Group I Status Report

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FNAL Group Mtg. 30/04/2002

GROUP I Activities

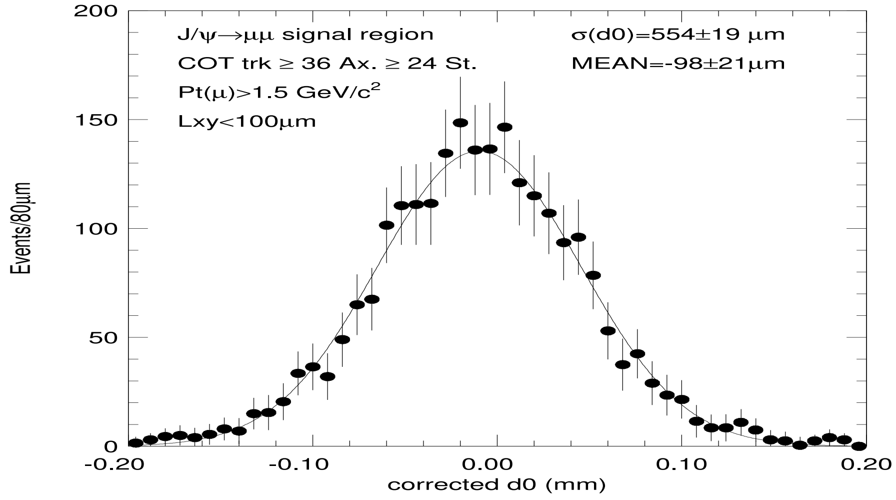
(A) Tracking performance study: /CDF/DOC/TRACKING/CDFR/5931
on-going effort on using conversion and Ks/Lambda outside SVX

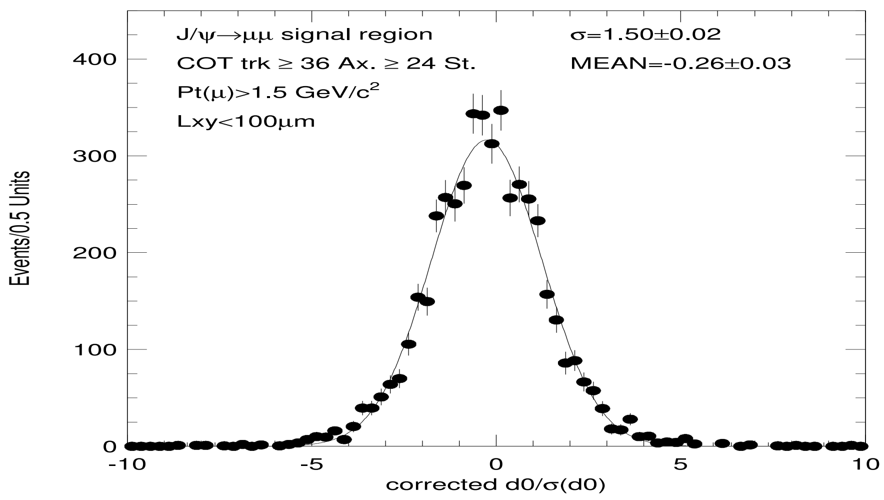
(B) Trigger validation and efficiency: CMX L1 trigger validation
CMU,CMX trigger efficiency using single CMUP4 triggered sample

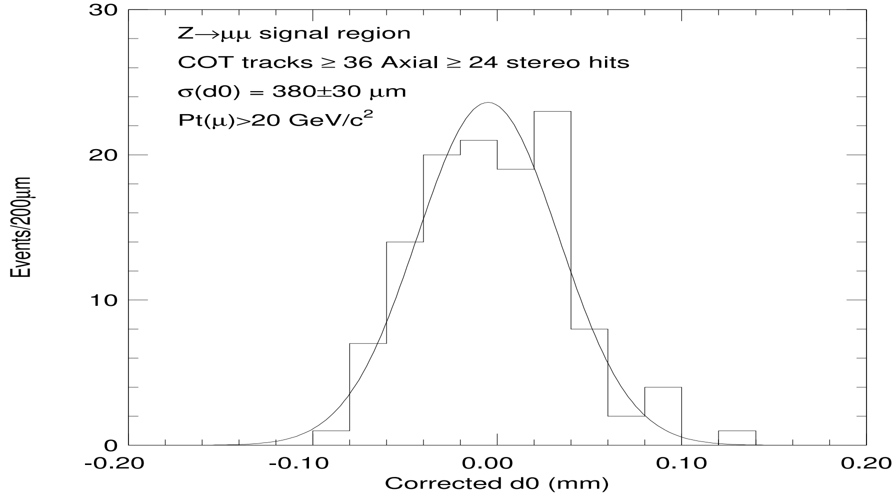
(C) Lep+SVT sample Electron reconstruction technique: using conversion to select unbiased pure electron to start with 3-prong vertex reconstruction

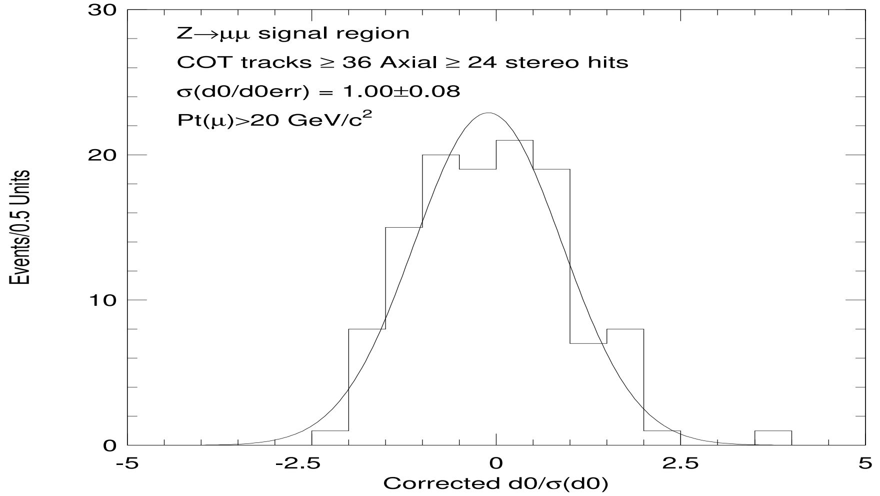
(D) B reconstruction: $B \to J/\psi X, \ (X = \pi, K^6*, K_s...)$

