Efficiencies

Summary

	Live Time	*pot* on Tape	Strip	Visual Scan	Trigger	Self-Veto
Average	0.89		0.88			
Period 1	0.92		0.59			
Period 2	0.91	0.89	0.59	0.83±0.06	0.96	0.96
Period 3	0.89		0.95			
Period 4	0.87		0.95			

these are averaged by station (and Period)

This gives an "overall" Period 4 efficiency of

$$\boxed{\varepsilon = 0.56}$$

Efficiencies - Strip

For Strip version 2 a direct result from stripping MC events gives 0.98 for CC events and 0.96 for NC

For an estimate of version 1 efficiency, we have that for Period 4 , the ratio of v2 to v1

40 / 25 = 1.6±0.3

then assuming equal u and v-view finding probabilities (A, B)

Symbolically,

$$1.6\,(A \bullet B) = A + B$$

$$1.6\,\varepsilon^2 = 2\,\varepsilon(1-\varepsilon) + \varepsilon^2 \quad \text{so that}$$

$$\varepsilon = \frac{2}{1+1.6} = 0.77$$

$$\Rightarrow \varepsilon_{(\text{Per } 1,2)} \sim 0.77^2 = 0.59$$

$$\Rightarrow \varepsilon_{(\text{Per}3,4)} \sim 0.96$$

Efficiencies - Visual Scan

8 nustrip files were rescanned at about half speed, but without checks

run	cat 3	re-scan	Σ pot
3297	4	5	2.46
3301	4	4	2.34
3318	0	2	2.45
3335	4	4	2.44
3340	4	6	2.36
3345	10	12	2.50
3349	5	5	2.64
3352	8	9	3.04
	39	47	20.23

about 10% of Period 4

this gives :

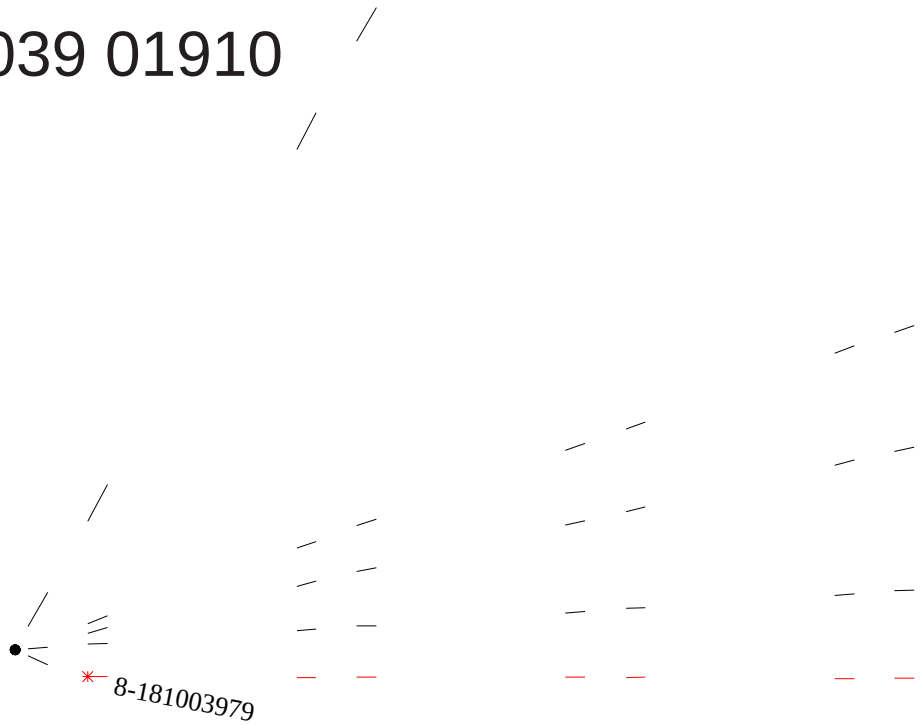
$$\boxed{\varepsilon_{VS} = 0.83 \pm 0.06}$$

