

PRODUCTION OF NUCLEI AND ANTINUCLEI IN BOTTOMONIUM DECAYS AND CONTINUUM AT $E_{\text{CM}} \sim 10 \text{ GeV}$

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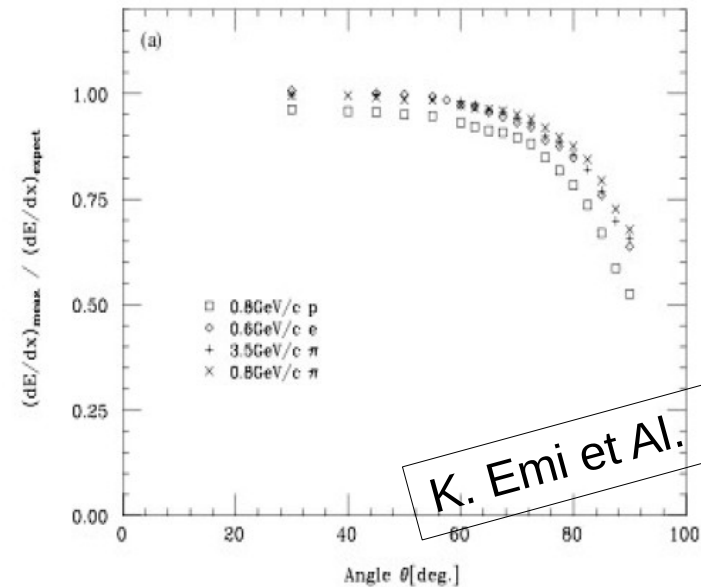
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Study of a dE/dx measurement and the gas-gain saturation by a prototype drift chamber for the BELLE-CDC (K. Emi et Al.)

Beam test with a real-size prototype of Belle CDC: gas-gain saturation effect in dE/dx measurements

dE/dx distributions decrease with increasing incident angles: space charge effect

Corrections implemented, optimized for π and K
(Belle libraries: dE/dx_{exp} for e, μ , π , K p)



MC SIMULATIONS FLAWS:

MC in single track mode

$$R = \frac{dE/dx_{meas}}{dE/dx_{exp,p}}$$

$R = 1$ for protons
 $R < 1$ for lighter particles
 $R > 1$ for heavier particles

Bins of momentum, 100 MeV wide each,
 $400 \text{ MeV} < p_{LAB} < 1400 \text{ MeV}$

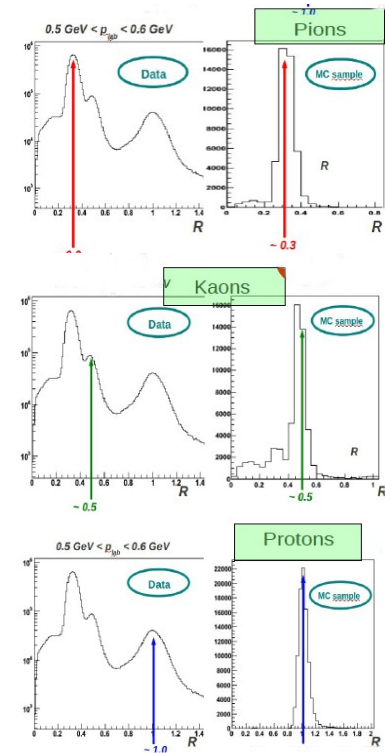
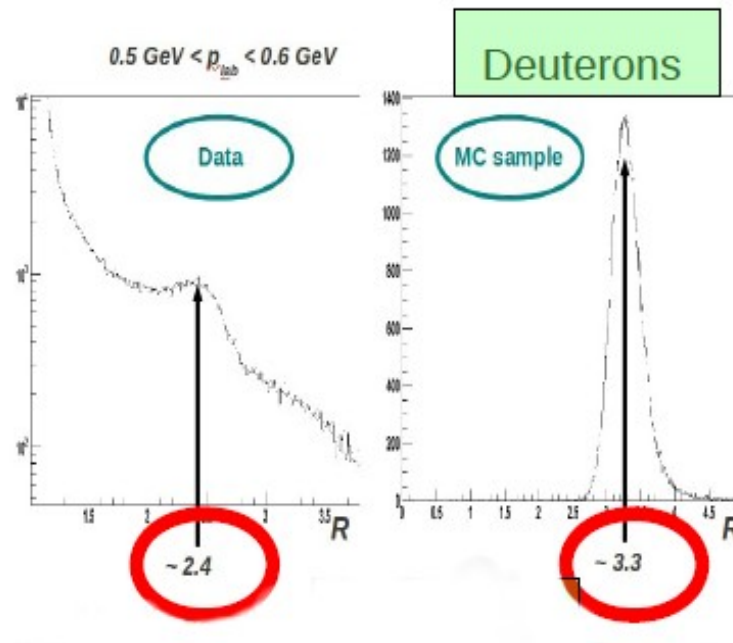
Control sample \rightarrow positive data

