JLab E96-002/01-006 Simulations

Hongguo Zhu

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Outline:

Simulation Package and Kinematics

HMS Momentum Resolution

NH_3 and ND_3 Single Arm Spectra

On-going Work

Offline Analysis

Simulation Package and Kinematics

- Simulation Package:

- MCEEP v3.5 based on PWIA, including target field effect simulation for charged particles and event reconstruction with target field and beam offset

- QFS: calculate q.e., two-nucleon, resonance, and x-scaling electron scattering cross section, J. W. Lightbody, Jr. and J. S. O. Connell, Computers in Physics 2, 57 (1988)

- Kinematics Coverage:

E [MeV]	θ_e	E' [MeV]	W [MeV]	ν [MeV]
5784	13.07°	4534 3969	938 - 1689 1494 - 1990	796 - 1703 1418 - 2212
5784	35°	2406	1110 - 1770	

- Target Model:

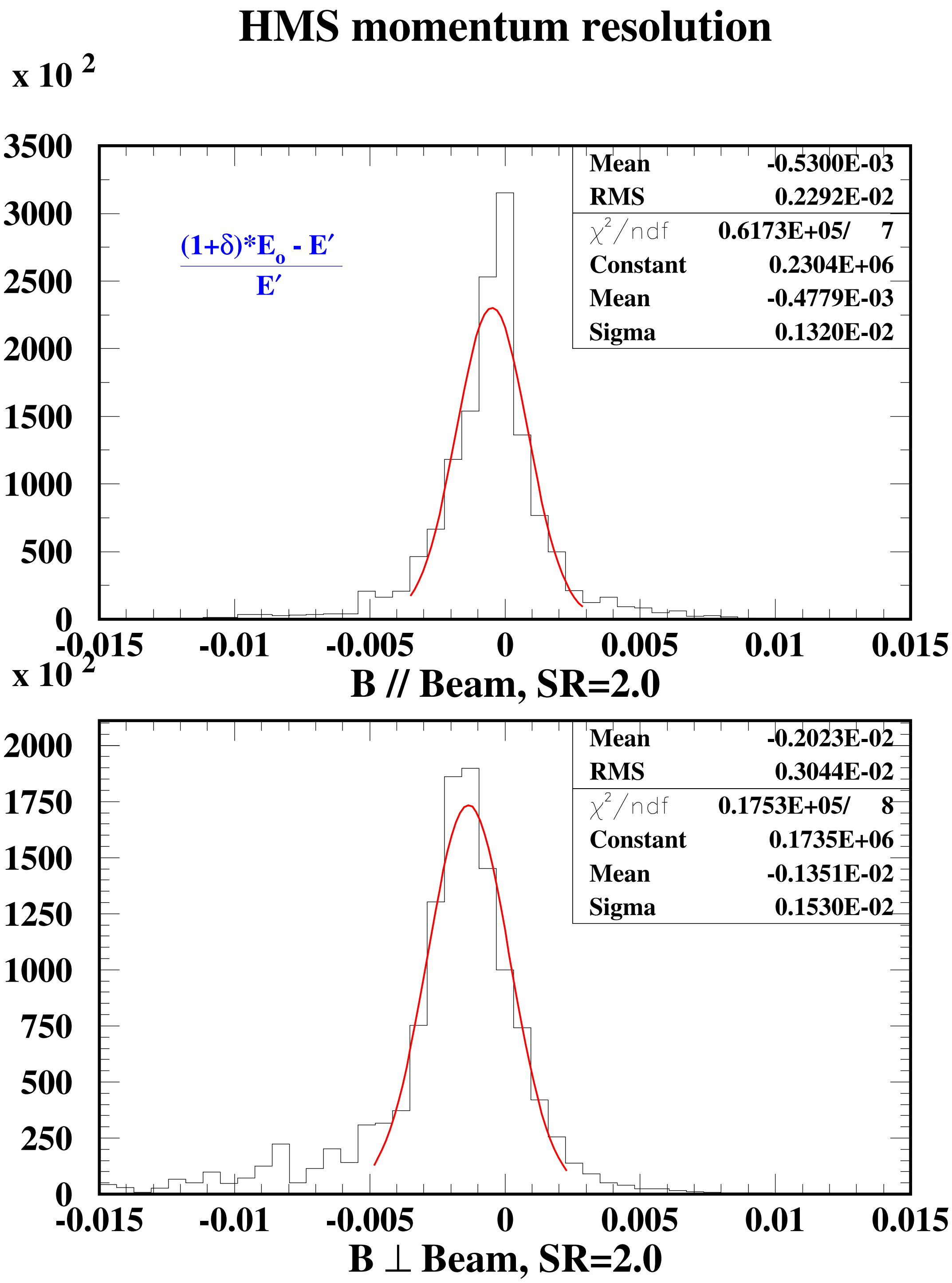
materials	$^{15}NH_3$($^{15}ND_3$)	^4He	Al
thickness [cm]	1.50	2.50	0.025

