pressure from psig to atm: $\text{P(atm)} = (\text{P(psig)} + 14.7) \times 6.8045 \times 10^{-2}$ (The gauge is reading -14.7psig at vacuum). Then with 1 amg = 2.6868×10^{19} atoms.cm^{-3} and the equation of ideal gas, we can calculate the N_2 density in amagats: $\rho(\text{amg}) = \frac{\text{P(atm)} \times 101325}{\text{kT}} \times \frac{10^{-6}}{2.6868 \times 10^{19}}$

For all kinematics except kin #3.6, 3.7 and 6.3, the reference cell was leaking. The average density was used to generate the cross sections with an uncertainty (δP) that reflects the range of pressure variation. Morever the linearity of the leak was checked using the pressure readback of the reference cell recorded in the datastream. An error of 1% is added to take into account the reading accuracy of the high pressure gauge quoted by the manufacturer.

2.2 Radiation lengths

The incident and scattered electrons lose energy when going through materials in their path. Therefore, the energy of the incident electrons at the target is smaller than the incident energy at the source and the energy of the scattered electrons at the target is larger than the scattered energy detected in the High Resolution Spectrometers.
In order to access the true scattering conditions, the thicknesses of the material around the scattering center must be estimated and external radiative corrections applied.
First we evaluate the radiation length of the nitrogen gas. With $X_o(\mathrm{N}_2) = 37.99$ g/cm^2, we get†:

$$R_o(\mathrm{cm}) = \frac{37.99}{\rho_{\mathrm{N}}(\mathrm{g/cm}^3)} = \frac{60784}{\rho_{\mathrm{N}}(\mathrm{amg})} \tag{3}$$

Using the target chamber length and radius, (39.2 ± 0.5)cm and (0.95 ± 0.02)cm respectively, the number of radiation lengths (N_{X_o}) can then be calculated:

- Under the assumption that the reaction happens at the center of the cell, the incident electron traversed 19.6cm of nitrogen gas before the scattering.
- The scattered electron encountered 0.95cm/sinθ (see table 1 for corresponding values of θ) of nitrogen gas.

The number of radiation lengths for each kinematic is summarized in table 2.

$^\dagger \rho(\mathrm{g/cm}^3) = \rho(\mathrm{amg}) \times 2.6868 \times 10^{19} \times \frac{\mathrm{M_N}}{\mathrm{N_A}}$

Table 2: Radiation lengths from Nitrogen gas

E (GeV)	θ	ρ_N (amg)	R_o(cm)	N_{X_o} before	N_{X_o} after
3.028	25°	2 × 9.94	3058	6.41×10^{-3}	7.35×10^{-4}
4.018	25°	2 × 9.50	3199	6.13×10^{-3}	7.03×10^{-4}
5.009	25°	2 × 9.48	3206	6.11×10^{-3}	7.01×10^{-4}
5.009	32°	2 × 9.57	3176	6.17×10^{-3}	5.65×10^{-4}
‡5.009	32°	2 × 9.92	3064	6.40×10^{-3}	5.85×10^{-4}

Then adding the glass and other materials thicknesses [7], we get the total radiation lengths (table 3).

Table 3: Total radiation lengths

E (GeV)	θ	X_o before	X_o after
3.028	25°	8.76×10^{-3}	0.0606
4.018	25°	8.36×10^{-3}	0.0569
5.009	25°	8.34×10^{-3}	0.0595
5.009	32°	8.40×10^{-3}	0.0469
‡5.009	32°	8.75×10^{-3}	0.0498

2.3 Nitrogen cross section model

Nitrogen data was not taken at every E01-012 kinematics due to time constraints. The Quasi-Free Scattering Model (QFS) [4] was used to predict the cross sections of the missing kinematics.

QFS is a parametrization of inclusive inelastic scattering from arbitrary nuclei. It assumes that the total cross section is the sum of five reactions: quasielastic scattering, the dip, the $\Delta(1232)$, the resonances centered at the invariant masses of 1500 and 1700 MeV and finally a non-resonant background. QFS is expected to calculate the Born cross section within 20%. It has been modified to incorporate external radiative corrections [5].

‡Exodus reference cell runs for 1335<W<1625 MeV.

We have introduced a scaling procedure[§] to get a better agreement between QFS radiated and the experimental E01-012 nitrogen cross sections. The results before and after the scaling are shown in Fig. 1 and the scaling scheme for the nitrogen cross section is as follows:

- In QFS [4], the dipole parameter a_Δ in the $\Delta(1232)$ region is 774 MeV for the free nucleon and drops linearly to 700 MeV for ^{4}He. Then the authors assume that a_Δ stays constant at 700 MeV for heavier nuclei. In our analysis, it was found that a_Δ for the nitrogen was overestimated. We set a_Δ=685 MeV and scaled the cross section in the $\Delta(1232)$ region by $(0.1 + 0.75 \cdot \mathrm{E}_p)$ and the cross section in the dip region by 0.65 to improve the agreement between the model and data.

- At higher W, the model undershoots the data at (3GeV, 25°) and overshoots for the others kinematics. In order to correct for this, the cross sections of the higher resonances, σ_{1500} and σ_{1700}, are multiplied by 4.0/E and $Q^2/100$ respectively, and the non-resonant background cross section, σ_{BG}, by $2.7/(4.0 \cdot \mathrm{E} \cdot \sin(\theta/2))$.

2.4 Results

2.4.1 Radiative corrections

The nitrogen elastic radiative tail was generated using the SLAC code ROSETAIL.F and the nitrogen form factors from [6]. It was found to be three orders of magnitude smaller than the inelastic cross sections. Therefore it will be considered negligible in our analysis.
The "scaled QFS model" was used to generate Born cross sections at energies and angles needed in the radiative corrections procedure. External and internal radiative corrections were done with RADCOR.F [5]. The input model was varied by $\pm 20\%$ in order to estimate the uncertainty arising in the radiative corrections procedure, which was found to be less than 8%.