COT Tracking d_0 resolution





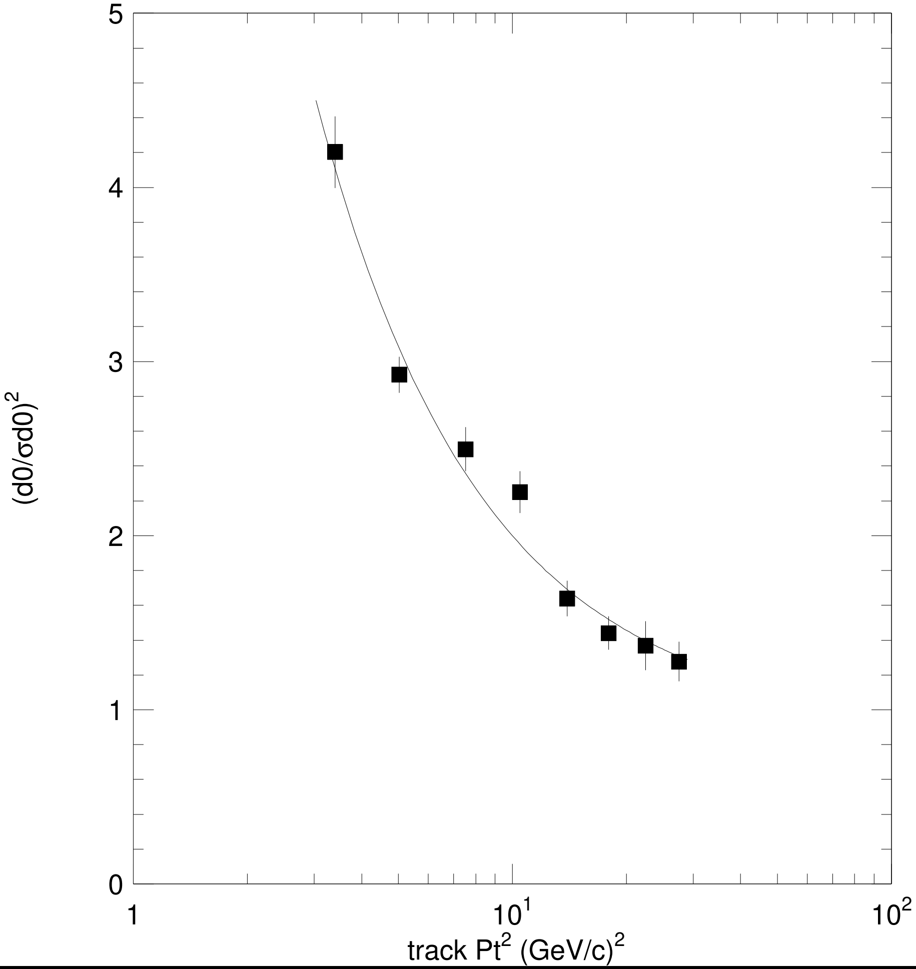




P_t Dependence of COT d_0

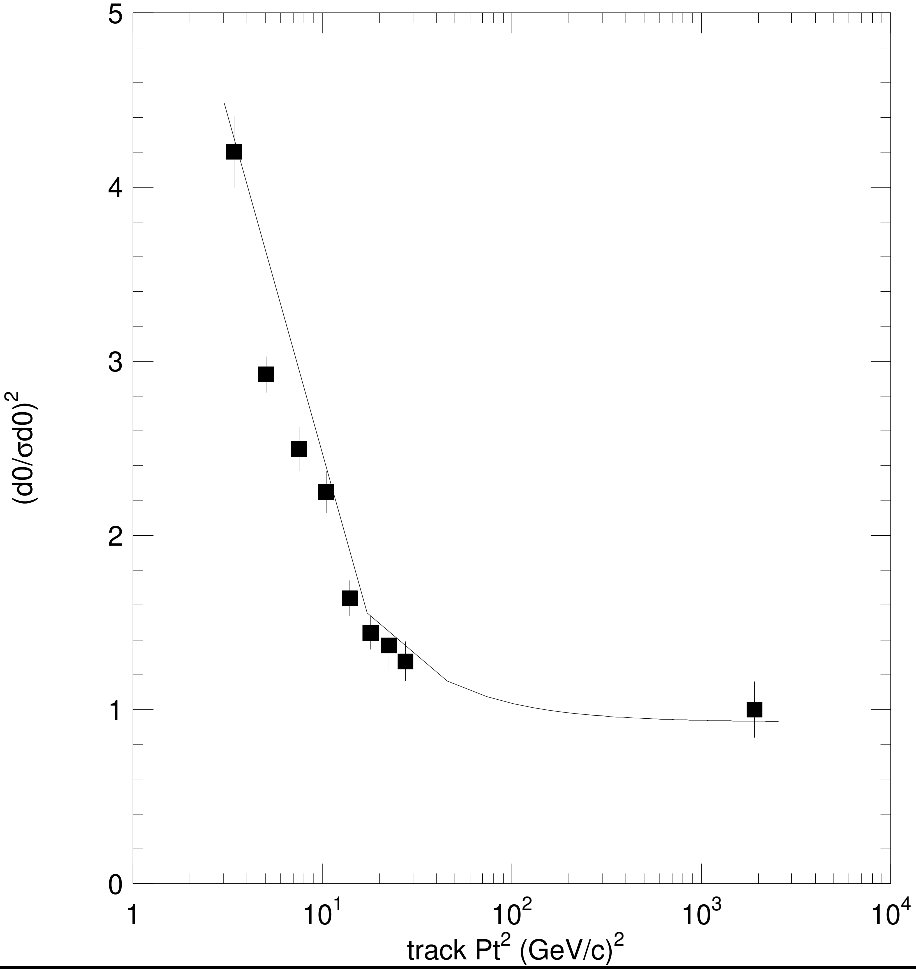
MINUIT χ^2 Fit to Plot 18&0
COT d0 pull square vs pt square
File: masspull.dat 18-APR-2002 01:11
Plot Area Total/Fit 17.597 / 17.597 Fit Status 3
Func Area Total/Fit 14.871 / 14.871 E.D.M. 7.999E-12
χ^2= 11.0 for 8 - 2 d.o.f., C.L.= 8.9%

Errors		Parabolic	Minos	
Function 1: multscat				
NORM	0.91282	± 7.4474E-02	- 7.4474E-02	+ 7.4474E-02
PARM01	10.865	± 0.6142	- 0.6142	+ 0.6142

