B_s mixing with Dipole

SLD Physics Meeting
5/26/00
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S. Willocq

- Dipole with vxalone tracks: performance, cut tuning
- Status of analysis

Implementation of vxalone-trks:

1) Track selection

a) usual qual. trk selection → qual. list

b) bbgtvxo, bbvlink, bbattvxo $\Big\}$ list of vxo trks

c) ZVTOP 3 finds B, D vertex
using qual. tracks only

d) attach vxo to existing vertices
using L/D

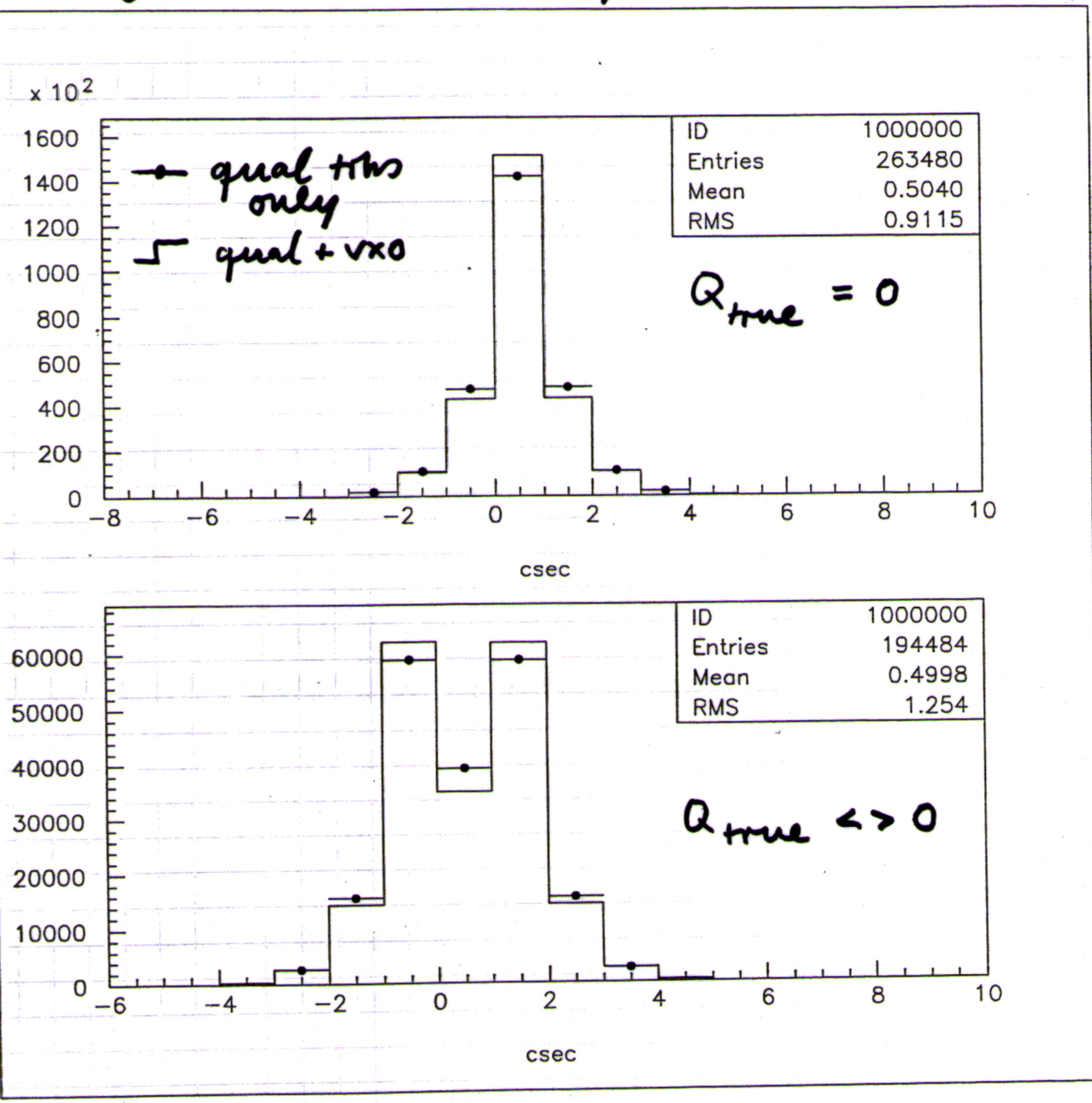
2) Basic topological selection (Mass...)