2.4.2 Systematic errors

The systematic errors (table 4) have two sources: the experimental uncertainties $\delta\sigma_{exp}$ (uncertainty on the beam energy, the number of charges, the

[§]The reader should not try to interpret any physics from the changes made to physical parameters

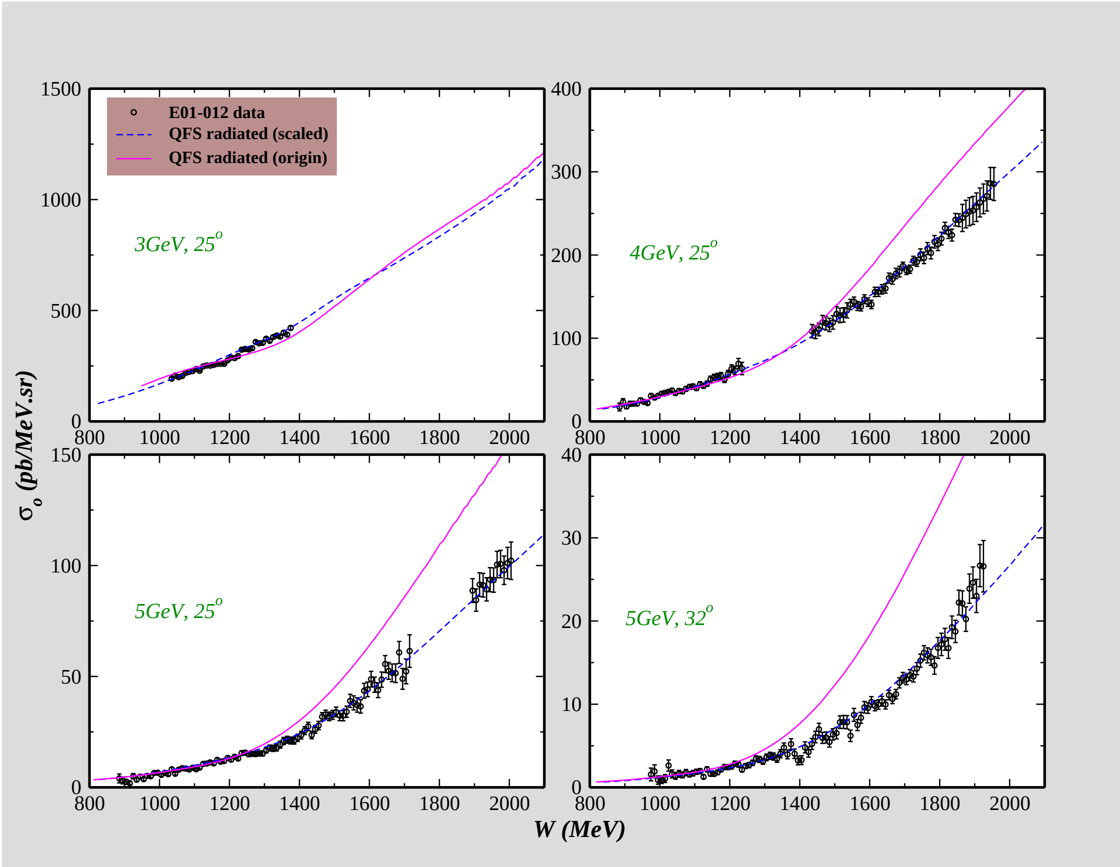

Figure 1: Nitrogen cross sections: comparison of the QFS Model before (magenta curve) and after (blue dashed curve) scaling. The density uncertainties from table 1 have been added to the statistical errors of the data.

target density and all the other factors that enter in the calculation of the experimental cross section) and the uncertainty from the radiative corrections δRC (explained in the previous section). Thus, the absolute systematic error on the unfolded cross section is evaluated as:

$$\Delta\sigma_{Born} = \sqrt{(\delta\sigma_{exp} \cdot \sigma_{exp})^2 + [\delta RC \cdot (\sigma_{Born} - \sigma_{exp})]^2} \tag{4}$$

The beam energy was monitored by using the "Tiefenbach"¶ energy for each run and has a systematic uncertainty of 0.5% (the statistical uncertainty is

¶This energy is calculated using Hall A arc Bdl and Hall A arc beam position monitors, and frequently calibrated.

negligible). The beam current monitors (BCM) were calibrated 2 months before E01-012. We are using those results [8] in our analysis. The changes between different BCM calibrations is never greater than 1%, so we are taking this value as an estimate to our uncertainty on the beam charge.

Table 4: Systematic errors

description	kin.3	kin.4	kin.5	kin.6
Target density	see table 1			
Beam energy	0.5%			
Charge	1%			
Acceptance[2]	1.7%	2.0%	2.0%	3.0%
Tracking efficiency[3]	1%			
Trigger efficiency[3]	1%			
Cerenkov detection efficiency[1]	1%			
Cerenkov cut efficiency[1]	1%			
EM calorimeter detection efficiency[1]	1%			
EM calorimeter cut efficiency[1]	1%			
$\delta\sigma_{exp}$	3.2%	3.4%	3.4%	4.0%
δRC	8%			

2.4.3 Nitrogen Born cross sections

The nitrogen experimental and Born cross sections at E01-012 kinematics are shown in Fig. 2.