τ Candidates

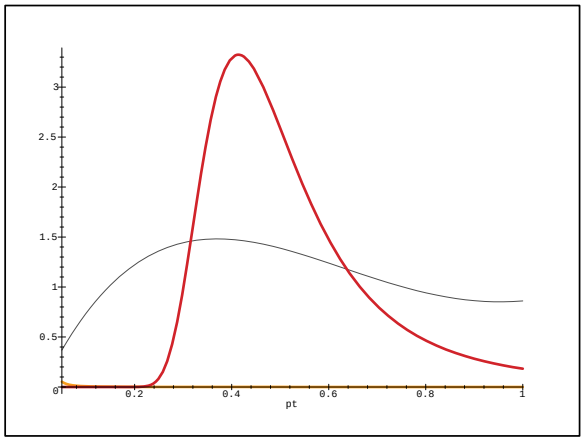
- The "five"
- Scatter Background for each candidate
- Scatter Background in the "203"
- Charm background

RUN	EVT	MOD	TYP	n_p	θ_{lep}	Δz	θ_d	p_d	$\Delta\phi$	$P(\tau)$	$P(scat)$
3024	30175	1/3	E200	4	0.025	4.4	0.093	4.8	5.3		
3039	01910	1/3	E200	5	0.065	0.25	0.090	6.0	2.69		
3333	17655	3/4	E200	5	0.009	0.54	0.013	8.6	3.93		
3356	17099	3/4	E200	9	[0.03]	<0.9	>0.026	5.7	[1.73]		
3263	25102	1/4	E800	3	0.172	1.80	0.130	2.0	4.28		
2929	18912					6.0					
3065	03238										
3130	28864					0.36	0.097	0.8			
2811	21998					4.0	0.030				

3039 01910

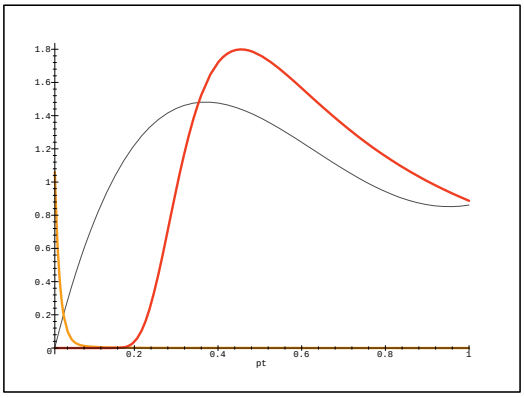


Material	:	Base plastic
Daughter	:	Electron
Momentum	:	4.6 GeV/c
Kink dist	:	0.28 mm
Scatter bkg	:	< 0.01
Charm bkg	:	0.2
EPA	:	t c s