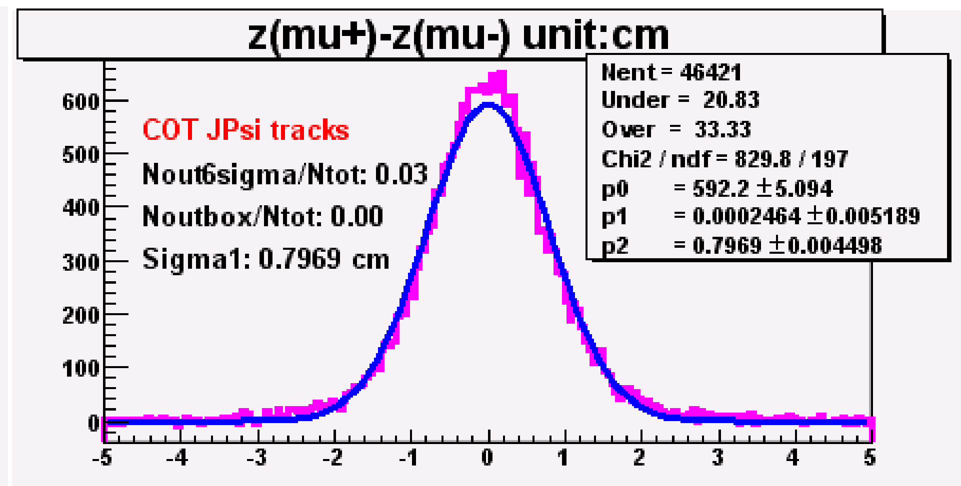


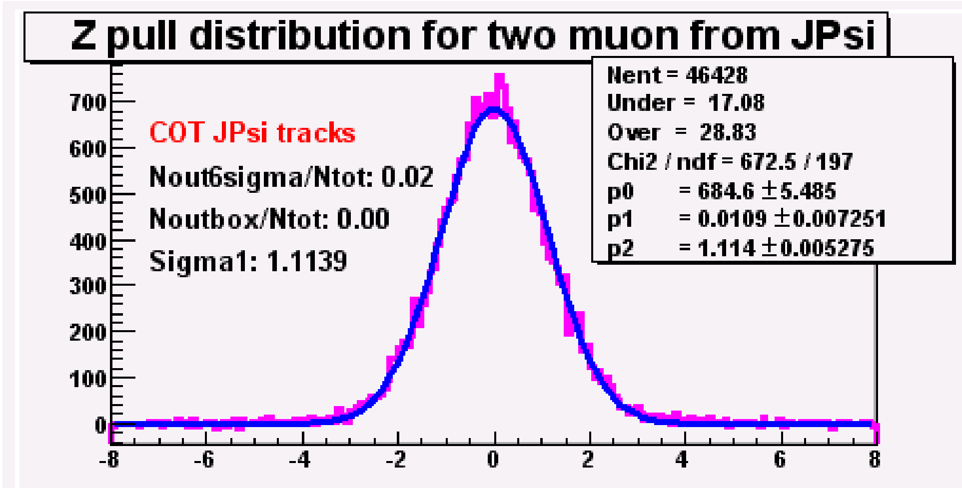
MINUIT χ^2 Fit to Plot 18&0
COT d0 pull square vs pt square
File: masspull.dat 18-APR-2002 01:06
Plot Area Total/Fit 18.597 / 18.597 Fit Status 3
Func Area Total/Fit 8.5743 / 8.5743 E.D.M. 2.780E-23
χ^2= 11.2 for 9 - 2 d.o.f., C.L.= 13.1%

Errors		Parabolic	Minos	
Function 1: multscat				
NORM	0.92729	± 6.7561E-02	- 6.7561E-02	+ 6.7561E-02
PARM01	10.766	± 0.5755	- 0.5755	+ 0.5755

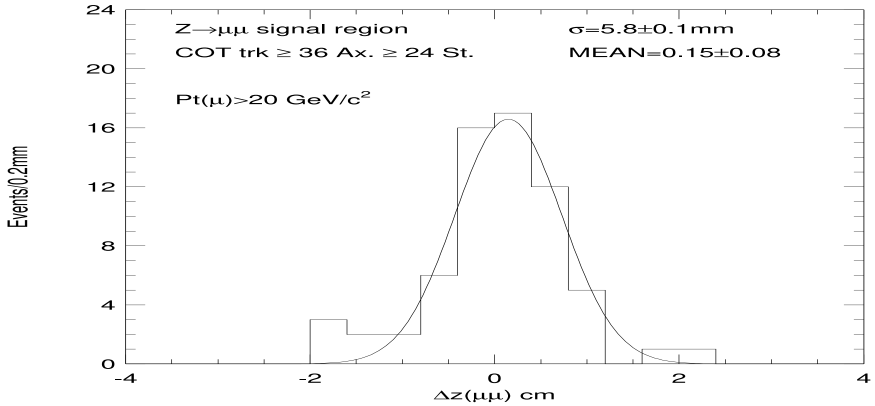


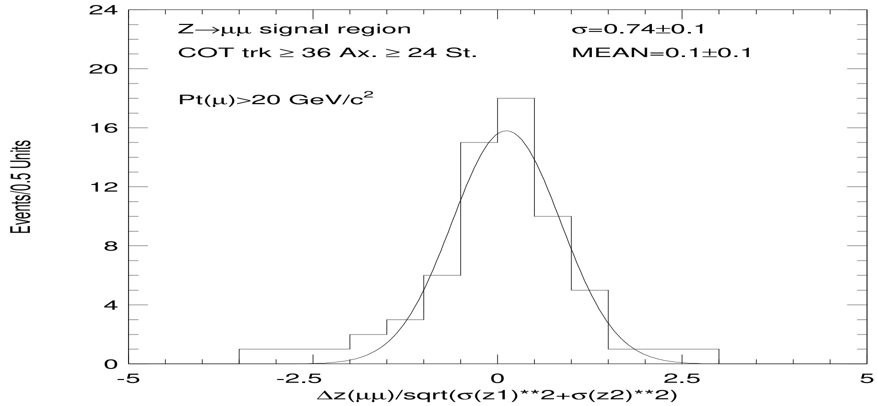
COT track z_0 resolution
K_s, J/ψ, Z





The z resolution of $J/\psi \to \mu\mu$ vertex measured with COT tracks.