1.2 fb⁻¹ of $\Upsilon(1S)$, from exp 65
 5.0 fb⁻¹ of $\Upsilon(2S)$, from exp 71

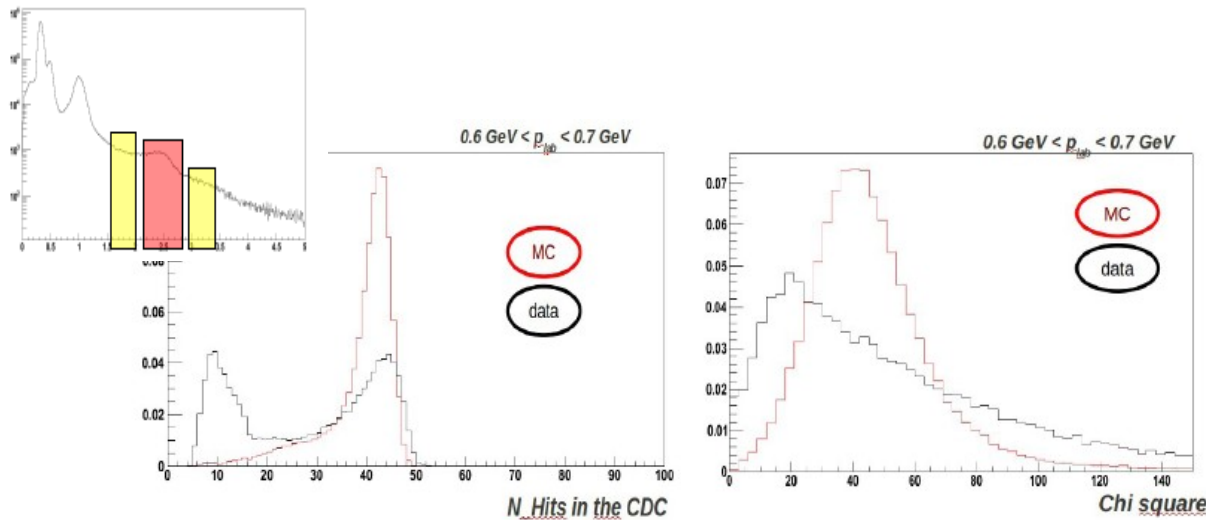
MC SIMULATIONS VS REAL DATA

- Distribution of R between $0.5 \text{ GeV} < p_{\text{LAB}} < 0.6 \text{ GeV}$

comparison between real data and MC simulation for different particles (π , K, p, d)



- deuterons: distribution of N_{hits} and χ^2



MC simulation in single track mode: unable to describe deuterons' annihilation and tracking

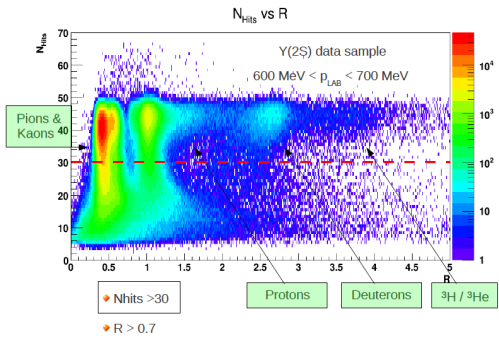
→ Analysis data driven

REAL DATA (positive tracks)