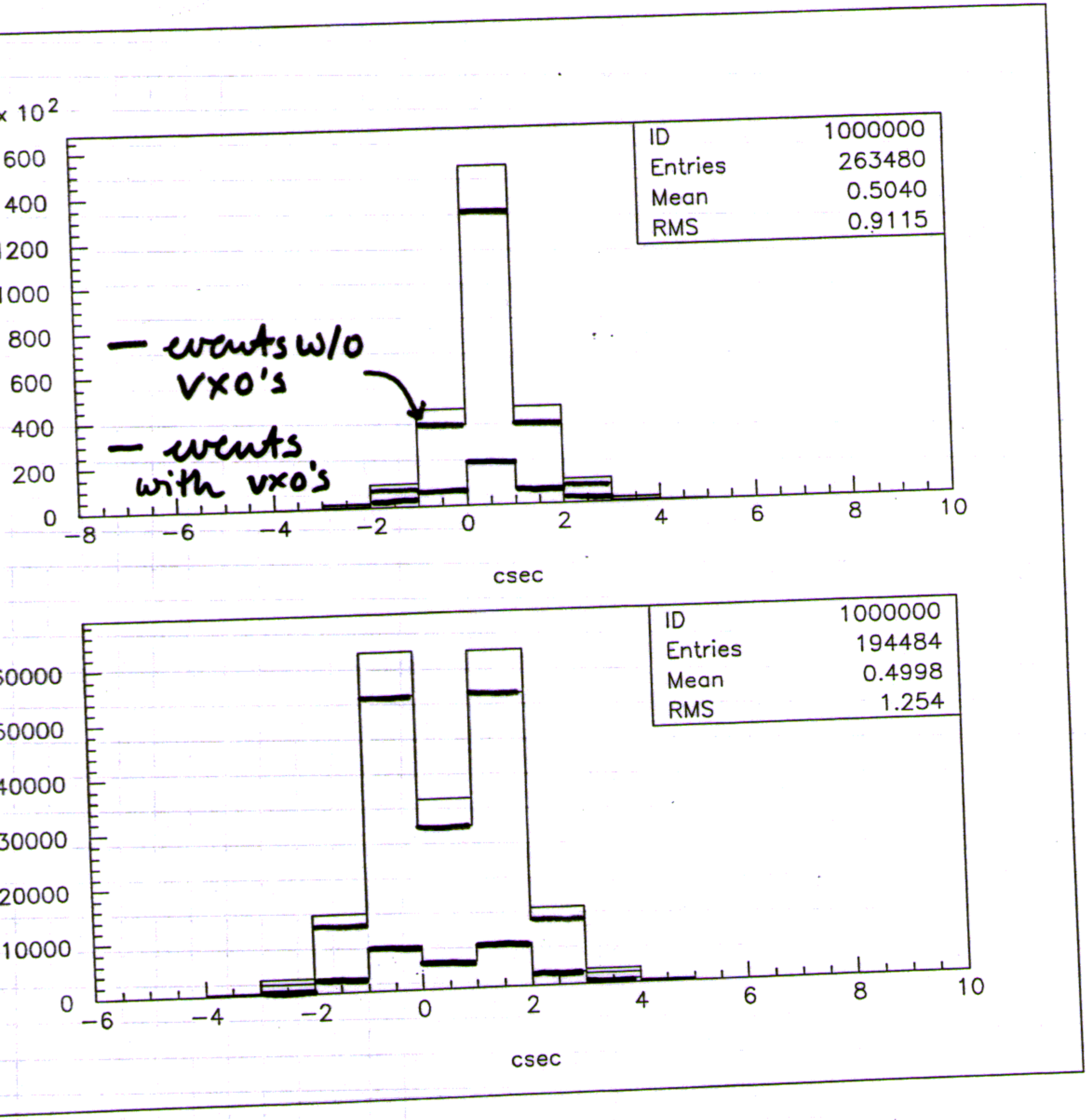
3) Dipole selection $Q^{tot} = 0 \quad Q_B \neq Q_D$

min. sep., etc..

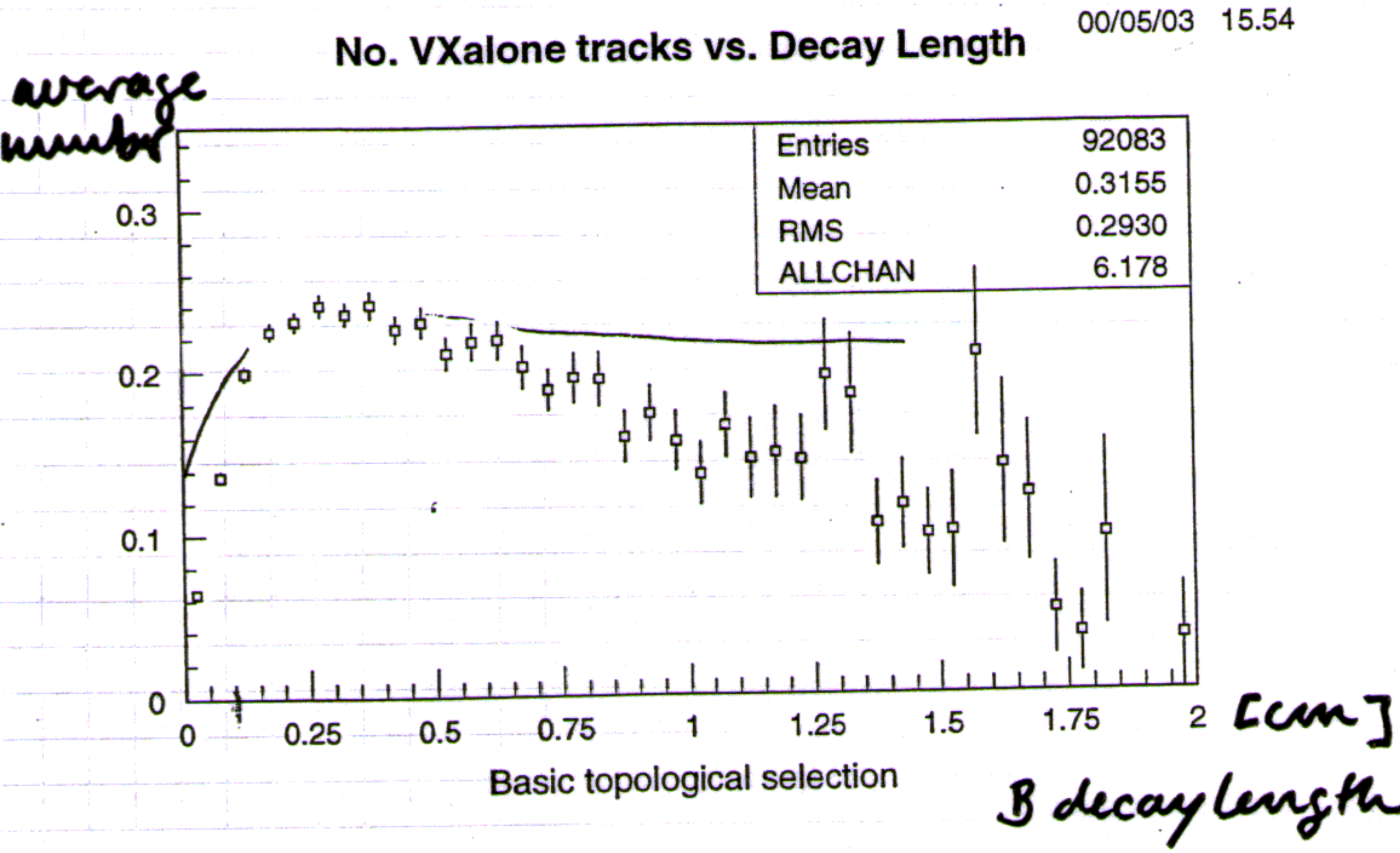
as usual: $S \propto \sqrt{N_{dip}} \cdot f_{B_s} (1-2\eta)$

$b\bar{b}$ MC basic top. selection




x 10^2
ID 1000000
Entries 263480
Mean 0.5040
RMS 0.9115
— events w/o vxo's
— events with vxo's
csec
ID 1000000
Entries 194484
Mean 0.4998
RMS 1.254
csec

How many VXalone tracks per event?