- HMS acceptance:

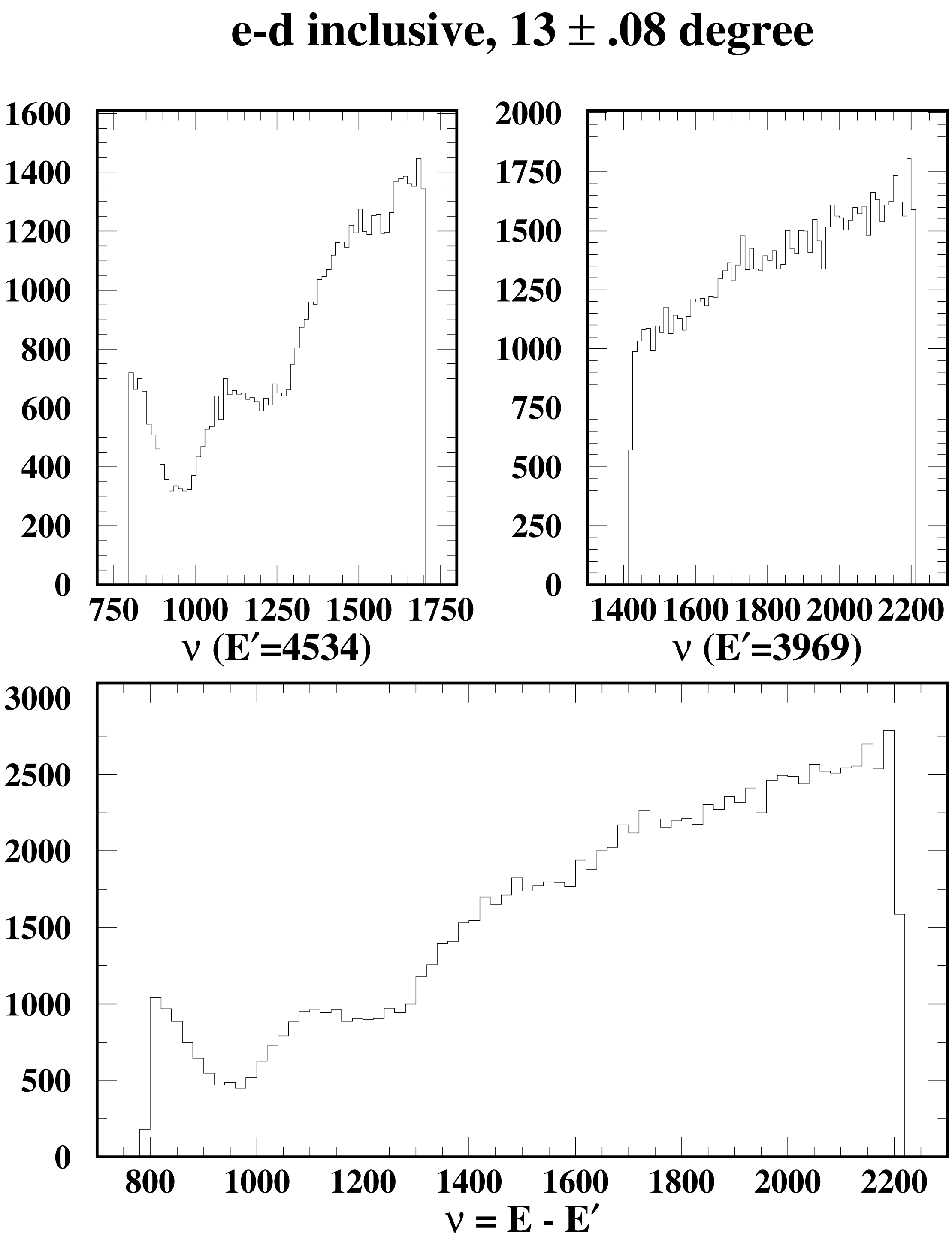
standard Hall C HMS 100 setting, 54 × 140 msr, $\frac{\Delta P}{P}$=±10%