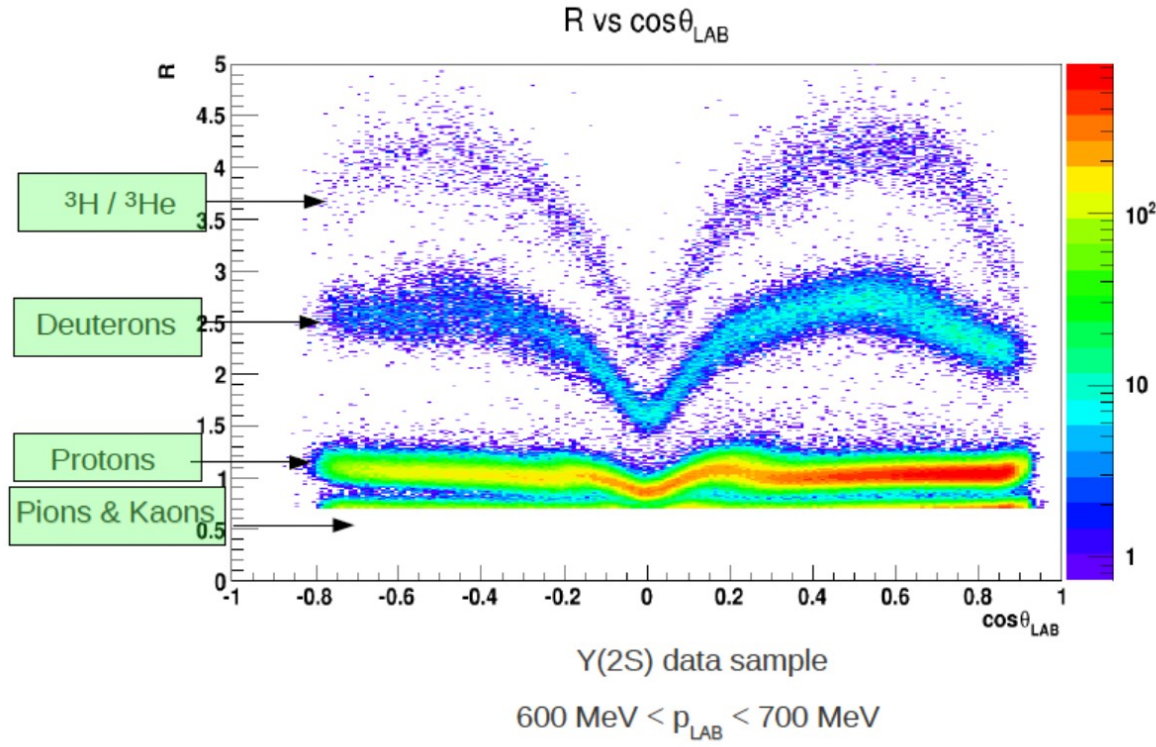
Two cutoff values:

$R > 0.7$

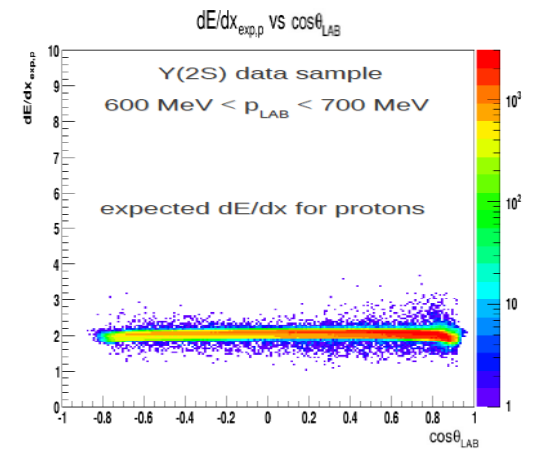
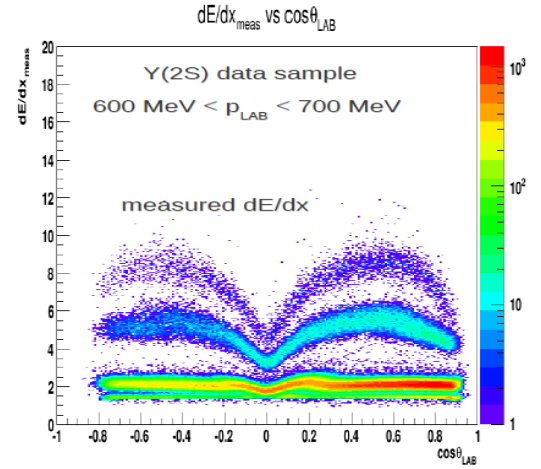
$N_{hits} > 30$