Standard cuts:

Min. Dist IP - vxo track 500 μ

vxo - Impact parameter xy, z

→ regain vxo tracks at hi/lo decaylength new cuts:

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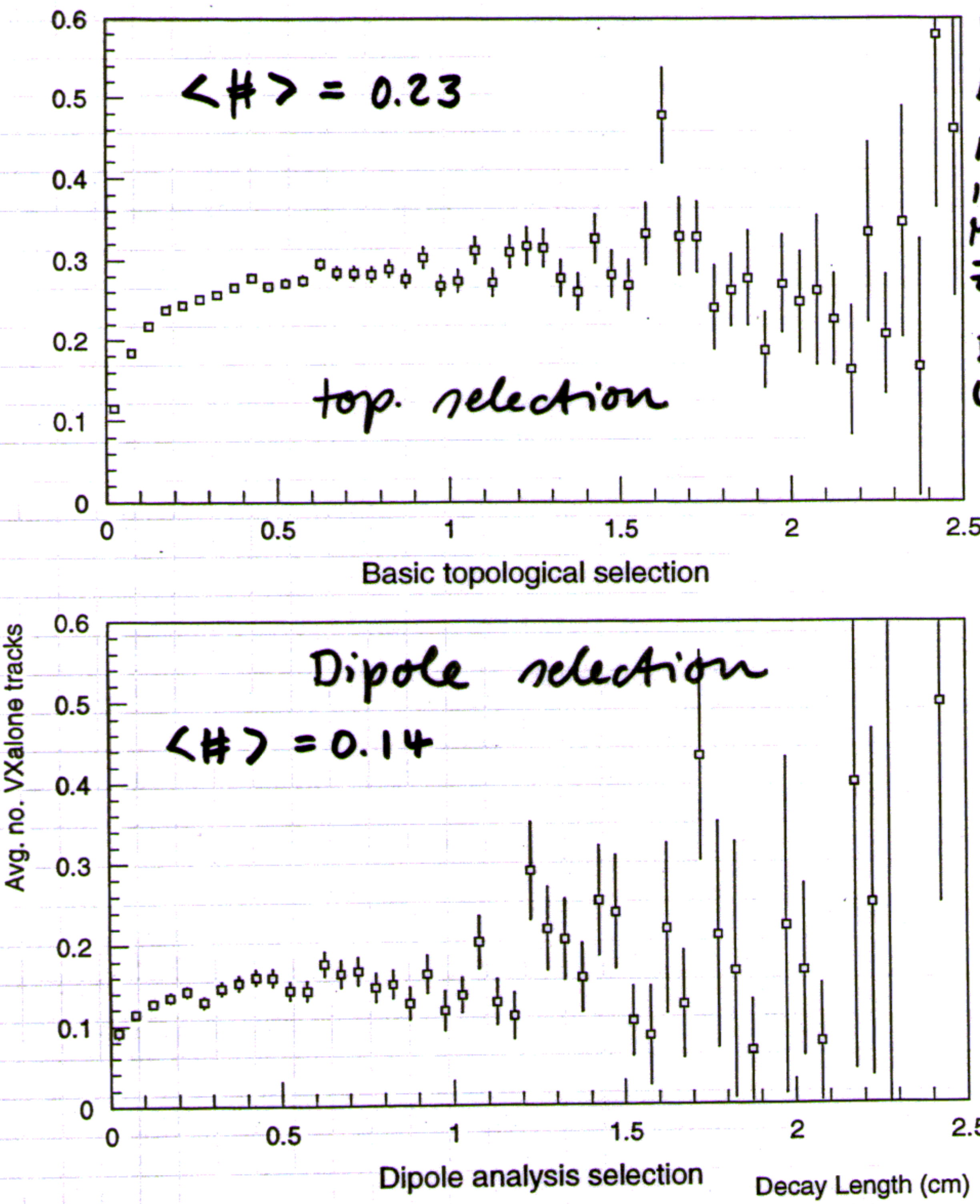
No. VXalone tracks vs. Decay Length



using:

BBGTVXOP.
implow = -1
imphigh = 1
Maxchi2 = 8
Z_cut = 1.5

BBVCVXOP.
Lodimin = 0.025

Why does #VXO drop with Dipole selection?