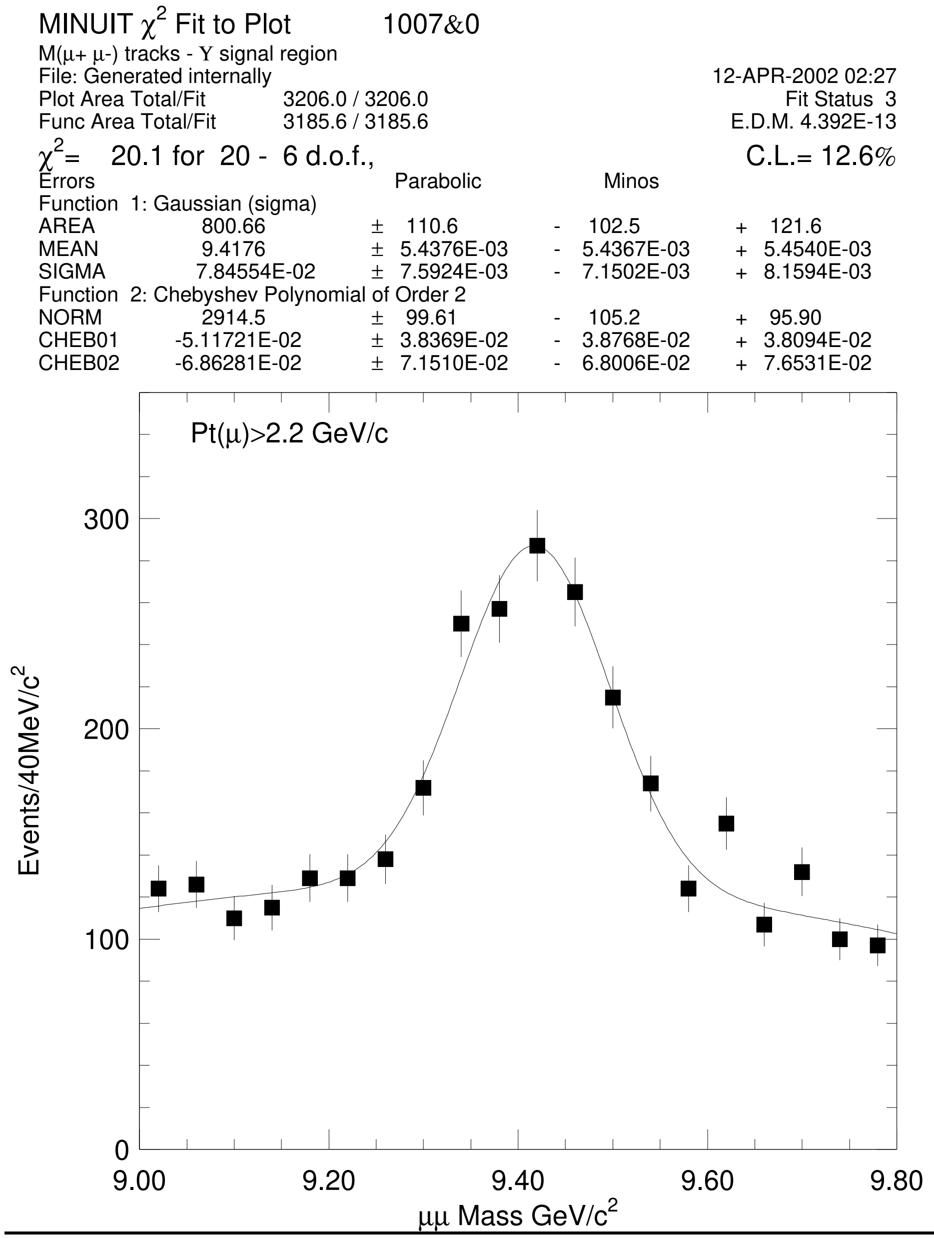


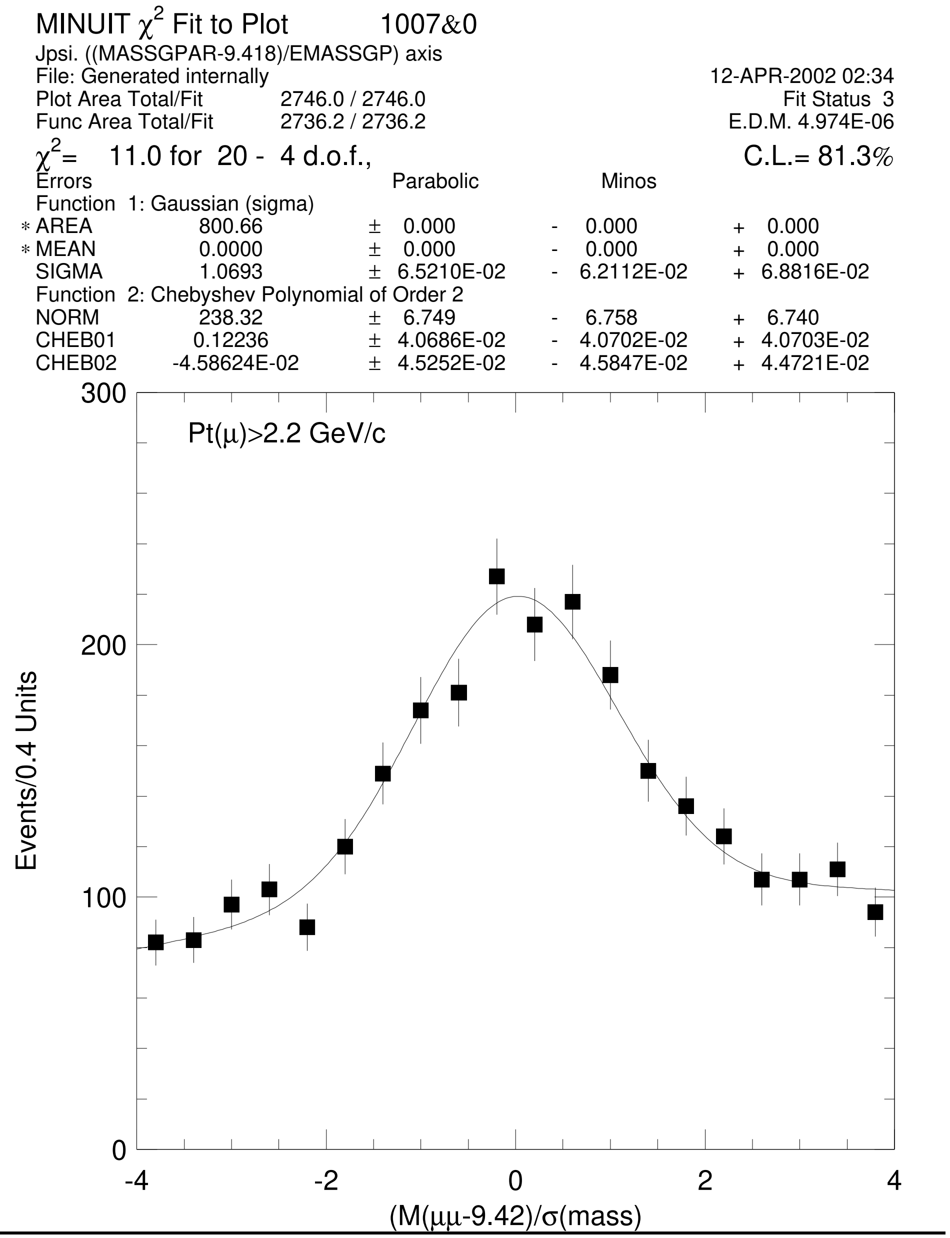
The z resolution of $Z \to \mu\mu$ vertex measured with COT tracks.