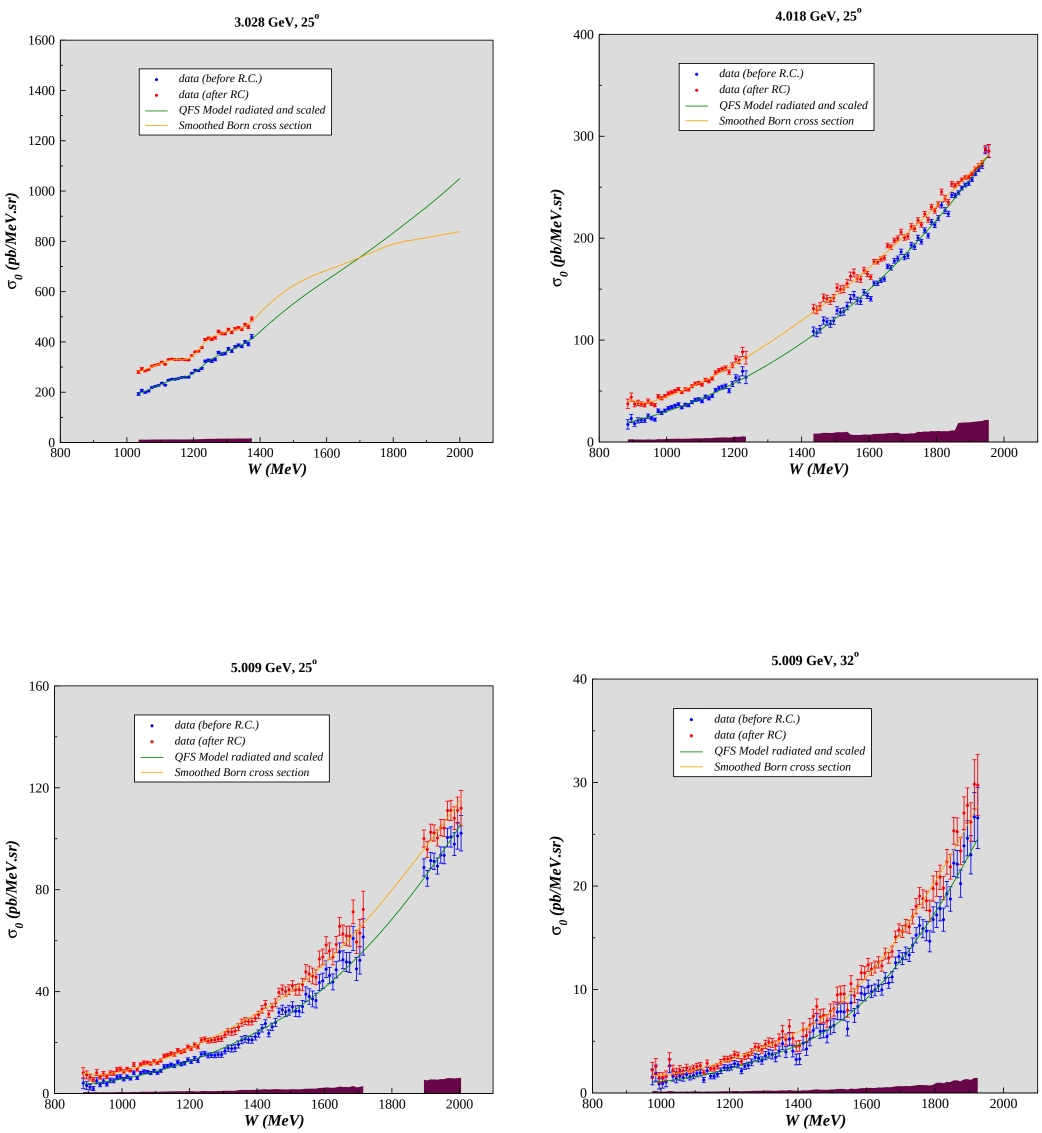

Figure 2: Nitrogen experimental (blue) and Born (red) cross sections. The data can be found in tables 6-9 in appendix. The systematic errors of the data are shown as the maroon band at the bottom of each plot. See text for more details.

At (3GeV, 25°), the data were extrapolated (green curve) to high W using the scaled QFS model described in section 2.3. For the other missing cross section coverages (at (4GeV, 25°) and (5GeV, 25°)), the data were interpolated (green curve too) using a smoothing procedure (from Seonho Choi) using bspline. These extrapolation and interpolations of the cross sections were assigned a statistical error of 5% (represented the error on the model used) and a systematical error from the radiative correction and interpolation (or extrapolation) uncertainties. The statistical error bars and the systematic error bands are not displayed on the plots in these cases but the values can be found in the tables 6-9.

3 Nitrogen dilution

The nitrogen data were taken in a reference cell with physical properties as close as possible to the polarized ^{3}He target. Therefore, to determine the nitrogen dilution, it is not necessary to apply radiative corrections to the nitrogen unpolarized cross sections. In this section, σ_{N} represents the experimental nitrogen cross section.
The unpolarized ^{3}He cross section can be extracted as follows:

$$\sigma_{exp} = \sigma_{raw} - \frac{\rho_{\mathrm{N}}}{\rho_{^3\mathrm{He}} + \rho_{\mathrm{N}}} \sigma_{\mathrm{N}} \tag{5}$$

where ρ_{N} and $\rho_{^3\mathrm{He}}$ are the nitrogen and ^{3}He filling densities of the polarized ^{3}He target cell (see table 5).

Table 5: Nitrogen and ^{3}He filling densities (in amagats) of Pol. ^{3}He target cell [10]

Cell	$\rho_{^3\mathrm{He}}$	ρ_{N}	$\rho_{\mathrm{N}}/(\rho_{^3\mathrm{He}} + \rho_{\mathrm{N}})$
Duke	9.18	0.169	1.81%
Exodus	9.62	0.173	1.77%

When generating the unpolarized ^{3}He cross sections (σ_{raw}), the statistical error is proportional to $\sqrt{N}$, where N is the number of selected events. But in these selected events, some come from the scattering on nitrogen nuclei ($N = N_{^3\mathrm{He}} + N_{\mathrm{N}}$). So when applying the nitrogen dilution, the statistical errors must be adjusted for non-^{3}He events [9]:

$$\delta\sigma_{exp} = \delta\sigma_{raw} \cdot \sqrt{\sigma_{raw}/\sigma_{exp}} \tag{6}$$

Fig. 3 shows the results of the experimental unpolarized ^{3}He cross sections for our four kinematic settings. Also showed are the nitrogen dilution for each bin and the raw unpolarized ^{3}He cross sections. The contribution of the nitrogen to the raw ^{3}He cross sections was found to be 6-7% depending on the kinematics.

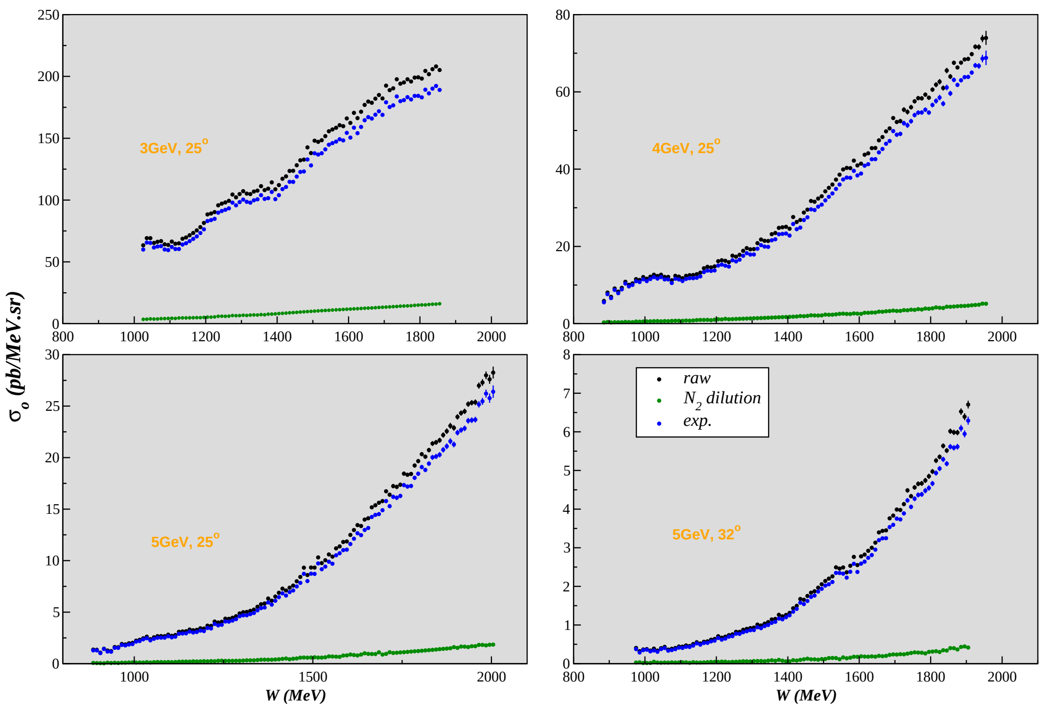

Figure 3: ^{3}He unpolarized cross sections (no radiative corrections applied yet): the experimental unpolarized ^{3}He cross sections is shown in blue, the nitrogen dilution in green and the raw unpolarized ^{3}He cross sections in black.