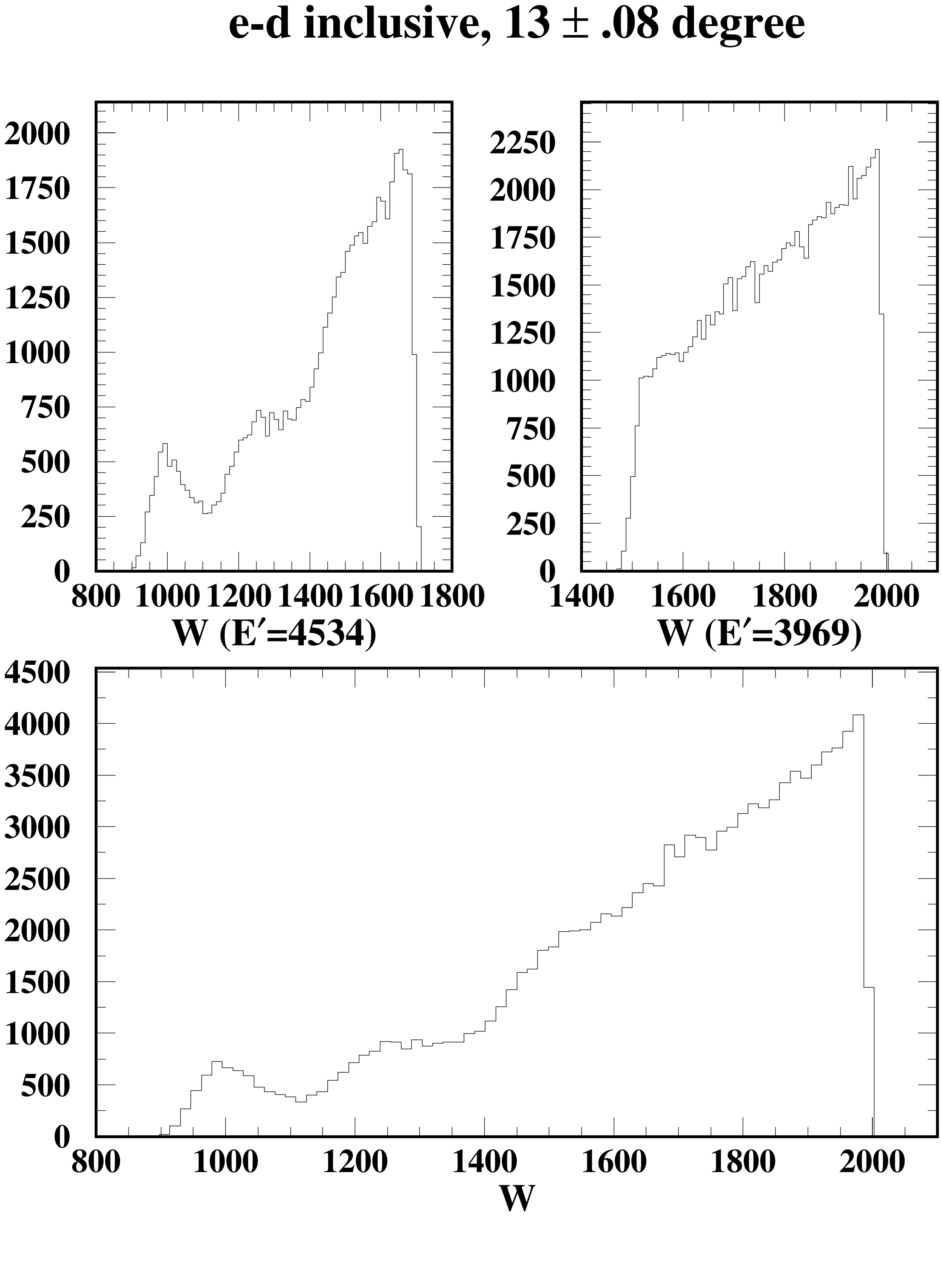
HMS Momentum Resolution

HMS momentum reconstruction resoultuion with 20 mm slow raster and target field parallel and perpendicular to beam (Gen01 reconstruction)