COT track z_0 resolution Summary

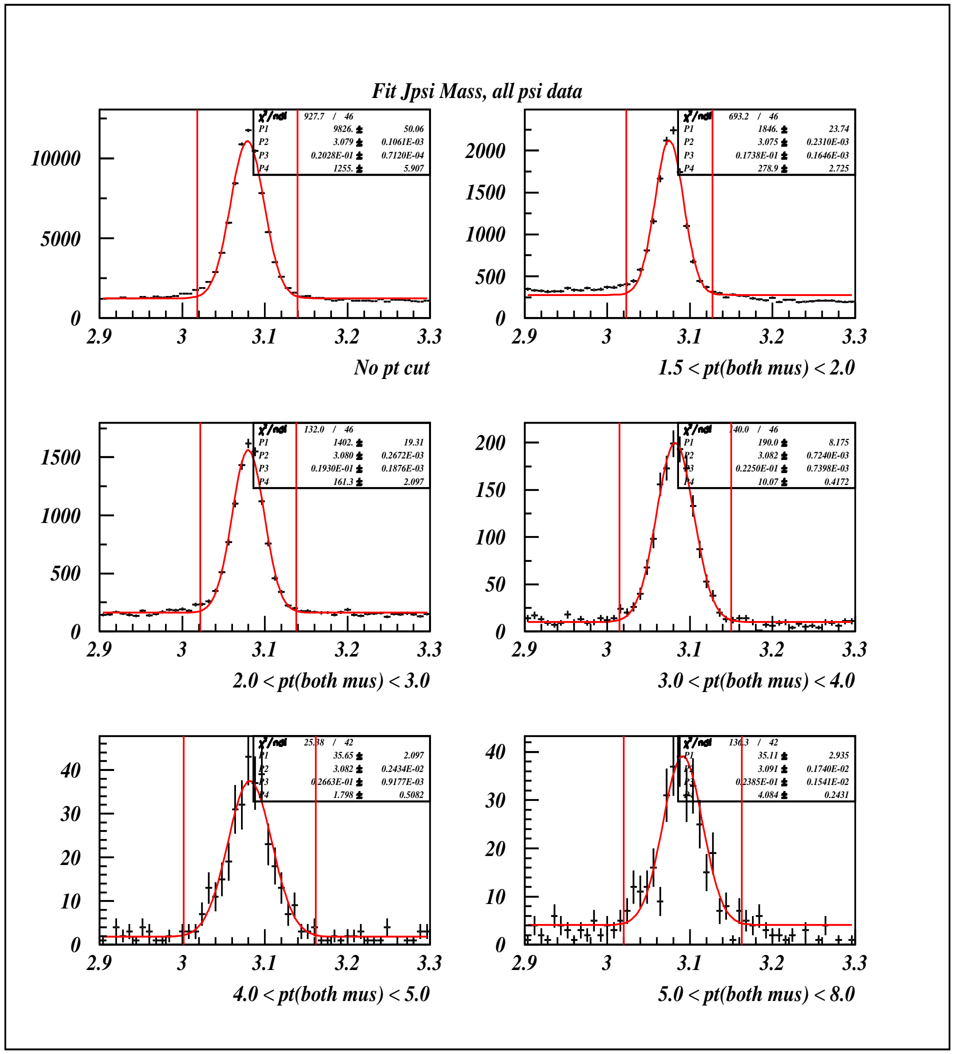
P_t range GeV/c	Method	σ_{z_0} mm	$\sigma_{pull}(z_0)$
$0.4 - 2$	K_s vertex	7.28 ± 0.01	1.47
$1.3 < P_t \sin^{3/2}\theta < 1.5$	J/ψ vertex	6.9 ± 0.4	
$1.5 < P_t \sin^{3/2}\theta < 1.7$	J/ψ vertex	6.6 ± 0.2	
$1.7 < P_t \sin^{3/2}\theta < 2.1$	J/ψ vertex	6.2 ± 0.1	
$2.1 < P_t \sin^{3/2}\theta < 2.7$	J/ψ vertex	5.5 ± 0.1	
$2.7 < P_t \sin^{3/2}\theta < 3.9$	J/ψ vertex	5.1 ± 0.2	
> 20	Z vertex	4.1 ± 0.07mm	0.74 ± 0.1