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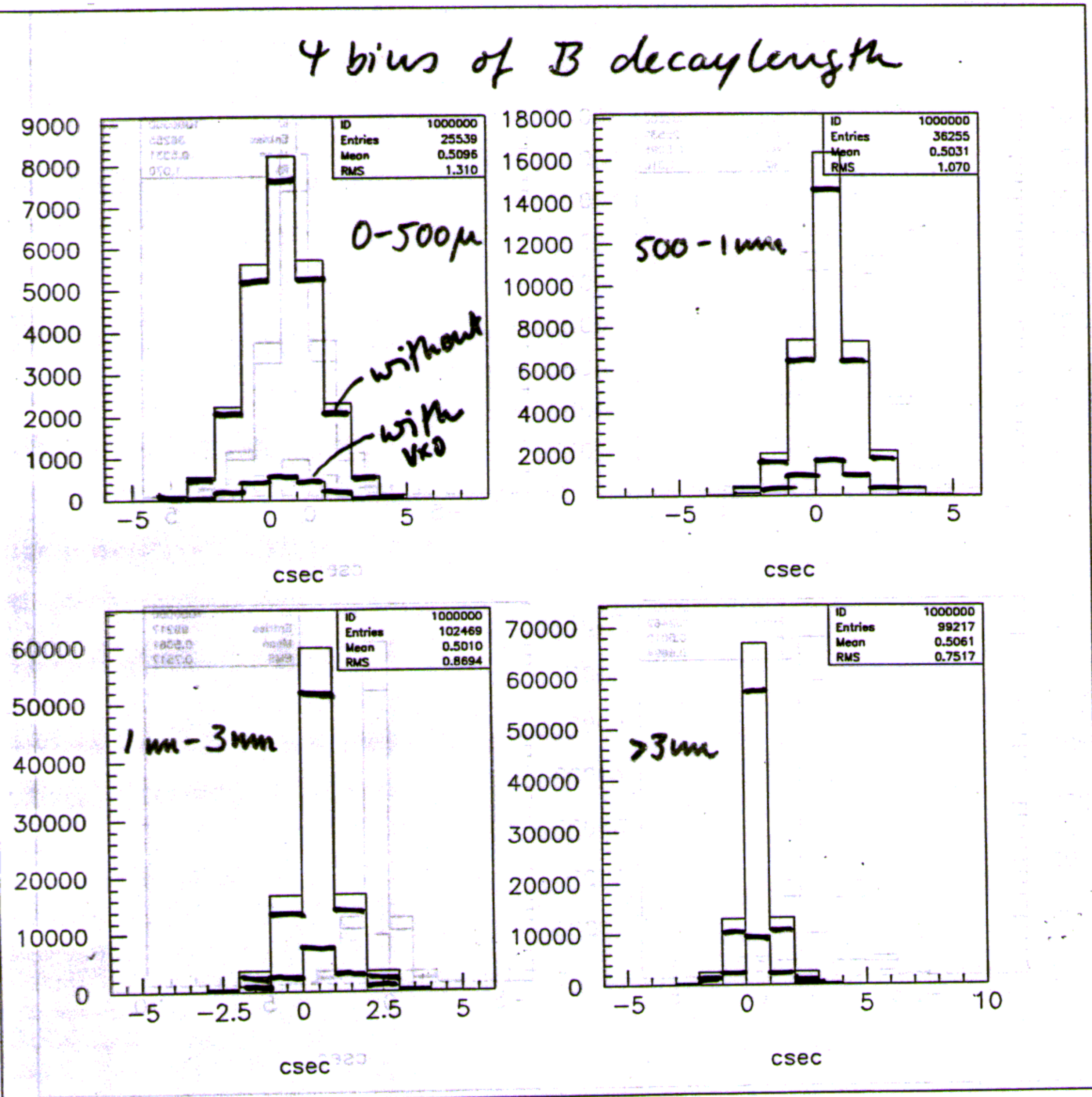
vxo's at small decaylength



events with vxo's

no vxo's attached

vx0 tracks :

basic top. selection :

$Q <> 0 \qquad \langle \# \rangle = 0.27$

$Q = 0 \qquad \langle \# \rangle = 0.17$

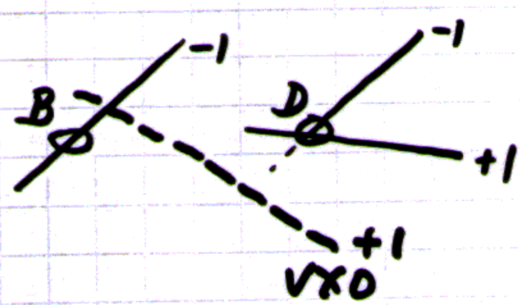
~60% of b hadrons are neutral
=> Q = 0 sample has mostly correct rec. charge
=> less likely to add vx0 trk.

Dipole selection :

$\langle \# \rangle = 0.14$

a) add. cut $\quad p_T(\mathrm{vx0}) < 4$ GeV

b) $Q^{\mathrm{qual+vx0}} = 0$ & $Q_B^{\mathrm{qu+vx0}} \neq Q_D^{\mathrm{qu.+vx0}}$



Full dipole analysis cuts

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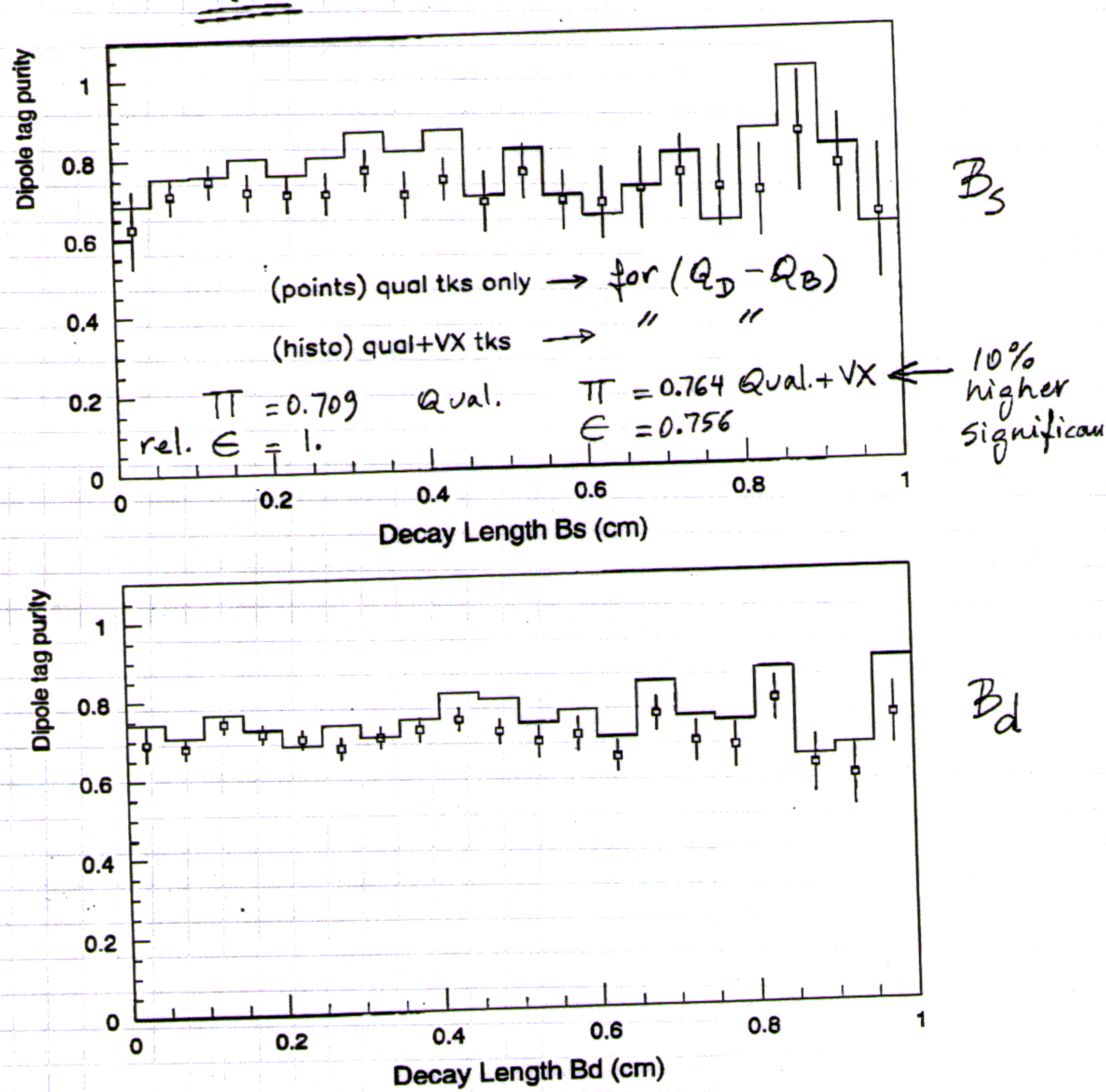
Dipole events with 1 or more VXalone trks