Angular dependence



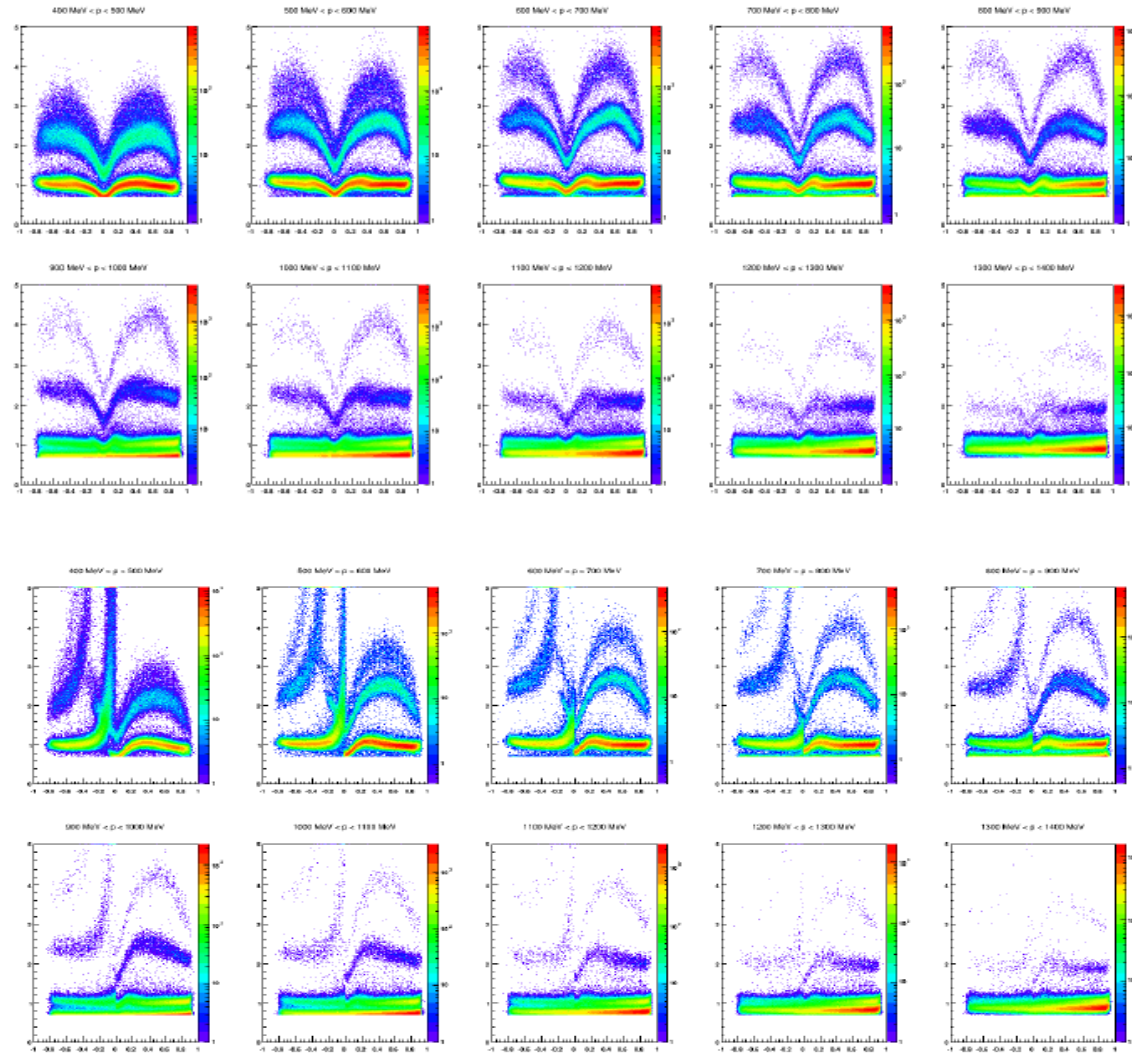
$$R = \frac{dE/dx_{meas}}{dE/dx_{exp,p}}$$



$R, dE/dx_{meas}$: same shape

Scatter plot of R vs $\cos\theta$ in each bin of momentum, from $400 \text{ MeV} < p_{\text{LAB}} < 500 \text{ MeV}$ to $1300 \text{ MeV} < p_{\text{LAB}} < 1400 \text{ MeV}$
 (The graphs are arranged in ascending order of the momentum, from left to right and from top to bottom)