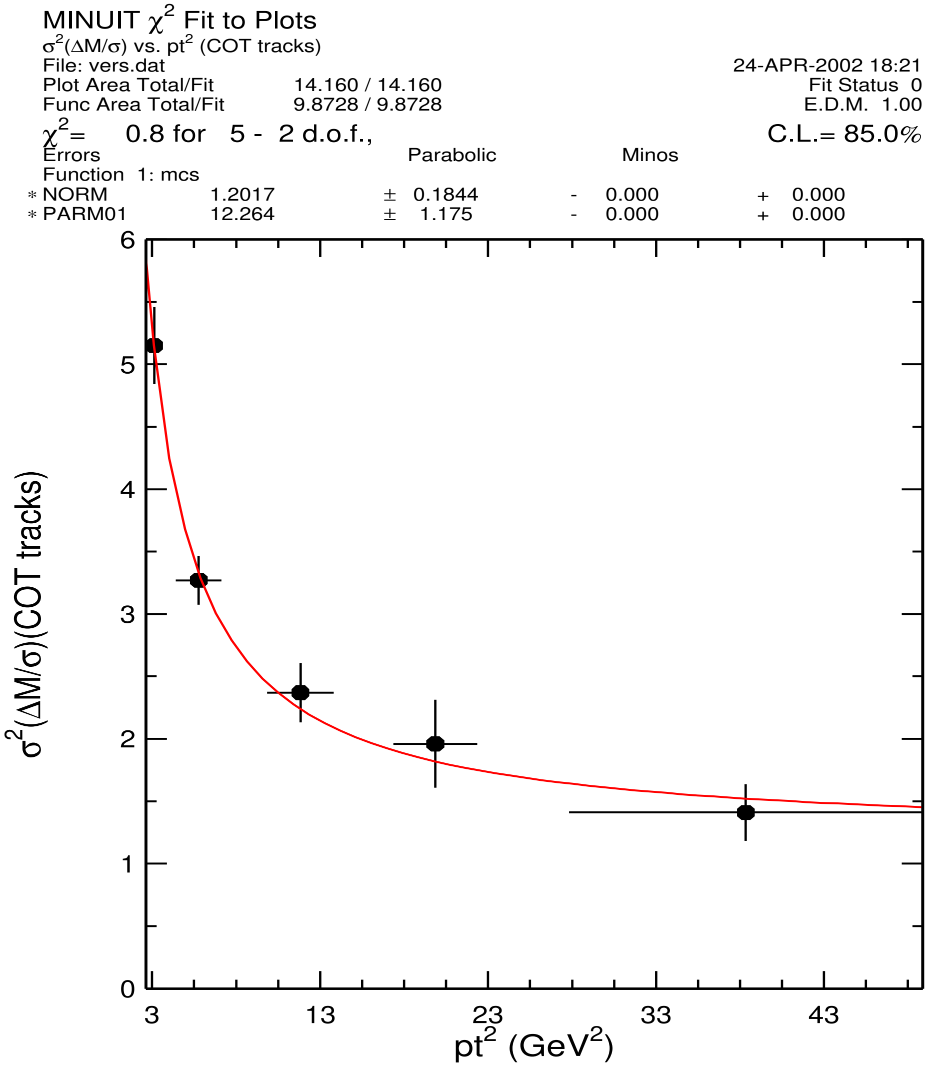
COT mass measurement $\Upsilon(1S)$





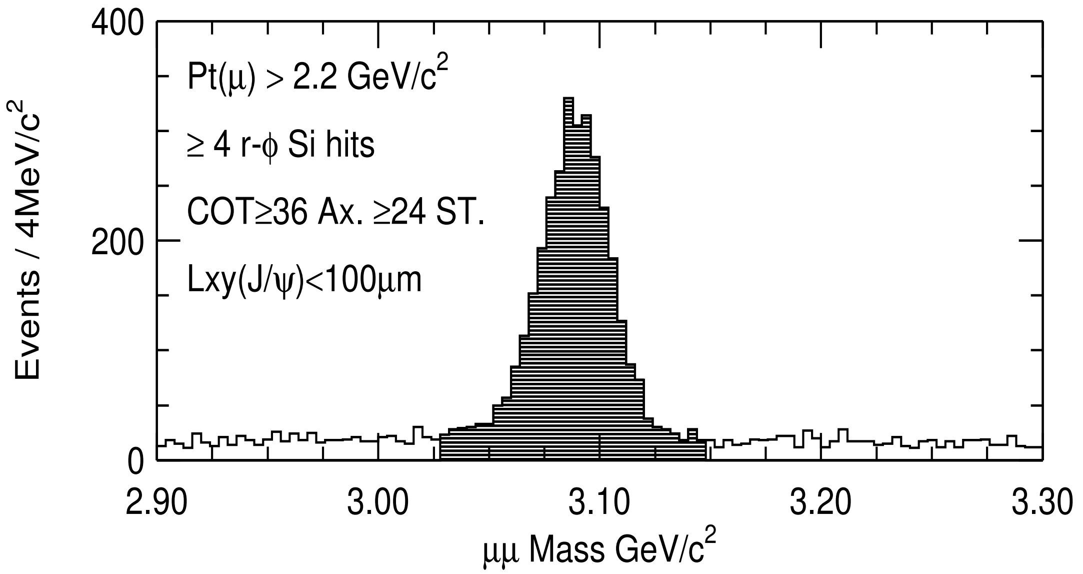
COT Mass measurement
J/ψ

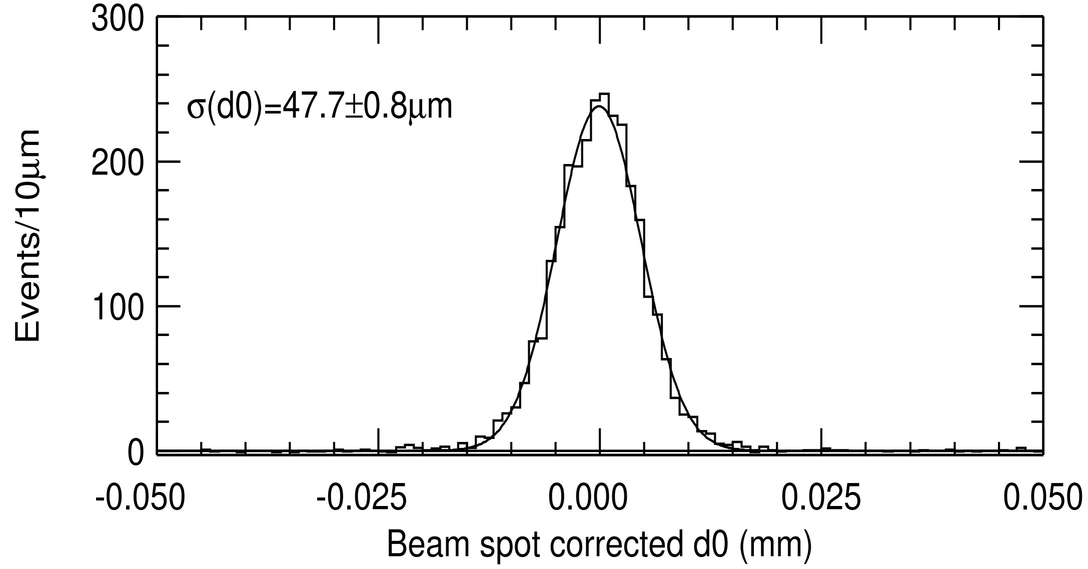




J/ψ invariant mass distributions and mass pulls in different P_t bins.