A small correction was applied to take into account the glass thickness difference between Exodus and its reference cell. This reference cell has its entrance window 22% thicker and its exit wall 29% thicker than Exodus (in Duke case, both thickness differences are less than 10%). "Scaled QFS model" was used to determine the effect on the radiated cross sections caused by these differences. It was found to be 5% relative and the dilution ratio $\sigma_n/\sigma_{^3\mathrm{He}}$ increased by 0.3% absolute. The corrections have been applied on data taken during Exodus running.

4 Conclusions

The E01-012 dilution factor analysis has been presented and the nitrogen Born cross sections were obtained for $1.0 < \mathrm{Q}^2 < 4.0$ $(\mathrm{GeV/c})^2$. These data and the "scaled QFS model" can be used by other experiments. The good coverage of the nitrogen data taken during E01-012 experiment greatly facilitated the extraction of the unpolarized ^{3}He cross sections and allowed us to control our systematic errors.

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A Nitrogen cross section tables

In order to obtain the necessary nitrogen cross sections coverage, several methods were used. Therefore the cross sections recorded in tables 6-9 can be of:

- type 0 → real data.
- type 1 → from "QFS scaled model".
- type 2 → generated by using a smoothing procedure (from Seonho Choi) using bspline.

Both type 1 and type 2 cross sections were assigned a statistical error of 5% and a systematical error from the radiative correction and interpolation (or extrapolation) uncertainties.
The mass invariant W and the energy transfer ν are in MeV. $\delta\sigma_{stat}$, $\delta\sigma_{syst}$, RC and σ_{Born} are in pb/MeV.sr.

Table 6: Nitrogen Cross Section: E=3.028GeV, θ=25°

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
995.0	747.9	169.265	8.463	9.061	90.796	260.061	1
1005.0	756.1	175.139	8.757	9.056	88.921	264.060	1
1015.0	764.4	180.986	9.049	9.126	88.153	269.139	1
1025.0	772.7	186.808	9.340	9.232	87.945	274.753	1
1035.0	780.0	192.766	5.637	9.508	87.180	279.946	0
1045.0	789.0	207.034	4.548	9.797	86.388	293.422	0
1055.0	797.0	199.259	3.660	9.584	85.886	285.145	0
1065.0	806.0	204.419	3.299	9.695	85.735	290.154	0
1075.0	815.0	218.481	3.043	9.998	85.068	303.549	0
1085.0	824.0	223.138	2.743	10.094	84.693	307.831	0
1095.0	832.0	227.174	2.543	10.158	83.976	311.150	0
1105.0	841.0	236.254	2.574	10.360	83.488	319.742	0
1115.0	851.0	228.085	2.475	10.114	82.752	310.837	0
1125.0	860.0	247.785	2.588	10.582	81.956	329.741	0

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Table 6: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1135.0	869.0	251.700	2.624	10.596	80.126	331.826	0
1145.0	878.0	251.573	2.594	10.497	78.123	329.696	0
1155.0	888.0	254.528	2.580	10.437	75.121	329.649	0
1165.0	897.0	258.844	2.591	10.429	72.327	331.171	0
1175.0	907.0	259.692	2.578	10.325	69.397	329.089	0
1185.0	916.0	259.325	2.562	10.285	68.689	328.014	0
1195.0	926.0	275.586	2.756	10.804	69.983	345.569	0
1205.0	936.0	287.270	3.071	11.092	73.018	360.288	0
1215.0	946.0	285.386	3.255	11.222	77.873	363.259	0
1225.0	956.0	294.700	3.581	11.723	82.963	377.663	0
1235.0	966.0	323.172	4.354	12.628	86.047	409.219	0
1245.0	976.0	326.782	5.170	12.796	87.490	414.272	0
1255.0	986.0	324.011	5.630	12.751	87.033	411.044	0
1265.0	997.0	329.761	5.043	13.029	86.052	415.813	0
1275.0	1007.0	357.877	5.120	13.747	83.948	441.825	0
1285.0	1018.0	351.654	4.973	13.488	81.879	433.533	0
1295.0	1028.0	353.704	5.030	13.454	79.330	433.034	0
1305.0	1039.0	372.609	5.159	13.922	76.816	449.425	0
1315.0	1050.0	363.280	5.003	13.560	74.516	437.796	0
1325.0	1060.0	380.089	5.105	13.972	71.674	451.763	0
1335.0	1071.0	386.943	5.149	14.107	69.299	456.242	0
1345.0	1082.0	382.200	5.185	13.921	68.083	450.283	0
1355.0	1093.0	400.015	5.875	14.469	67.911	467.926	0
1365.0	1104.0	391.070	6.433	14.214	68.609	459.679	0
1375.0	1116.0	421.143	8.162	15.188	69.920	491.063	0
1385.0	1127.7	422.958	21.148	14.703	71.801	494.759	1
1395.0	1139.1	434.554	21.728	15.117	74.121	508.675	1
1405.0	1150.5	446.567	22.328	15.545	76.475	523.042	1
1415.0	1162.1	458.395	22.920	15.923	77.425	535.820	1
1425.0	1173.7	470.038	23.502	16.283	77.955	547.993	1
1435.0	1185.4	481.496	24.075	16.634	78.365	559.861	1
1445.0	1197.2	492.768	24.638	16.957	77.962	570.730	1
1455.0	1209.0	503.856	25.193	17.278	77.627	581.483	1
1465.0	1221.0	514.760	25.738	17.577	76.668	591.428	1

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Table 6: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1475.0	1233.0	525.491	26.275	17.867	75.476	600.967	1
1485.0	1245.1	536.049	26.802	18.150	74.130	610.179	1
1495.0	1257.3	546.433	27.322	18.414	72.143	618.576	1
1505.0	1269.6	556.645	27.832	18.677	70.193	626.838	1
1515.0	1282.0	566.683	28.334	18.927	67.762	634.445	1
1525.0	1294.4	576.550	28.827	19.175	65.321	641.871	1
1535.0	1306.9	586.262	29.313	19.411	62.287	648.549	1
1545.0	1319.5	595.823	29.791	19.647	59.260	655.083	1
1555.0	1332.2	605.235	30.262	19.873	55.698	660.933	1
1565.0	1345.0	614.497	30.725	20.098	51.954	666.451	1
1575.0	1357.8	623.609	31.180	20.328	48.418	672.027	1
1585.0	1370.8	632.570	31.629	20.552	44.433	677.003	1
1595.0	1383.8	641.383	32.069	20.783	40.862	682.245	1
1605.0	1396.9	650.162	32.508	21.012	36.739	686.901	1
1615.0	1410.0	658.994	32.950	21.248	32.571	691.565	1
1625.0	1423.3	667.879	33.394	21.495	28.671	696.550	1
1635.0	1436.6	676.817	33.841	21.750	25.020	701.837	1
1645.0	1450.1	685.807	34.290	22.009	20.901	706.708	1
1655.0	1463.6	694.850	34.743	22.278	17.214	712.064	1
1665.0	1477.1	703.946	35.197	22.552	13.373	717.319	1
1675.0	1490.8	713.098	35.655	22.830	8.969	722.067	1
1685.0	1504.6	722.318	36.116	23.118	5.471	727.789	1
1695.0	1518.4	731.609	36.580	23.412	1.798	733.407	1
1705.0	1532.3	740.970	37.049	23.712	-2.397	738.573	1
1715.0	1546.3	750.403	37.520	24.018	-6.179	744.223	1
1725.0	1560.4	759.906	37.995	24.330	-9.948	749.958	1
1735.0	1574.5	769.479	38.474	24.650	-14.453	755.026	1
1745.0	1588.8	779.123	38.956	24.975	-18.317	760.806	1
1755.0	1603.1	788.838	39.442	25.305	-22.128	766.710	1
1765.0	1617.5	798.623	39.931	25.645	-26.732	771.891	1
1775.0	1632.0	808.478	40.424	25.990	-30.958	777.520	1
1785.0	1646.5	818.404	40.920	26.343	-35.575	782.829	1
1795.0	1661.2	828.400	41.420	26.725	-42.394	786.006	1
1805.0	1675.9	838.466	41.923	27.104	-47.941	790.525	1