performance of vxo tracks

for : Neutral topological vertices

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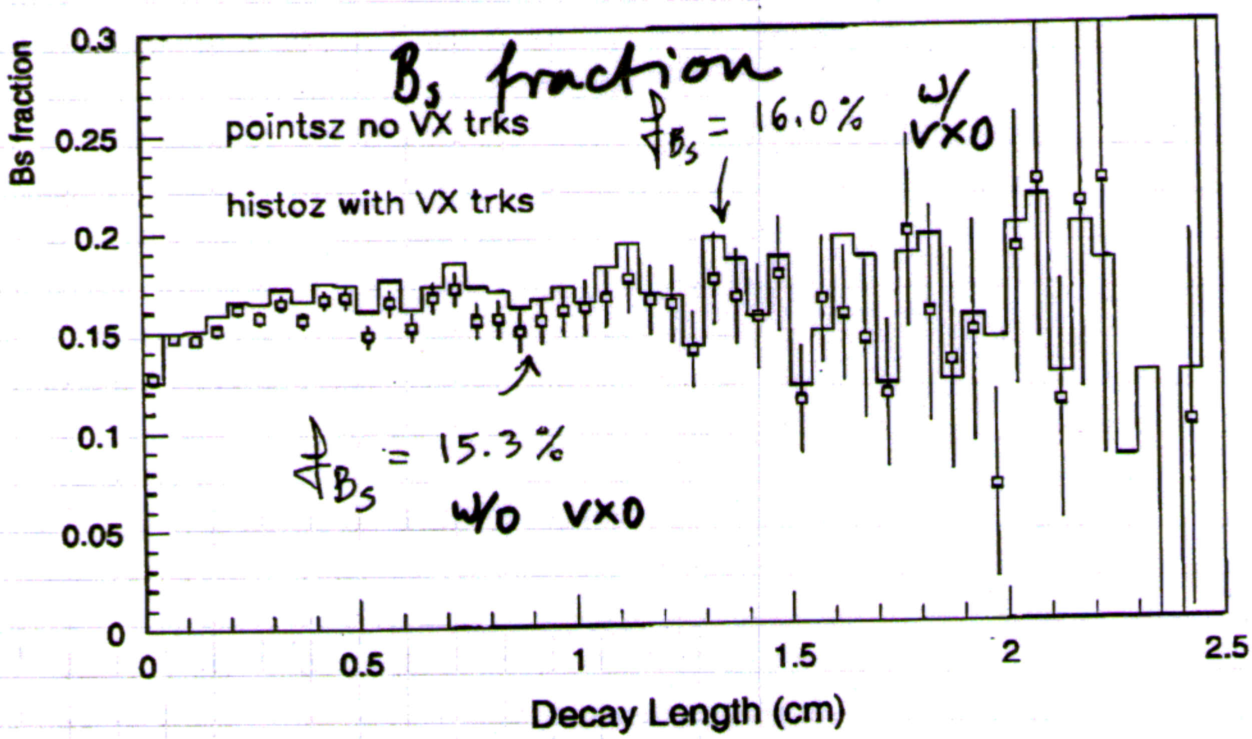
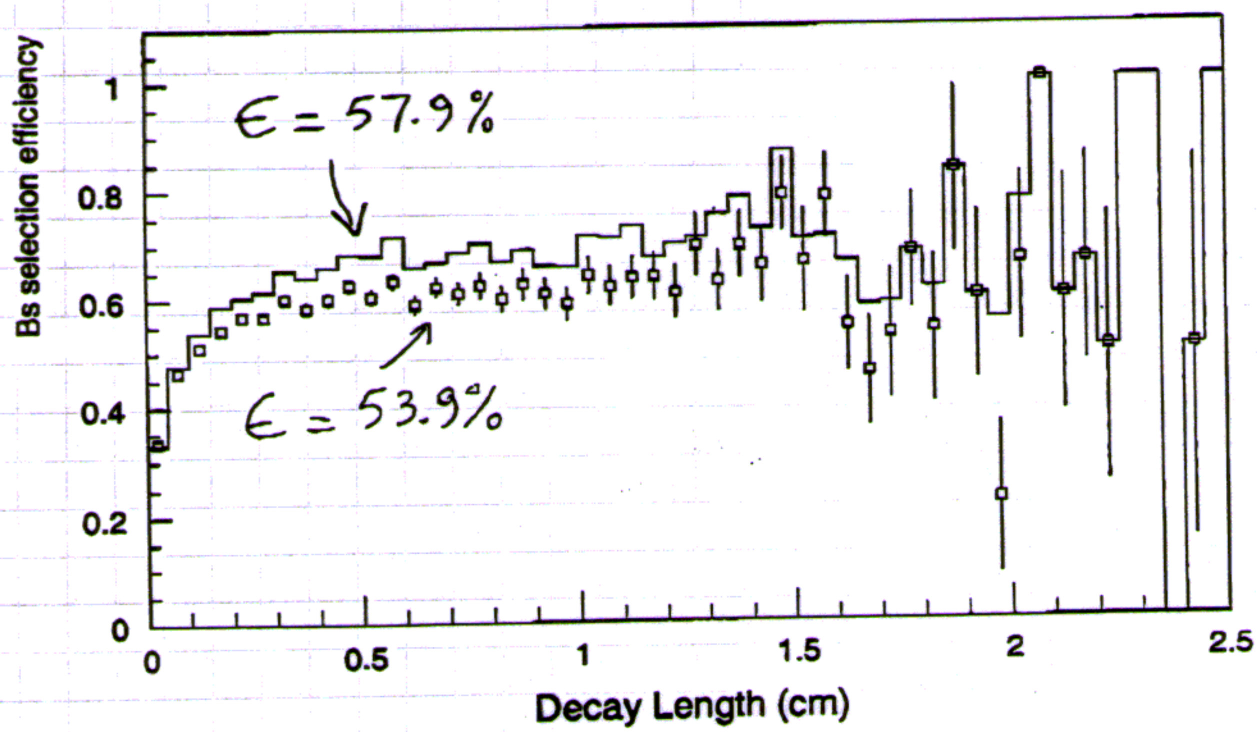