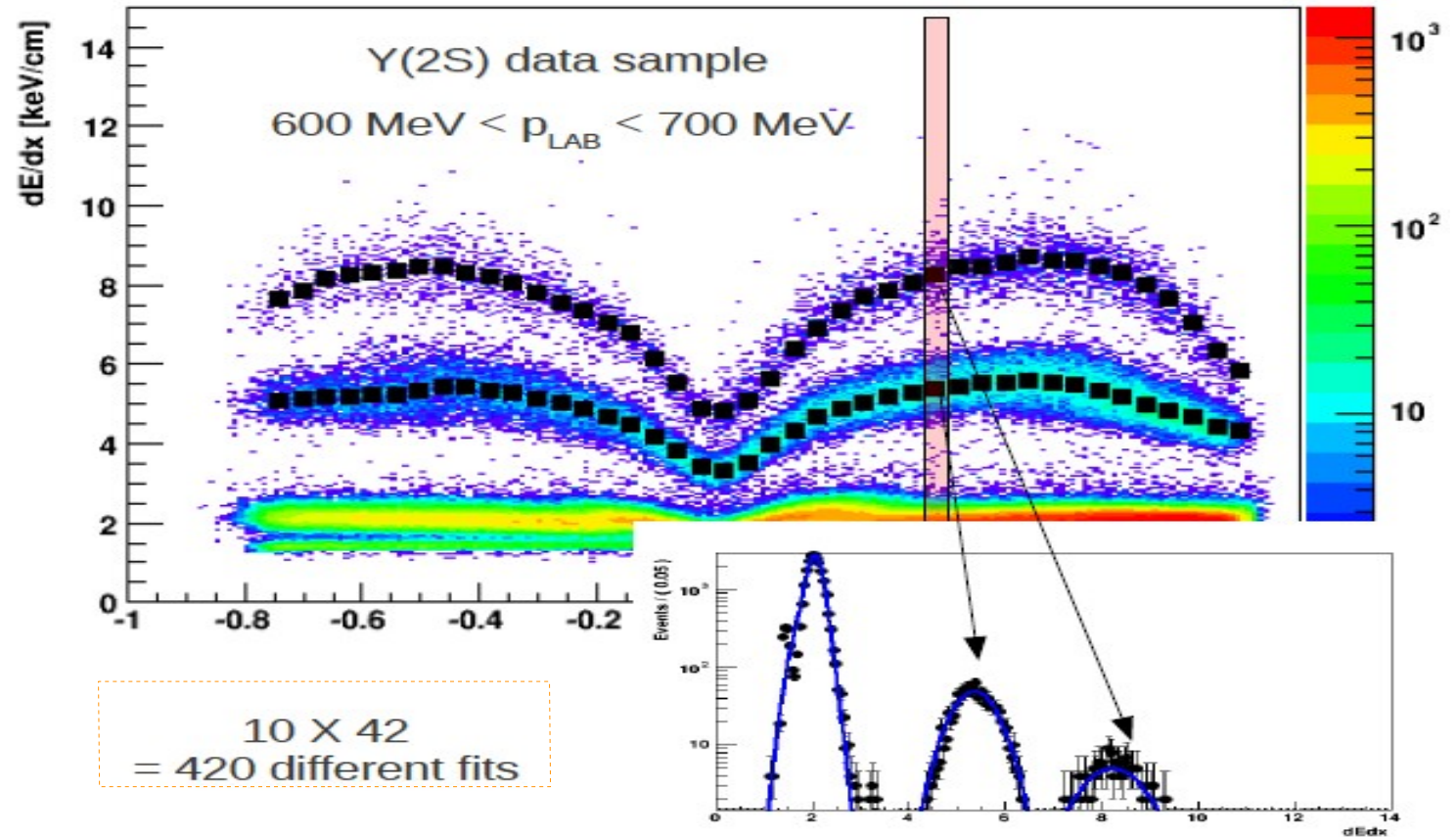
Y(2S) data sample,
exp 71



Y(1S) data sample,
exp 65

The angular dependence does depend only from the experiment number, not from the energy in the centre of mass

Y(2S) data sample, exp 71

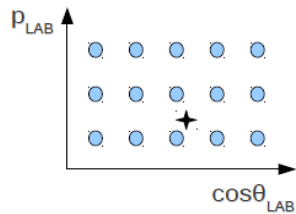


- Corrections $c = c(p_{\text{LAB}}, \cos\theta_{\text{LAB}})$
- Each bin of p_{LAB} : 42 bins of $\cos\theta_{\text{LAB}}$
- Fit with 4 gaussian
- Correction parameters: extract mean values of deuteron and tritons distribution
- 2 sets of corrections for each bin of momentum