SVXII position resolution





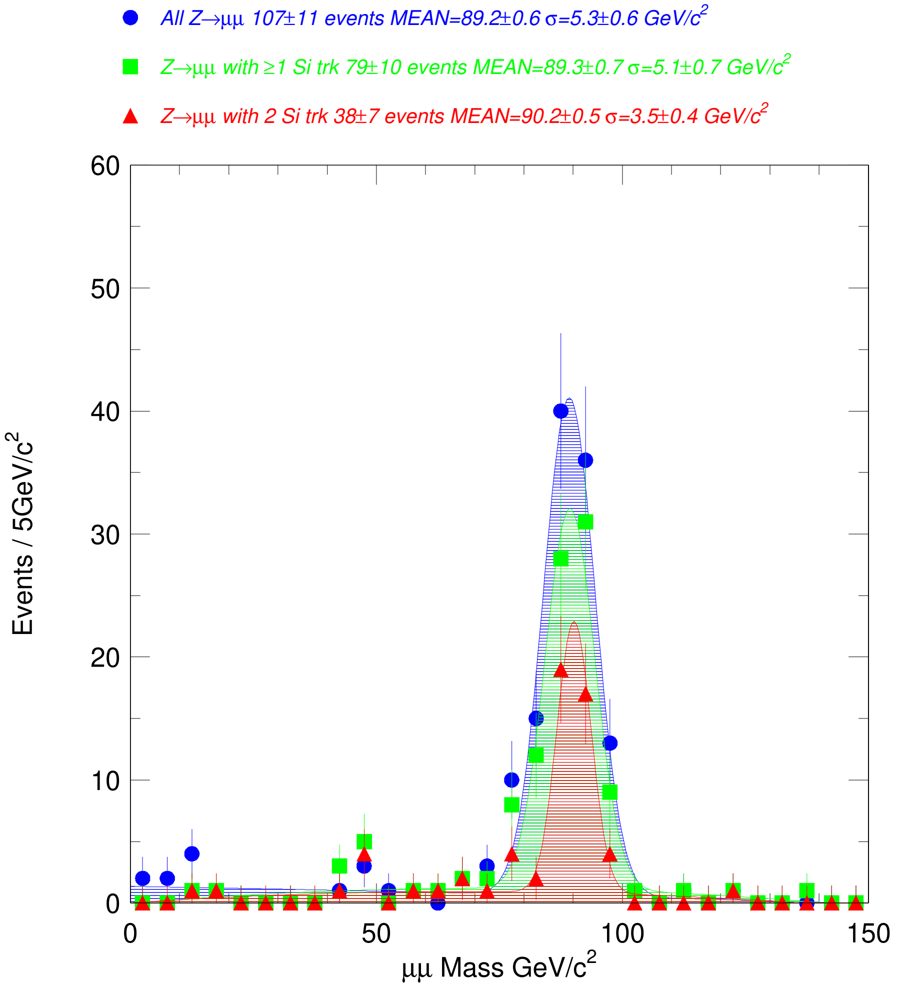
4.4.0int6 tracking

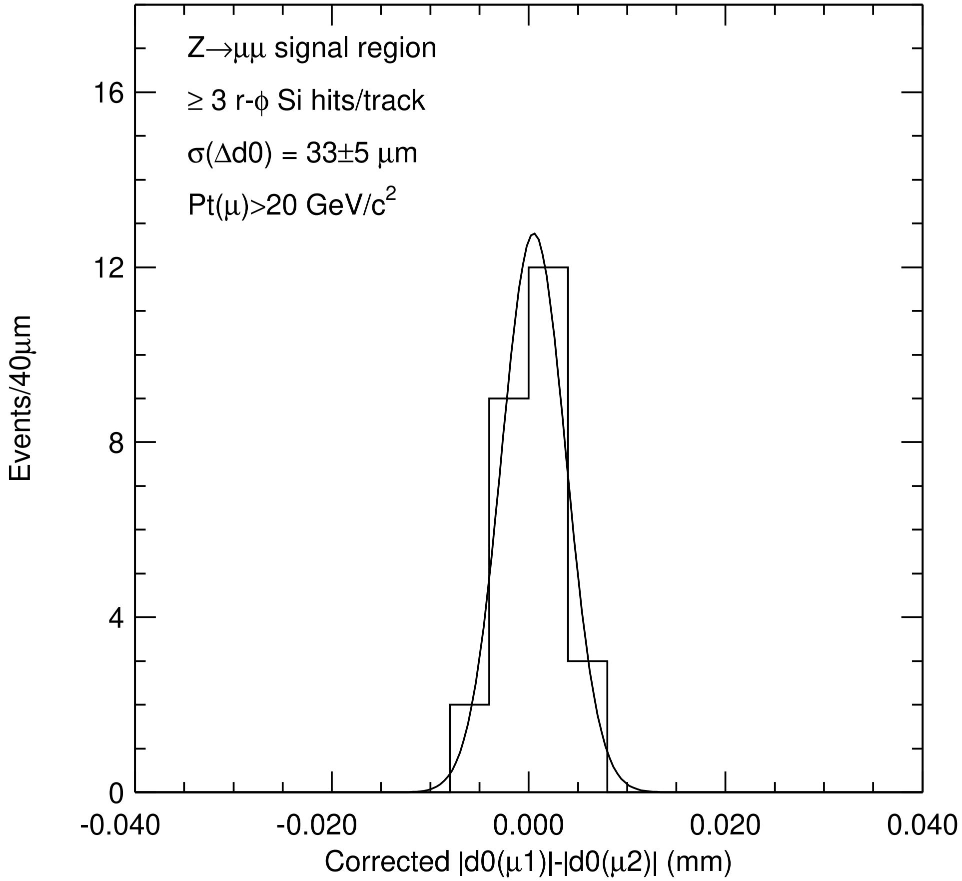
100020 2 TEST

Run 137024-138335

Default OI tracks (parent of OIZ)