bottom line

full dipole cuts

	Qual trks	Qual + vxo
B_s fract.	17.6 %	18.4 %
B_s right dipole tag	82.1 %	82.1 %

$\Rightarrow$ extra 4.5 % in significance

(events w. ≥ 1 vxo track $\quad \pi = 75\%$)

may do better: Tom's vxo-track attachment
exploit linked tracks?
Aaron's latest

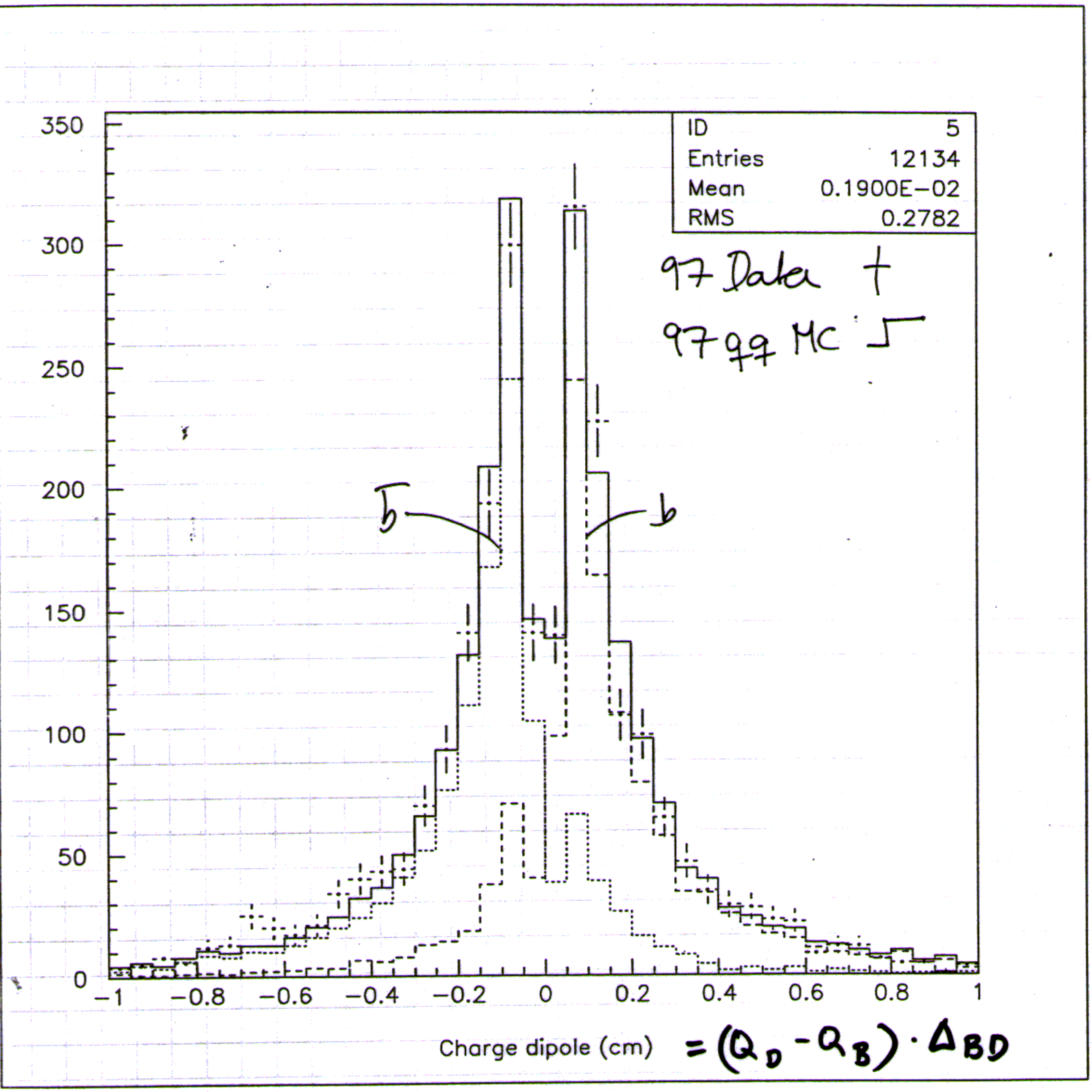
analysis frozen

Moving on to get Amplitude fits running

- Data / MC checks
- Parametrizations
  - using Dan's new boost reco
    - 16% improvement in tail resol.
    - 3% in core res
    - better centered
  - using Tracy's fake D-tracks
    - 10%-ish improvement in decaylength residual

crosscheck: $\sigma_t(MC) = \sigma_t(calc.)$?