CORRECTION PARAMETERS, dE/dx_{corr}

New Y(2S) data sample, exp 71

Discrete lattice in $\cos\theta_{\text{LAB}}$ p_{LAB} plane

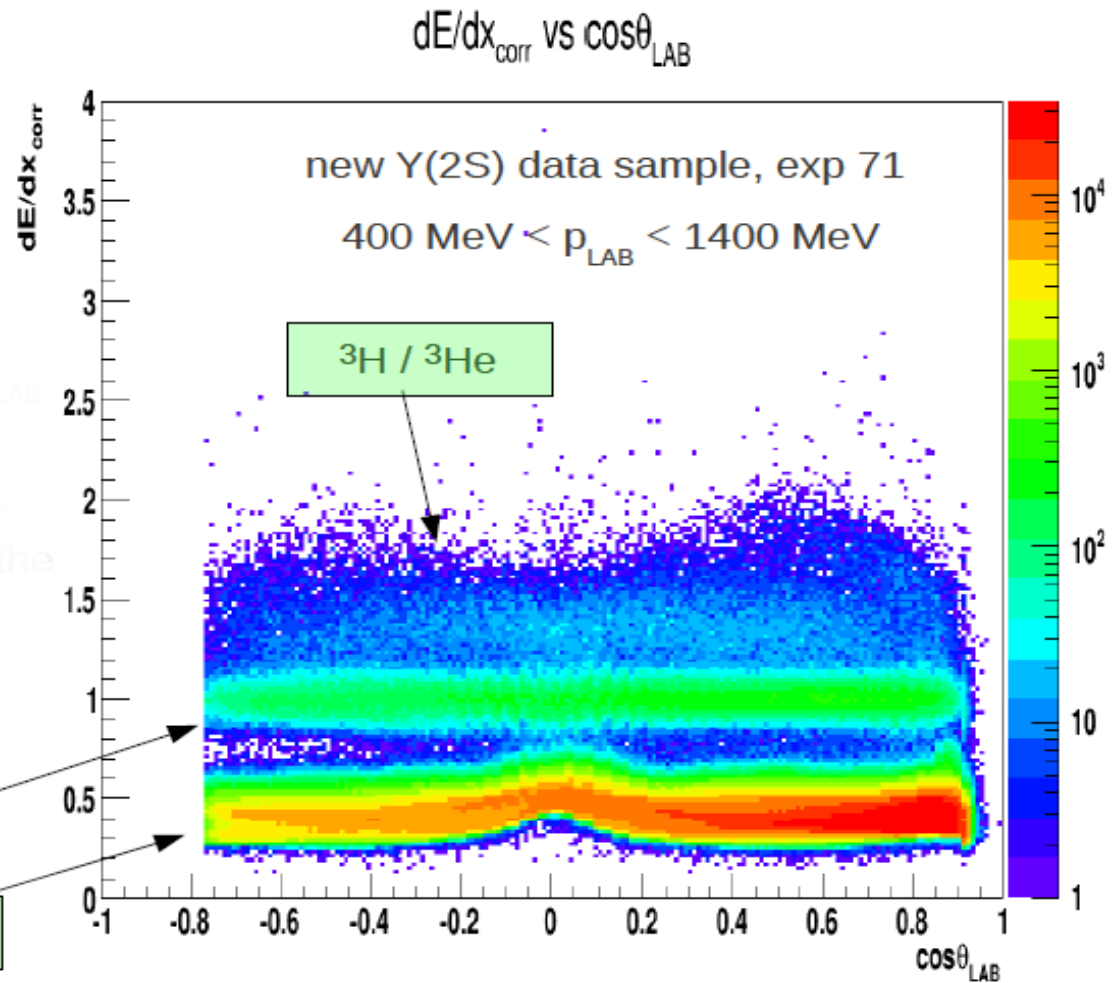


Corrections applied point by point:
weighted average of the four closest
corrections (\rightarrow corrPar)