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Table 6: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1815.0	1690.7	848.600	42.430	27.499	-54.211	794.389	1
1825.0	1705.6	858.773	42.939	27.919	-61.590	797.182	1
1835.0	1720.6	868.977	43.449	28.344	-68.626	800.351	1
1845.0	1735.7	879.214	43.961	28.784	-75.967	803.247	1
1855.0	1750.8	889.483	44.474	29.268	-85.172	804.311	1
1865.0	1766.0	899.784	44.989	29.732	-92.663	807.121	1

Table 7: Nitrogen Cross Section: E=4.018GeV, θ=25°

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
885.0	1113.0	17.252	4.587	2.030	20.285	37.537	0
895.0	1120.0	23.141	3.984	2.340	20.912	44.053	0
905.0	1127.0	18.032	2.667	1.996	19.196	37.228	0
915.0	1134.0	21.211	2.603	2.035	17.184	38.395	0
925.0	1141.0	21.288	2.151	1.972	15.929	37.216	0
935.0	1148.0	21.231	2.005	1.935	15.256	36.487	0
945.0	1155.0	25.333	2.114	2.145	14.754	40.087	0
955.0	1162.0	23.436	1.776	2.011	14.245	37.681	0
965.0	1170.0	22.012	1.564	1.925	14.150	36.162	0
975.0	1177.0	30.671	1.793	2.446	14.148	44.819	0
985.0	1185.0	28.651	1.607	2.326	14.283	42.934	0
995.0	1192.0	30.759	1.590	2.458	14.326	45.085	0
1005.0	1200.0	33.212	1.553	2.617	14.422	47.634	0
1015.0	1207.0	34.251	1.510	2.685	14.497	48.748	0
1025.0	1215.0	35.528	1.511	2.770	14.596	50.124	0
1035.0	1223.0	37.028	1.489	2.875	14.838	51.866	0
1045.0	1231.0	33.962	1.446	2.683	14.959	48.921	0
1055.0	1239.0	36.573	1.483	2.856	15.148	51.721	0
1065.0	1247.0	36.039	1.473	2.832	15.432	51.471	0
1075.0	1255.0	39.085	1.482	3.034	15.635	54.720	0
1085.0	1263.0	41.313	1.585	3.183	15.814	57.127	0
1095.0	1272.0	41.921	1.574	3.230	16.036	57.957	0
1105.0	1280.0	40.013	1.493	3.115	16.300	56.313	0
1115.0	1288.0	44.474	1.600	3.410	16.487	60.961	0

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Table 7: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1125.0	1297.0	42.854	1.538	3.311	16.664	59.518	0
1135.0	1306.0	45.356	1.605	3.483	16.975	62.331	0
1145.0	1314.0	50.856	1.759	3.851	17.221	68.077	0
1155.0	1323.0	52.898	1.848	3.990	17.359	70.257	0
1165.0	1332.0	53.773	2.016	4.056	17.641	71.414	0
1175.0	1341.0	54.725	2.107	4.125	17.866	72.591	0
1185.0	1350.0	50.457	2.137	3.852	18.146	68.603	0
1195.0	1359.0	56.962	2.447	4.286	18.300	75.262	0
1205.0	1368.0	63.085	2.947	4.701	18.547	81.632	0
1215.0	1377.0	61.375	3.363	4.592	18.778	80.153	0
1225.0	1386.0	69.402	4.475	5.138	19.030	88.432	0
1235.0	1396.0	63.531	6.248	4.748	19.228	82.759	0
1245.0	1405.1	65.537	3.277	2.719	19.477	85.014	2
1255.0	1414.6	67.354	3.368	2.779	19.671	87.025	2
1265.0	1424.2	69.200	3.460	2.840	19.883	89.083	2
1275.0	1433.9	71.075	3.554	2.904	20.136	91.211	2
1285.0	1443.6	72.978	3.649	2.966	20.318	93.296	2
1295.0	1453.4	74.911	3.746	3.031	20.530	95.441	2
1305.0	1463.3	76.872	3.844	3.096	20.750	97.622	2
1315.0	1473.3	78.862	3.943	3.160	20.905	99.767	2
1325.0	1483.3	80.880	4.044	3.226	21.086	101.966	2
1335.0	1493.4	82.928	4.146	3.294	21.288	104.216	2
1345.0	1503.6	85.004	4.250	3.359	21.408	106.412	2
1355.0	1513.9	87.109	4.355	3.428	21.575	108.684	2
1365.0	1524.2	89.242	4.462	3.500	21.818	111.060	2
1375.0	1534.7	91.405	4.570	3.569	21.937	113.342	2
1385.0	1545.2	93.596	4.680	3.637	22.009	115.605	2
1395.0	1555.7	95.816	4.791	3.708	22.137	117.953	2
1405.0	1566.4	98.065	4.903	3.778	22.220	120.285	2
1415.0	1577.1	100.342	5.017	3.851	22.320	122.662	2
1425.0	1587.9	102.650	5.133	3.921	22.348	124.998	2
1435.0	1599.0	108.529	4.298	7.880	22.364	130.893	0
1445.0	1610.0	107.149	3.895	7.788	22.504	129.653	0
1455.0	1621.0	110.567	3.605	8.022	22.433	133.000	0