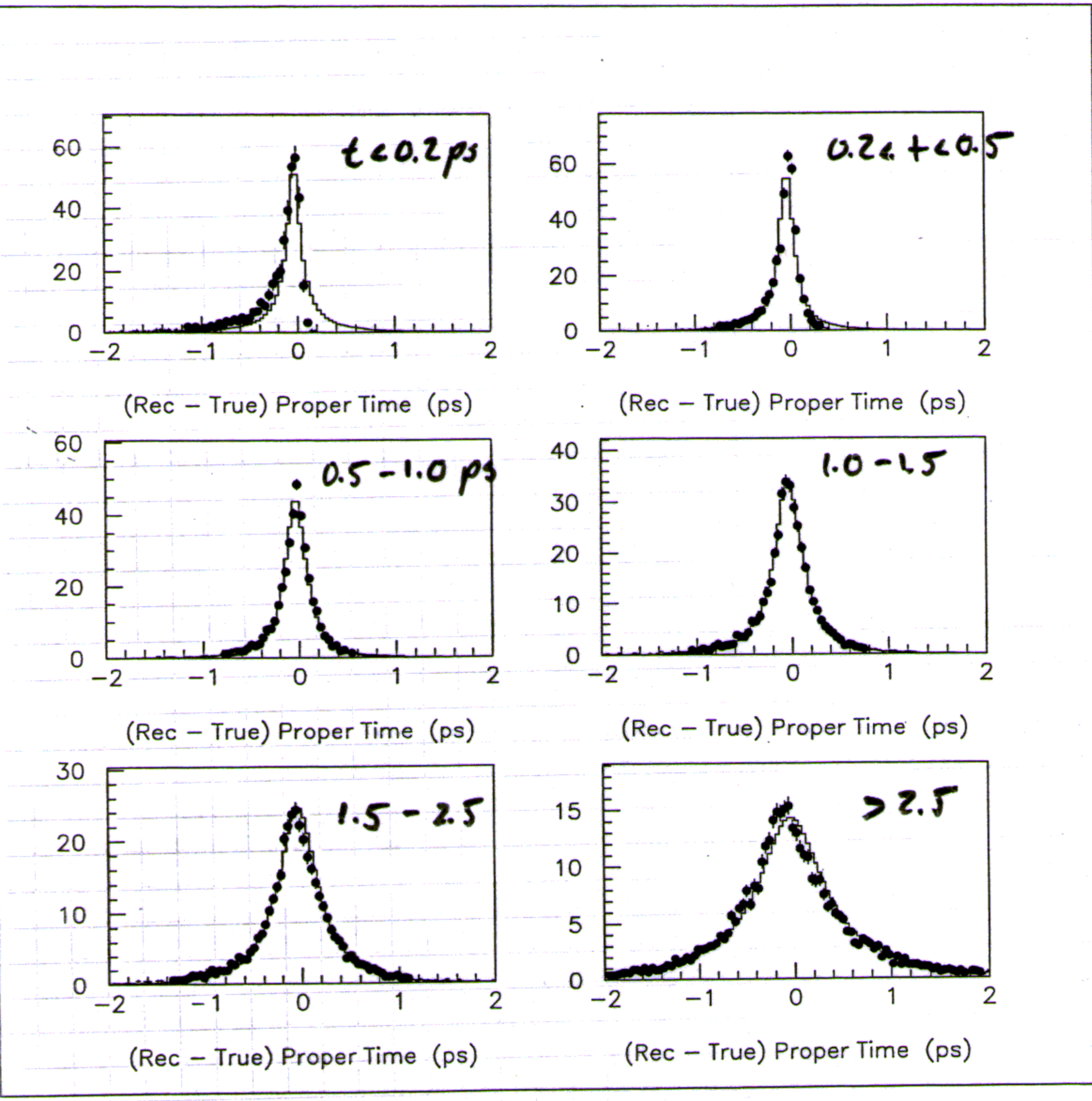
- Amplitudefits for MC



ID 5
Entries 12134
Mean 0.1900E-02
RMS 0.2782
97 Data
97 99 MC
$\bar{b}$
b
Charge dipole (cm) $= (Q_D - Q_B) \cdot \Delta_{BD}$

φ 97 b5 MC

⌐ calculate $\sigma_t = \sqrt{\left(\frac{\sigma_L}{\beta\gamma c}\right)^2 + t^2\left(\frac{\sigma_{\beta\gamma}}{\beta\gamma}\right)^2}$