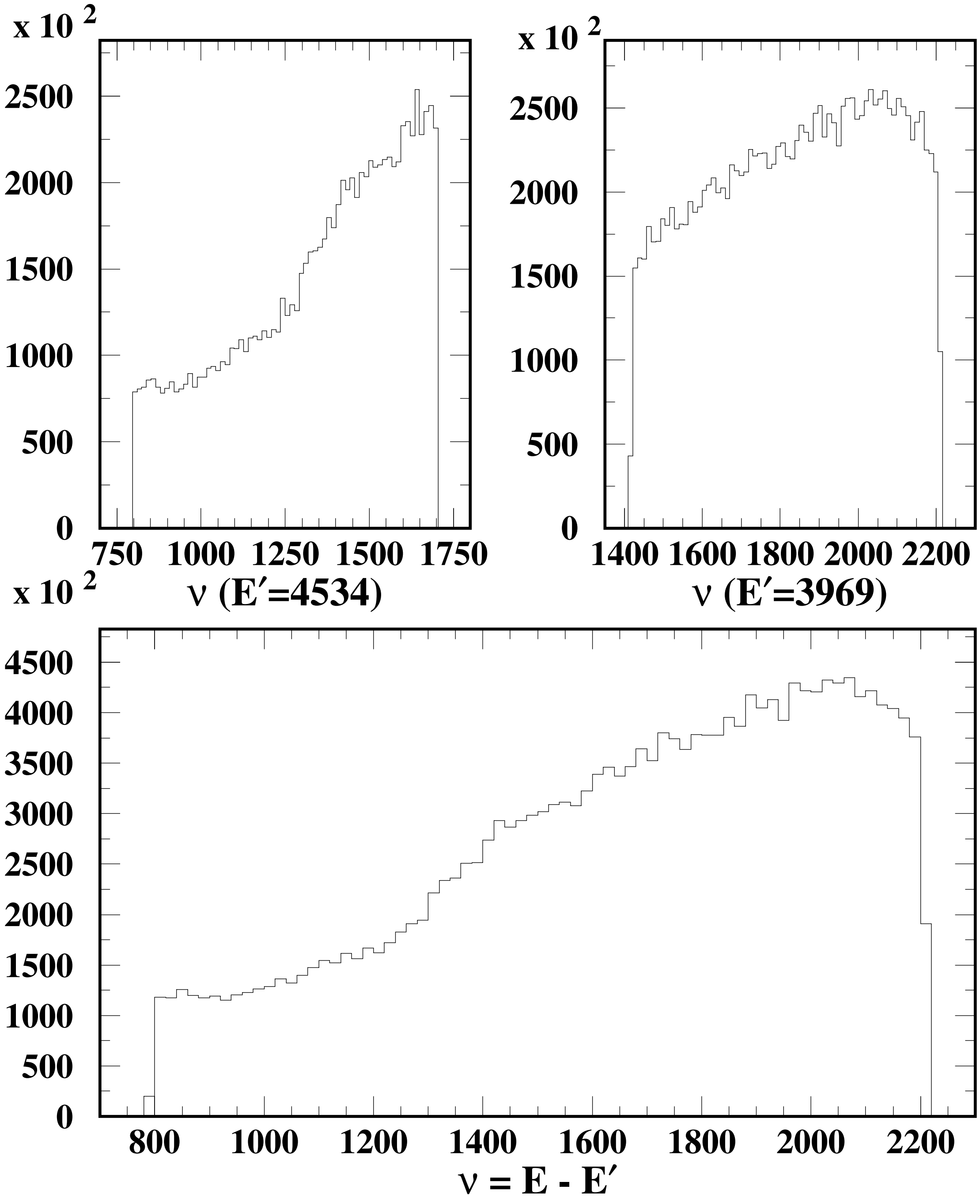


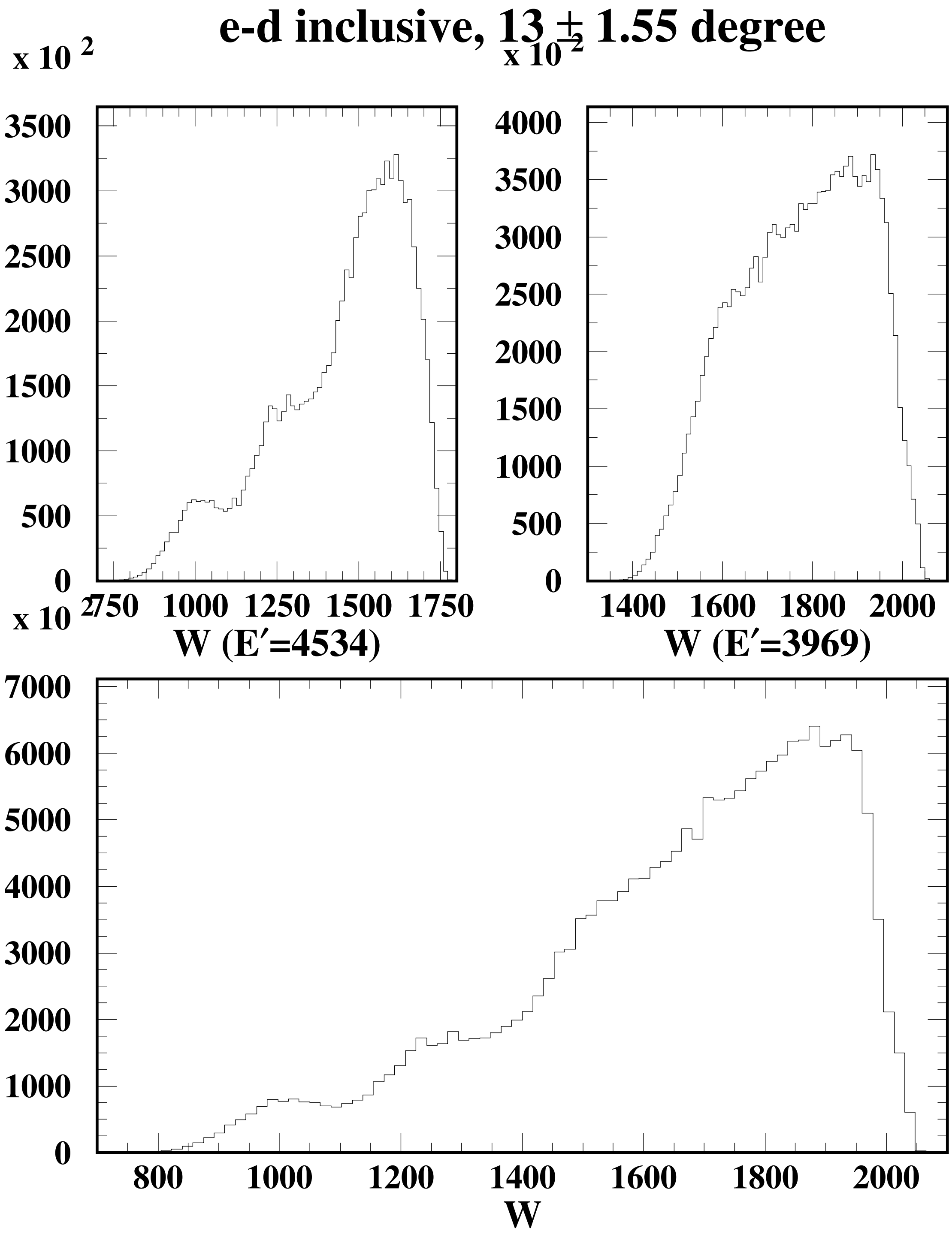
ND_3 and NH_3 Single Arm Spectra




e-d inclusive, 13 ± .08 degree
W (E′=4534)
W (E′=3969)
W
0
250
500
750
1000
1250
1500
1750
2000
2250
2500
3000
3500
4000
4500
800
1000
1200
1400
1600
1800
2000