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Table 7: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1465.0	1632.0	119.215	3.591	8.618	22.419	141.634	0
1475.0	1643.0	118.012	3.540	8.536	22.435	140.447	0
1485.0	1654.0	116.024	3.450	8.398	22.410	138.434	0
1495.0	1666.0	118.970	3.509	8.602	22.448	141.418	0
1505.0	1677.0	129.132	3.643	9.304	22.337	151.469	0
1515.0	1689.0	127.379	3.595	9.181	22.247	149.626	0
1525.0	1700.0	128.075	3.578	9.229	22.205	150.280	0
1535.0	1712.0	133.451	3.742	9.601	22.151	155.602	0
1545.0	1724.0	140.591	4.083	6.826	22.095	162.686	0
1555.0	1735.0	143.878	3.876	6.547	22.005	165.883	0
1565.0	1747.0	138.719	3.414	6.549	21.876	160.595	0
1575.0	1759.0	137.906	2.976	6.511	21.731	159.637	0
1585.0	1771.0	146.868	2.864	6.970	21.645	168.513	0
1595.0	1783.0	143.379	2.544	6.852	21.491	164.870	0
1605.0	1795.0	140.528	2.286	6.782	21.337	161.865	0
1615.0	1808.0	155.624	2.219	7.572	21.263	176.887	0
1625.0	1820.0	155.737	2.121	7.567	21.015	176.752	0
1635.0	1832.0	158.676	2.139	7.710	20.853	179.529	0
1645.0	1845.0	159.867	2.131	7.755	20.772	180.639	0
1655.0	1857.0	172.255	2.215	8.320	20.504	192.759	0
1665.0	1870.0	170.950	2.179	8.272	20.274	191.224	0
1675.0	1883.0	177.756	2.249	8.572	20.008	197.764	0
1685.0	1896.0	180.027	2.408	8.678	19.803	199.830	0
1695.0	1908.0	186.653	2.656	7.619	19.399	206.052	0
1705.0	1921.0	181.457	2.639	7.589	19.097	200.554	0
1715.0	1934.0	182.913	2.668	7.687	18.807	201.720	0
1725.0	1947.0	193.115	2.836	8.127	18.252	211.367	0
1735.0	1961.0	191.597	2.794	7.995	17.845	209.442	0
1745.0	1974.0	200.290	2.581	9.598	17.156	217.446	0
1755.0	1987.0	196.550	2.331	9.412	16.624	213.174	0
1765.0	2001.0	207.682	2.389	9.929	16.126	223.808	0
1775.0	2014.0	202.484	2.328	9.677	15.477	217.961	0
1785.0	2028.0	215.967	2.416	10.314	14.770	230.737	0
1795.0	2041.0	212.737	2.364	10.136	14.104	226.841	0

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Table 7: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1805.0	2055.0	219.675	2.477	10.461	13.486	233.161	0
1815.0	2069.0	232.463	2.813	10.130	12.886	245.349	0
1825.0	2082.0	227.116	2.812	10.267	11.944	239.060	0
1835.0	2096.0	223.947	2.519	10.165	11.325	235.272	0
1845.0	2110.0	242.415	2.509	10.909	10.753	253.168	0
1855.0	2124.0	241.883	2.236	11.029	9.804	251.687	0
1865.0	2139.0	244.543	1.952	18.196	9.129	253.672	0
1875.0	2153.0	249.193	1.810	18.557	7.989	257.182	0
1885.0	2167.0	252.118	1.821	18.796	7.322	259.440	0
1895.0	2182.0	253.600	1.811	18.838	6.386	259.986	0
1905.0	2196.0	257.418	1.810	19.183	5.540	262.958	0
1915.0	2211.0	263.182	1.888	19.541	4.805	267.987	0
1925.0	2225.0	267.454	2.098	19.934	3.501	270.955	0
1935.0	2240.0	270.972	2.453	20.175	2.621	273.593	0
1945.0	2255.0	286.085	3.279	21.324	1.363	287.448	0
1955.0	2269.0	285.356	6.309	21.173	0.338	285.694	0

Table 8: Nitrogen Cross Section: E=5.009GeV, θ=25°

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
885.0	1636.0	4.039	2.010	0.379	4.095	8.134	0
895.0	1642.0	3.126	1.556	0.366	4.192	7.318	0
905.0	1648.0	2.472	1.053	0.326	3.862	6.334	0
915.0	1655.0	1.948	0.808	0.294	3.527	5.475	0
925.0	1661.0	5.018	1.185	0.378	3.204	8.222	0
935.0	1668.0	3.482	0.811	0.303	2.975	6.457	0
945.0	1675.0	4.823	0.907	0.346	2.914	7.737	0
955.0	1681.0	3.682	0.748	0.303	2.919	6.601	0
965.0	1688.0	5.154	0.880	0.331	2.881	8.035	0
975.0	1695.0	5.010	0.791	0.340	2.893	7.903	0
985.0	1702.0	6.455	0.807	0.392	2.903	9.358	0
995.0	1709.0	6.617	0.777	0.435	2.973	9.590	0
1005.0	1716.0	5.634	0.684	0.373	3.034	8.668	0
1015.0	1723.0	6.532	0.713	0.394	3.069	9.602	0

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Table 8: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1025.0	1731.0	5.942	0.653	0.395	3.162	9.104	0
1035.0	1738.0	8.153	0.751	0.493	3.236	11.389	0
1045.0	1745.0	6.139	0.599	0.392	3.304	9.443	0
1055.0	1753.0	7.993	0.655	0.504	3.412	11.405	0
1065.0	1760.0	8.622	0.668	0.527	3.510	12.132	0
1075.0	1768.0	8.453	0.633	0.519	3.623	12.076	0
1085.0	1776.0	8.052	0.606	0.509	3.708	11.760	0
1095.0	1783.0	8.861	0.638	0.542	3.808	12.669	0
1105.0	1791.0	8.142	0.607	0.515	3.933	12.075	0
1115.0	1799.0	8.933	0.617	0.567	4.027	12.959	0
1125.0	1807.0	10.600	0.697	0.641	4.157	14.757	0
1135.0	1815.0	10.747	0.700	0.647	4.266	15.013	0
1145.0	1823.0	11.245	0.709	0.681	4.401	15.646	0
1155.0	1831.0	10.839	0.690	0.673	4.510	15.349	0
1165.0	1839.0	12.350	0.733	0.720	4.634	16.984	0
1175.0	1848.0	11.561	0.694	0.710	4.755	16.317	0
1185.0	1856.0	11.901	0.708	0.721	4.884	16.785	0
1195.0	1865.0	13.275	0.744	0.792	4.999	18.273	0
1205.0	1873.0	12.534	0.746	0.768	5.136	17.670	0
1215.0	1882.0	13.774	0.809	0.723	5.267	19.041	0
1225.0	1890.0	13.010	0.833	0.625	5.396	18.406	0
1235.0	1899.0	15.423	0.901	0.821	5.528	20.951	0
1245.0	1908.0	15.639	0.909	0.829	5.661	21.300	0
1255.0	1917.0	14.936	0.933	0.761	5.765	20.701	0
1265.0	1926.0	15.073	0.946	0.795	5.886	20.959	0
1275.0	1935.0	15.014	0.969	0.793	6.011	21.025	0
1285.0	1944.0	15.283	1.024	0.833	6.116	21.399	0
1295.0	1953.0	15.277	1.075	0.823	6.249	21.526	0
1305.0	1962.0	16.703	1.140	0.892	6.367	23.070	0
1315.0	1972.0	17.761	1.245	0.939	6.480	24.242	0
1325.0	1981.0	17.583	1.318	0.906	6.586	24.169	0
1335.0	1990.0	17.820	1.385	0.920	6.678	24.498	0
1345.0	2000.0	19.259	1.389	1.148	6.793	26.051	0
1355.0	2010.0	20.919	1.388	1.229	6.895	27.815	0