$$dE/dx_{\text{corr}} = dE/dx_{\text{meas}} / \text{corrPar}$$

Deuterons

Protons, pions & Kaons



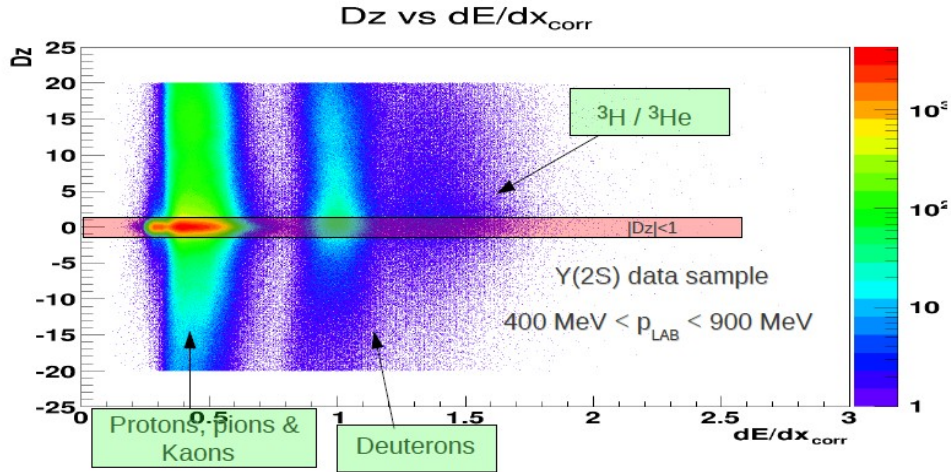
IMPACT PARAMETER Dz:

(tracks coming directly from Y(2S) decays are produced near the IP)

Cutoff value:

$$|Dz| < 1$$

Positive tracks



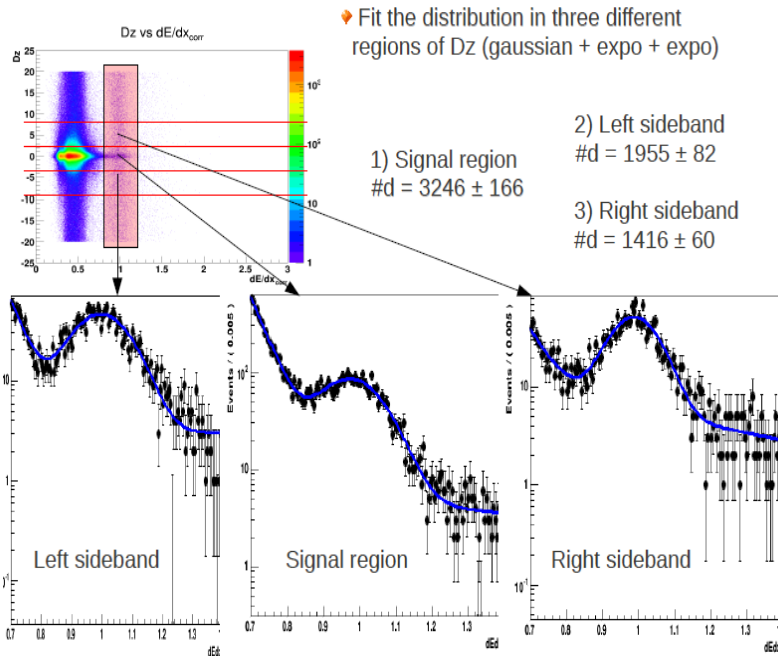
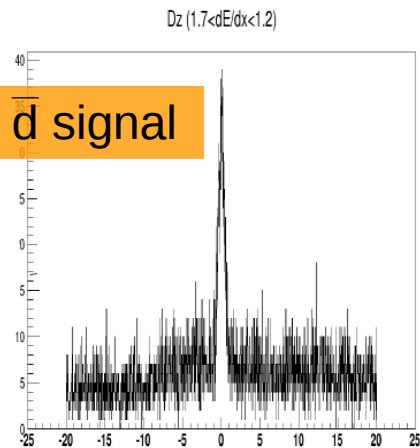
PRELIMINARY RESULT

$$\#d_{\text{exp71}} = \#d_{\text{sig}} - 1/2(\#d_{\text{sx}} + \#d_{\text{dx}})$$

$$= 1561 \pm 170 \text{ (11\% statistic)}$$

Estimated acceptance:
30% ± 5% (toy MonteCarlo)

Negative tracks



$$\#d_{\text{exp71}} = 4683 \pm 510$$

(±750 including σ_{acc})

a.a.c.

$$\#d_{\text{CLEO_BF}} = 4040 \pm 600 \text{ (15\%)} \quad \text{CLEO BF}$$

Compatibility: 0.8 σ
(0.6 σ including σ_{acc})