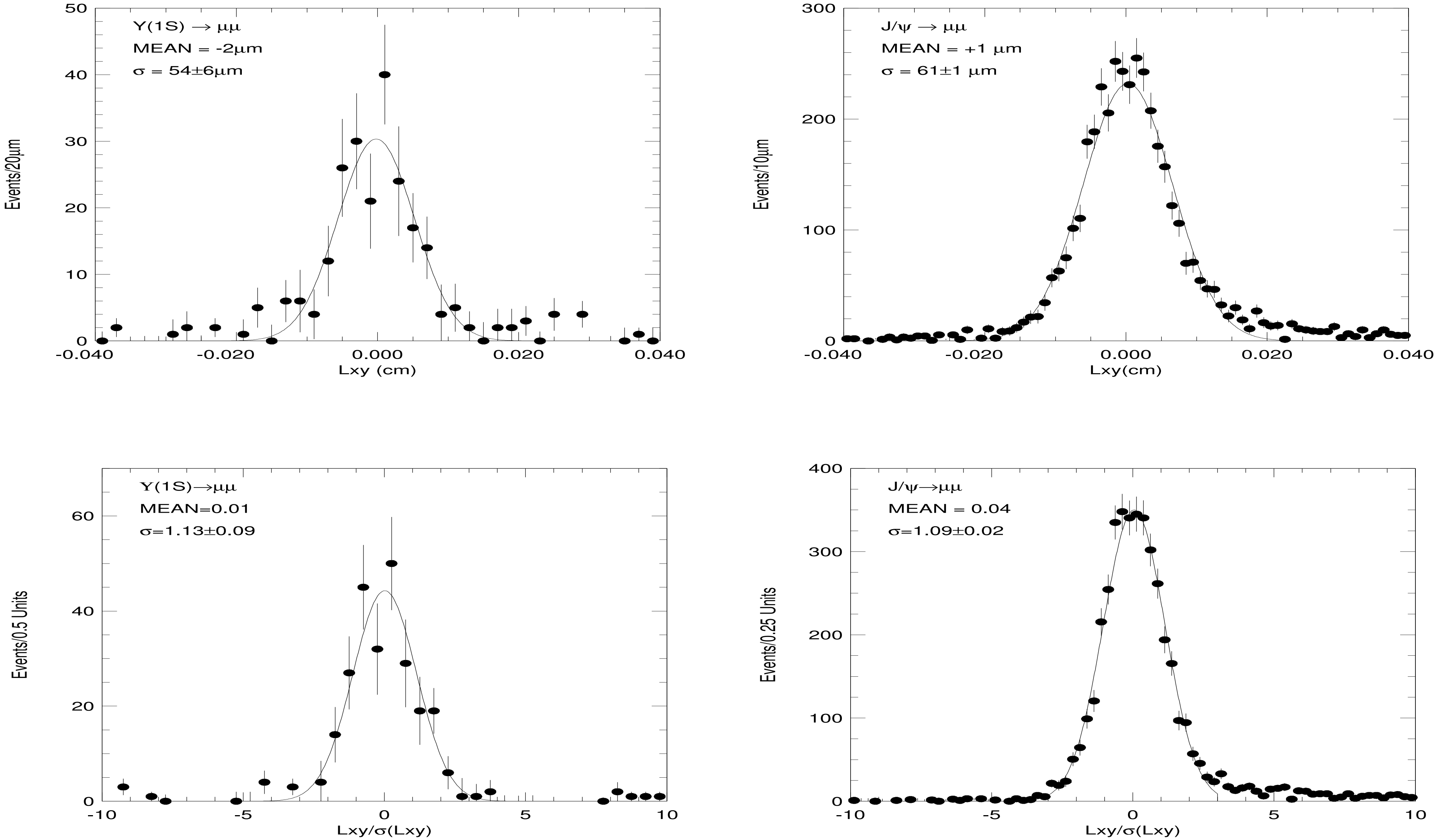
SVXII d_0 intrinsic resolution



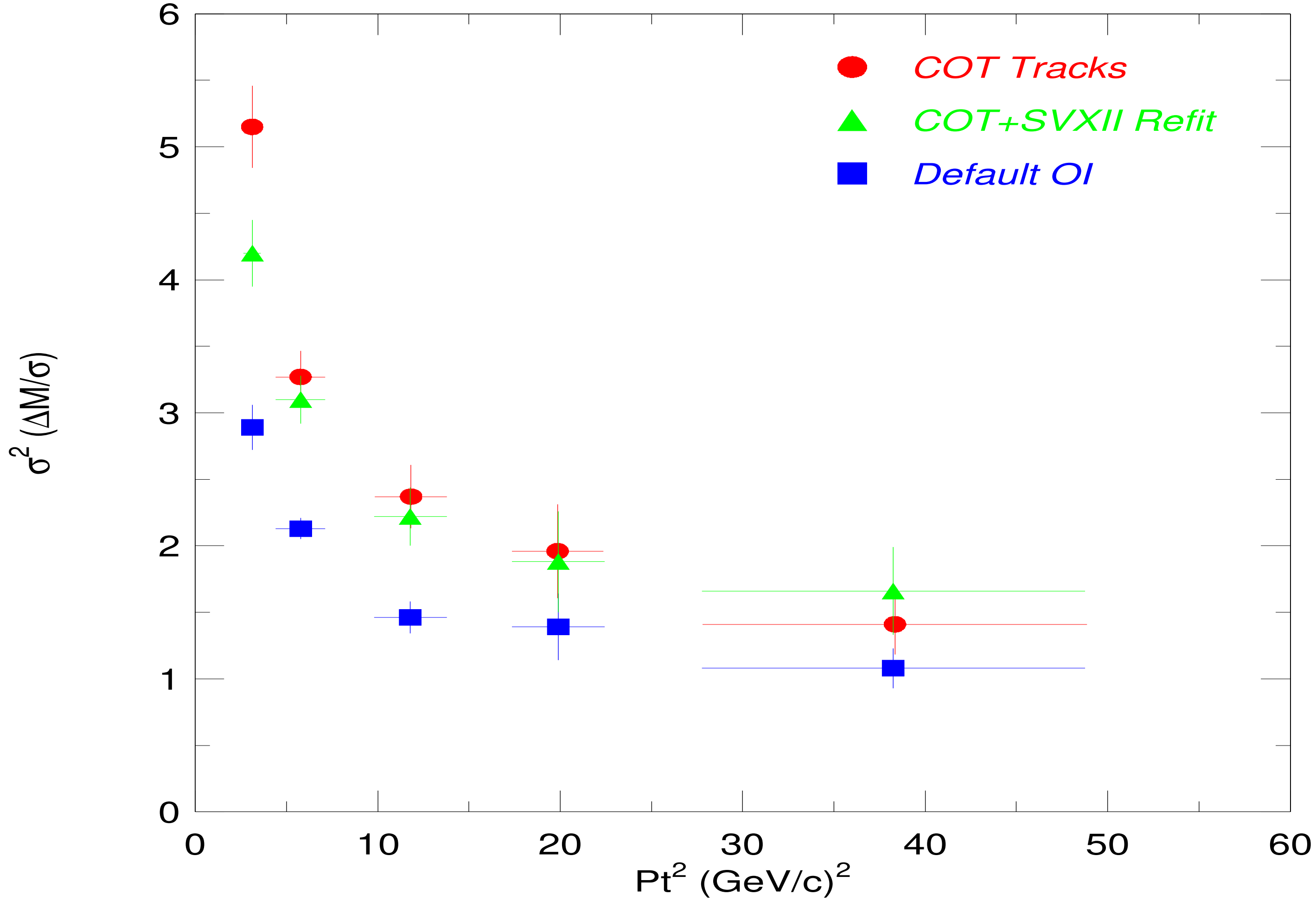


Right: $Z \to \mu\mu$ signal Left: Difference in impact parameter of the 2 μ Si tracks from $Z \to \mu\mu$. $\sigma(d_0) = \sigma(\Delta d_0)/\sqrt{2} = 23 \pm 3\mu$m.

Flight path resolution L_{xy}



Comparison of mass pulls



The J/ψ mass pull distributions of the COT and energy corrected COT-SVXII tracks in different P_t bins

Tracking Performance Conclusion

- For high P_t tracks the COT C, d_0 and ϕ_0 error estimates are correct. The error may be overestimated for z_0.
- For tracks with $P_t < 3$ GeV/c the effect of MCS in the SVXII and COT on the detector resolution is greater than the intrinsic resolution of the COT.
- $Z \to \mu\mu$ can be used to determine the intrinsic resolution of SVXII - need more statistics = add $Z \to ee$

To Do:

- Study $\cot\theta$ resolutions of the COT using conversions in the COT inner wall
- Study mass pulls as a function of MCS by using K_s and Λ decaying at different radii - this will seperate the SVXII MCS contribution from the COT MCS.
- Compare with MC results of single tracks

CMU-CMX L1 Trigger Validation

A. Current Trigger Parameters
B. Tighter XTRP Matching
C. Stub Timing, i. dT(CMX) $\leq$ 297ns; ii. dT $\leq$ 297ns
D. Wedge Opening Angle, i. $\leq$ 7; ii. $\geq$ 1
E. Require (at least) 2 Tracks
F. Require (at least 1) Pair of Oppositely Charged Tracks
G. $m_T \leq 4.0$ GeV/c^2

	Average L1 Rate Reduction	Average J/ψ Rate
A	1	1
B	0.88	0.98
C. i.	0.84	0.95
C. ii.	0.81	0.95
D. i.	0.55	0.95
D. ii.	0.37	0.91
E	0.34	0.91
F	0.31	0.91
G	0.21	0.91