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Table 8: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1365.0	2019.0	21.456	1.340	1.257	6.986	28.442	0
1375.0	2029.0	21.125	1.351	1.245	7.085	28.210	0
1385.0	2039.0	21.064	1.310	1.247	7.194	28.258	0
1395.0	2049.0	22.336	1.339	1.309	7.282	29.618	0
1405.0	2059.0	23.534	1.417	1.368	7.348	30.882	0
1415.0	2069.0	25.579	1.446	1.469	7.446	33.025	0
1425.0	2079.0	27.468	1.511	1.562	7.516	34.984	0
1435.0	2089.0	23.604	1.363	1.380	7.597	31.201	0
1445.0	2099.0	26.164	1.440	1.505	7.675	33.838	0
1455.0	2109.0	27.873	1.536	1.589	7.753	35.626	0
1465.0	2120.0	31.834	1.685	1.507	7.834	39.668	0
1475.0	2130.0	32.840	1.832	1.464	7.940	40.780	0
1485.0	2141.0	32.007	1.833	1.408	8.029	40.036	0
1495.0	2151.0	32.656	1.907	1.461	8.142	40.798	0
1505.0	2162.0	33.992	2.040	1.541	8.274	42.267	0
1515.0	2173.0	32.313	2.076	1.508	8.387	40.700	0
1525.0	2184.0	32.344	2.231	1.457	8.500	40.844	0
1535.0	2194.0	34.111	2.396	1.549	8.631	42.742	0
1545.0	2205.0	38.990	2.847	1.727	8.752	47.742	0
1555.0	2216.0	38.072	3.053	1.713	8.883	46.954	0
1565.0	2227.0	37.144	3.089	1.766	8.997	46.142	0
1575.0	2239.0	36.494	2.881	1.745	9.144	45.638	0
1585.0	2250.0	43.558	3.126	2.031	9.268	52.826	0
1595.0	2261.0	44.200	3.065	2.061	9.396	53.596	0
1605.0	2273.0	48.769	3.276	2.250	9.504	58.273	0
1615.0	2284.0	46.308	3.187	2.153	9.642	55.950	0
1625.0	2295.0	43.813	3.127	2.058	9.804	53.617	0
1635.0	2307.0	48.575	3.181	2.253	9.905	58.480	0
1645.0	2319.0	55.587	3.522	2.543	10.030	65.617	0
1655.0	2330.0	52.512	3.519	2.420	10.131	62.643	0
1665.0	2342.0	51.638	3.757	2.388	10.265	61.903	0
1675.0	2354.0	51.450	3.947	2.382	10.338	61.788	0
1685.0	2366.0	60.832	4.681	2.771	10.465	71.297	0
1695.0	2378.0	48.906	4.519	2.285	10.550	59.456	0

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Table 8: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1705.0	2390.0	52.288	5.395	2.425	10.652	62.940	0
1715.0	2402.0	61.453	7.150	2.805	10.815	72.268	0
1725.0	2414.3	57.241	2.862	2.132	10.869	68.110	2
1735.0	2426.6	58.655	2.933	2.179	10.982	69.637	2
1745.0	2439.0	60.093	3.005	2.226	11.030	71.123	2
1755.0	2451.4	61.555	3.078	2.274	11.131	72.686	2
1765.0	2463.9	63.041	3.152	2.322	11.176	74.217	2
1775.0	2476.5	64.550	3.228	2.374	11.304	75.854	2
1785.0	2489.2	66.084	3.304	2.424	11.364	77.448	2
1795.0	2501.9	67.641	3.382	2.474	11.404	79.045	2
1805.0	2514.7	69.222	3.461	2.526	11.469	80.691	2
1815.0	2527.5	70.827	3.541	2.578	11.491	82.318	2
1825.0	2540.5	72.456	3.623	2.630	11.526	83.982	2
1835.0	2553.5	74.109	3.705	2.686	11.626	85.735	2
1845.0	2566.5	75.785	3.789	2.739	11.605	87.390	2
1855.0	2579.7	77.486	3.874	2.793	11.589	89.075	2
1865.0	2592.9	79.210	3.961	2.847	11.523	90.733	2
1875.0	2606.2	80.959	4.048	2.904	11.557	92.516	2
1885.0	2619.5	82.731	4.137	2.960	11.529	94.260	2
1895.0	2633.0	88.711	3.379	5.226	11.353	100.064	0
1905.0	2647.0	84.468	3.104	4.983	11.305	95.773	0
1915.0	2660.0	91.423	3.166	5.378	11.141	102.564	0
1925.0	2674.0	91.134	3.188	5.361	11.109	102.243	0
1935.0	2688.0	89.271	3.158	5.253	11.020	100.292	0
1945.0	2701.0	93.616	3.187	5.499	10.778	104.394	0
1955.0	2715.0	93.472	3.290	5.489	10.692	104.164	0
1965.0	2729.0	100.455	3.672	5.889	10.594	111.049	0
1975.0	2743.0	100.704	3.972	5.901	10.409	111.113	0
1985.0	2757.0	97.880	4.475	5.736	10.168	108.048	0
1995.0	2771.0	101.122	5.228	5.920	9.989	111.111	0
2005.0	2786.0	102.162	6.943	5.978	9.826	111.989	0