try to parametrize offsets
& fold in correctly

~~Sum~~ Fall 97 $b\bar{b}$ MC ~~& Spr+Sum 98 $b\bar{b}$ MC~~

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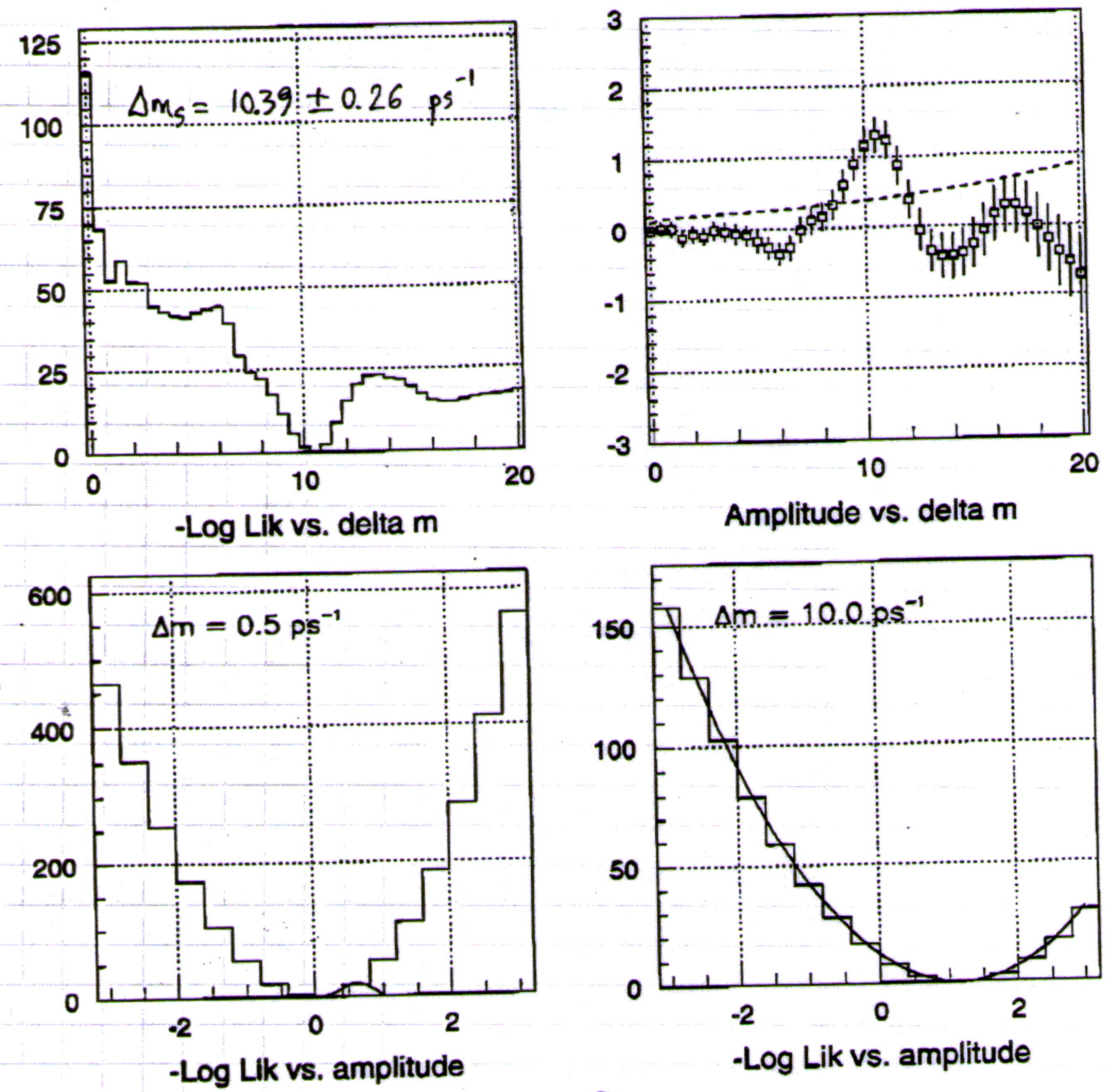
Dipole 97-98 R17 bbMC



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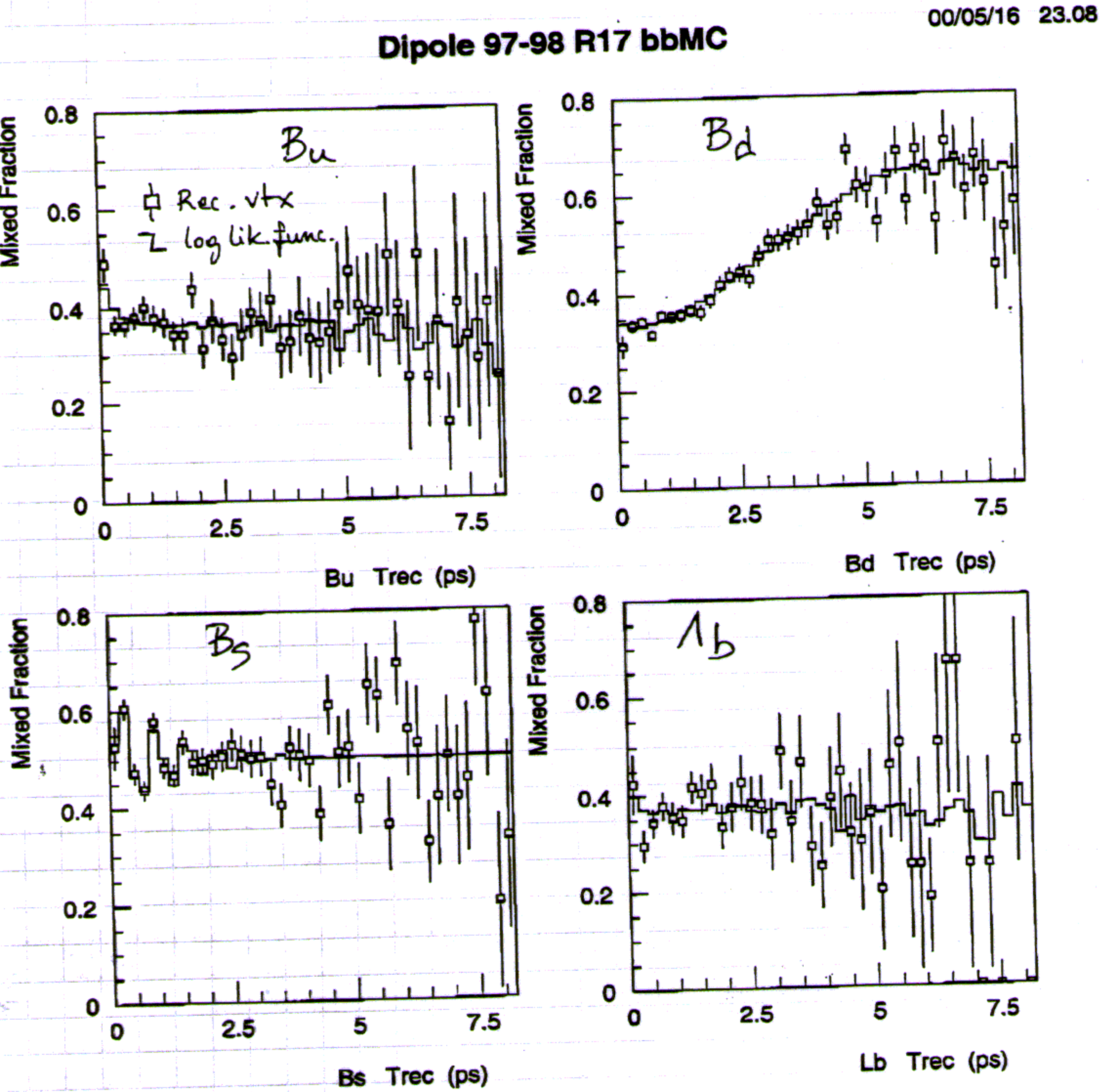
MIXED FRACTION vs. REC. PROPER TIME



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Summary: so far looking ok
lots of work ahead –