e-d inclusive, 13 ± 1.55 degree

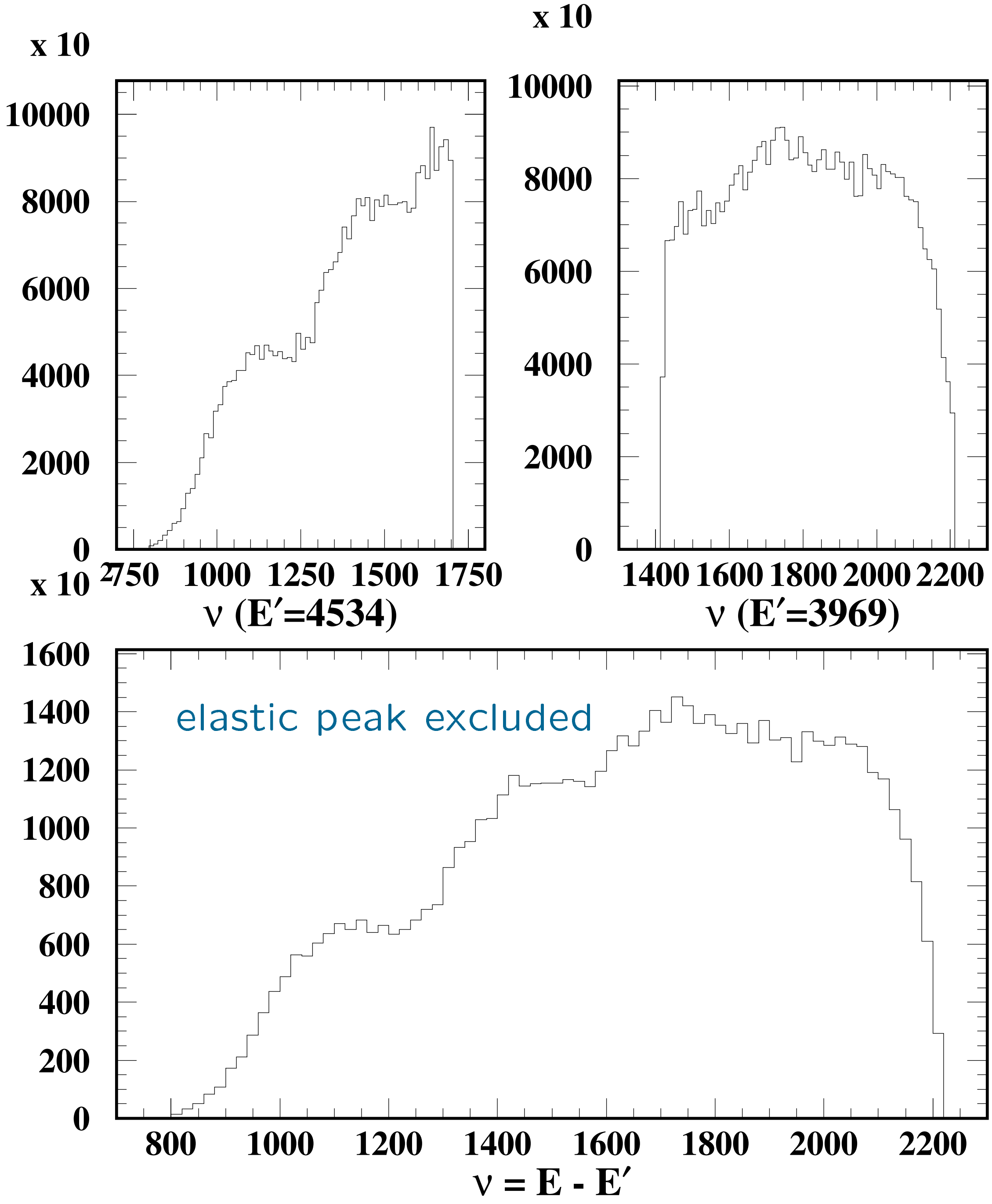


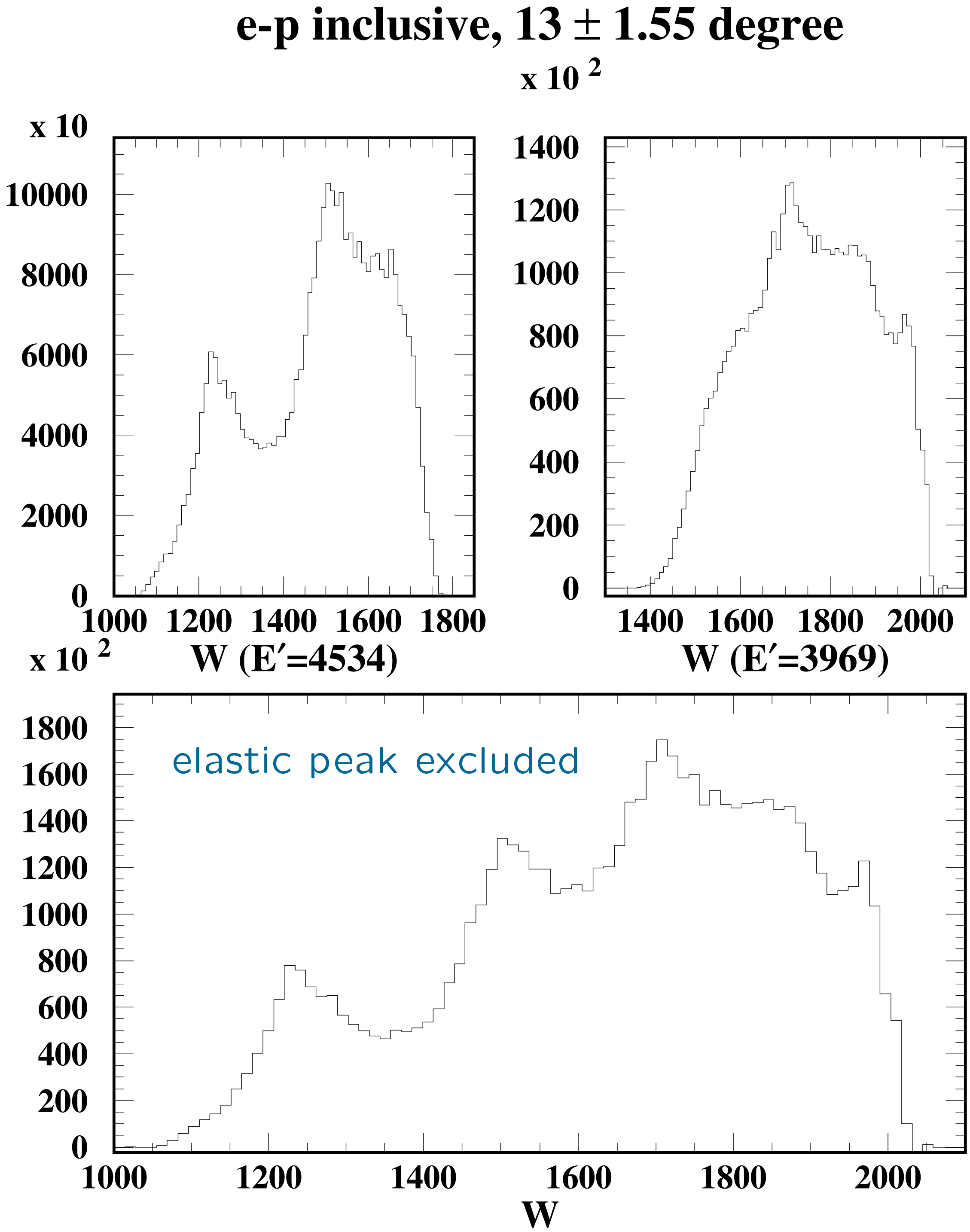


- $e-d$ Inclusive Yield at 13.07° (I_b=100 nA):

E'=4534 MeV	E'=3969 MeV	Total
75 s^{-1}	117 s^{-1}	159 s^{-1}

e-p inclusive, 13 ± 1.55 degree




e-p inclusive, 13 ± 1.55 degree
x 10
10000
8000
6000
4000
2000
0
1000 1200 1400 1600 1800
W (E′=4534)
x 10 2
1400
1200
1000
800
600
400
200
0
1400 1600 1800 2000
W (E′=3969)
x 10 2
1800
1600
1400
1200
1000
800
600
400
200
0
elastic peak excluded
1000 1200 1400 1600 1800 2000
W

On-going Work

- finishing up single arm spectra for nitrogen, helium, aluminium and other target materials
- further study on $e - p$ inclusive scattering yield
- repeat simulations for 35°

Offline Analysis

(to be adapted from Gen01)