Table 9: Nitrogen Cross Section: E=5.009GeV, θ=32°

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
975.0	2264.0	1.551	0.761	0.127	0.652	2.203	0
985.0	2270.0	1.923	0.771	0.152	0.628	2.552	0
995.0	2276.0	0.877	0.497	0.082	0.613	1.490	0
1005.0	2282.0	0.910	0.447	0.083	0.602	1.512	0
1015.0	2288.0	1.065	0.468	0.093	0.598	1.662	0
1025.0	2294.0	2.626	0.666	0.151	0.597	3.223	0
1035.0	2300.0	1.620	0.474	0.118	0.600	2.220	0
1045.0	2306.0	1.385	0.403	0.078	0.602	1.986	0
1055.0	2312.0	1.630	0.405	0.097	0.609	2.239	0
1065.0	2318.0	1.492	0.351	0.083	0.619	2.111	0
1075.0	2324.0	1.780	0.368	0.108	0.634	2.414	0
1085.0	2331.0	1.571	0.316	0.087	0.647	2.217	0
1095.0	2337.0	1.699	0.325	0.107	0.661	2.360	0
1105.0	2344.0	1.874	0.311	0.098	0.672	2.546	0
1115.0	2350.0	1.954	0.306	0.100	0.688	2.641	0
1125.0	2357.0	1.264	0.237	0.077	0.704	1.968	0
1135.0	2363.0	2.159	0.306	0.111	0.721	2.879	0
1145.0	2370.0	1.622	0.257	0.095	0.741	2.363	0
1155.0	2377.0	1.611	0.249	0.091	0.759	2.370	0
1165.0	2384.0	1.802	0.257	0.106	0.784	2.585	0
1175.0	2391.0	2.151	0.272	0.114	0.803	2.954	0
1185.0	2398.0	2.447	0.289	0.126	0.822	3.269	0
1195.0	2405.0	2.422	0.279	0.128	0.844	3.266	0
1205.0	2412.0	2.503	0.286	0.126	0.864	3.368	0
1215.0	2419.0	2.838	0.303	0.146	0.886	3.725	0
1225.0	2426.0	2.731	0.297	0.140	0.907	3.638	0
1235.0	2433.0	2.124	0.263	0.117	0.927	3.052	0
1245.0	2441.0	2.573	0.291	0.136	0.953	3.526	0
1255.0	2448.0	2.675	0.304	0.143	0.975	3.650	0
1265.0	2455.0	2.954	0.321	0.155	0.997	3.951	0
1275.0	2463.0	3.446	0.354	0.171	1.019	4.465	0
1285.0	2470.0	3.357	0.357	0.169	1.042	4.399	0
1295.0	2478.0	3.135	0.355	0.167	1.068	4.203	0
1305.0	2486.0	3.608	0.396	0.186	1.087	4.695	0

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Table 9: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1315.0	2493.0	3.794	0.423	0.192	1.108	4.902	0
1325.0	2501.0	3.709	0.430	0.179	1.127	4.836	0
1335.0	2509.0	3.448	0.433	0.167	1.149	4.597	0
1345.0	2517.0	4.048	0.485	0.191	1.171	5.218	0
1355.0	2525.0	4.777	0.557	0.218	1.191	5.968	0
1365.0	2533.0	3.963	0.527	0.189	1.207	5.170	0
1375.0	2541.0	5.207	0.645	0.236	1.227	6.433	0
1385.0	2549.0	4.047	0.564	0.196	1.243	5.290	0
1395.0	2557.0	3.235	0.520	0.169	1.264	4.499	0
1405.0	2565.0	3.278	0.534	0.169	1.279	4.556	0
1415.0	2574.0	4.811	0.660	0.223	1.295	6.106	0
1425.0	2582.0	4.251	0.619	0.204	1.311	5.562	0
1435.0	2590.0	5.217	0.661	0.240	1.334	6.550	0
1445.0	2599.0	6.055	0.684	0.272	1.358	7.413	0
1455.0	2607.0	6.981	0.720	0.309	1.390	8.371	0
1465.0	2616.0	5.948	0.665	0.271	1.429	7.377	0
1475.0	2625.0	6.002	0.660	0.274	1.469	7.471	0
1485.0	2633.0	5.465	0.618	0.256	1.510	6.975	0
1495.0	2642.0	6.365	0.685	0.291	1.553	7.918	0
1505.0	2651.0	6.522	0.690	0.298	1.599	8.121	0
1515.0	2660.0	7.834	0.757	0.349	1.645	9.479	0
1525.0	2669.0	7.869	0.774	0.352	1.695	9.564	0
1535.0	2678.0	7.830	0.801	0.351	1.745	9.574	0
1545.0	2687.0	6.201	0.683	0.291	1.794	7.995	0
1555.0	2696.0	8.713	0.773	0.386	1.848	0.561	0
1565.0	2705.0	7.496	0.665	0.343	1.898	9.393	0
1575.0	2714.0	8.364	0.665	0.377	1.949	10.313	0
1585.0	2724.0	9.625	0.687	0.426	2.003	11.628	0
1595.0	2733.0	9.532	0.631	0.427	2.053	11.585	0
1605.0	2742.0	10.269	0.636	0.453	2.108	12.377	0
1615.0	2752.0	9.809	0.595	0.444	2.158	11.967	0
1625.0	2761.0	9.960	0.570	0.437	2.212	12.172	0
1635.0	2771.0	10.355	0.550	0.491	2.268	12.623	0
1645.0	2781.0	9.963	0.510	0.479	2.319	12.282	0

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Table 9: *continued*

W	ν	σ_{exp}	$\delta\sigma_{stat}$	$\delta\sigma_{syst}$	RC	σ_{Born}	type
1655.0	2790.0	11.098	0.531	0.524	2.370	13.468	0
1665.0	2800.0	10.633	0.518	0.511	2.417	13.050	0
1675.0	2810.0	11.202	0.523	0.534	2.474	13.676	0
1685.0	2820.0	12.569	0.562	0.592	2.521	15.090	0
1695.0	2830.0	13.182	0.582	0.621	2.575	15.757	0
1705.0	2840.0	12.980	0.578	0.611	2.626	15.606	0
1715.0	2850.0	13.491	0.612	0.636	2.674	16.164	0
1725.0	2860.0	13.337	0.634	0.614	2.719	16.055	0
1735.0	2870.0	14.276	0.700	0.647	2.761	17.037	0
1745.0	2880.0	15.238	0.740	0.699	2.805	18.043	0
1755.0	2891.0	16.182	0.820	0.735	2.845	19.028	0
1765.0	2901.0	15.874	0.873	0.722	2.883	18.756	0
1775.0	2912.0	15.643	0.936	0.716	2.922	18.565	0
1785.0	2922.0	14.657	1.019	0.678	2.954	17.611	0
1795.0	2933.0	16.763	1.224	0.757	2.989	19.751	0
1805.0	2943.0	17.191	1.201	0.943	3.015	20.206	0
1815.0	2954.0	17.802	1.173	0.959	3.042	20.844	0
1825.0	2964.0	16.747	1.123	0.901	3.058	19.805	0
1835.0	2975.0	19.246	1.196	1.028	3.092	22.339	0
1845.0	2986.0	18.747	1.181	1.009	3.104	21.851	0
1855.0	2997.0	22.214	1.299	1.177	3.126	25.340	0
1865.0	3008.0	22.117	1.315	1.177	3.141	25.258	0
1875.0	3019.0	20.230	1.315	1.083	3.156	23.386	0
1885.0	3030.0	23.886	1.569	1.274	3.163	27.049	0
1895.0	3041.0	24.613	1.703	1.300	3.172	27.786	0
1905.0	3052.0	23.015	1.846	1.218	3.180	26.194	0
1915.0	3064.0	26.660	2.367	1.415	3.177	29.837	0
1925.0	3075.0	26.580	2.963	1.401	3.182	29.763	0