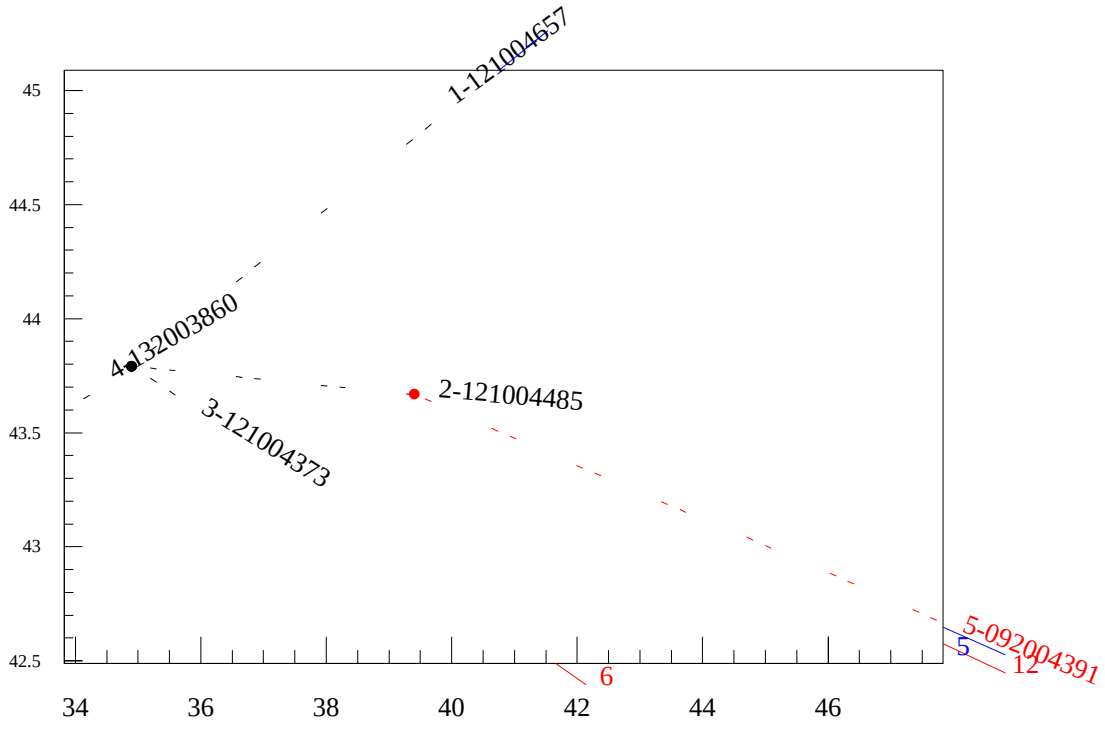


3333 17765

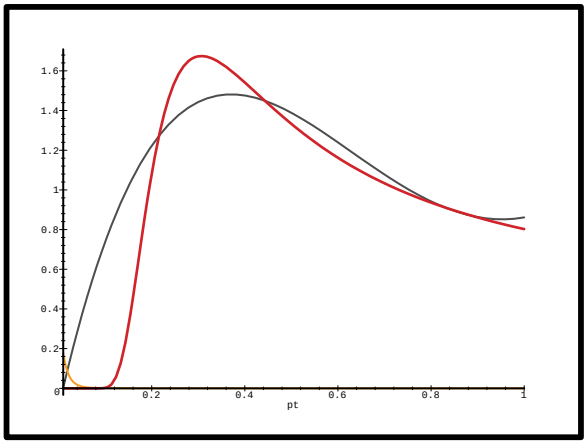
Material	:	Base plastic
Daughter	:	Electron
Momentum	:	8.6 GeV/c (NMS) ; 32 GeV/c Ecal/SFT
Kink dist	:	0.54 mm
Scatter bkg	:	< 0.01
Charm bkg	:	0.2
EPA	:	t c s



3029 30175

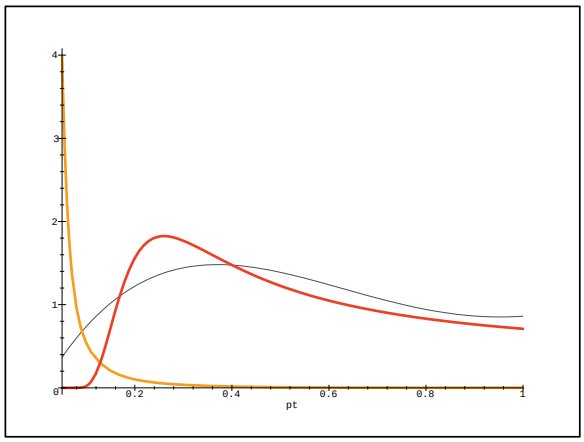


Material : Base plastic
Daughter : Electron
Momentum : 3.3 GeV/c (NMS); 5.7 GeV (SFT)
Kink dist : 4.4 mm
Scatter bkg : < 0.01
Charm bkg : 0.2
EPA : t c s

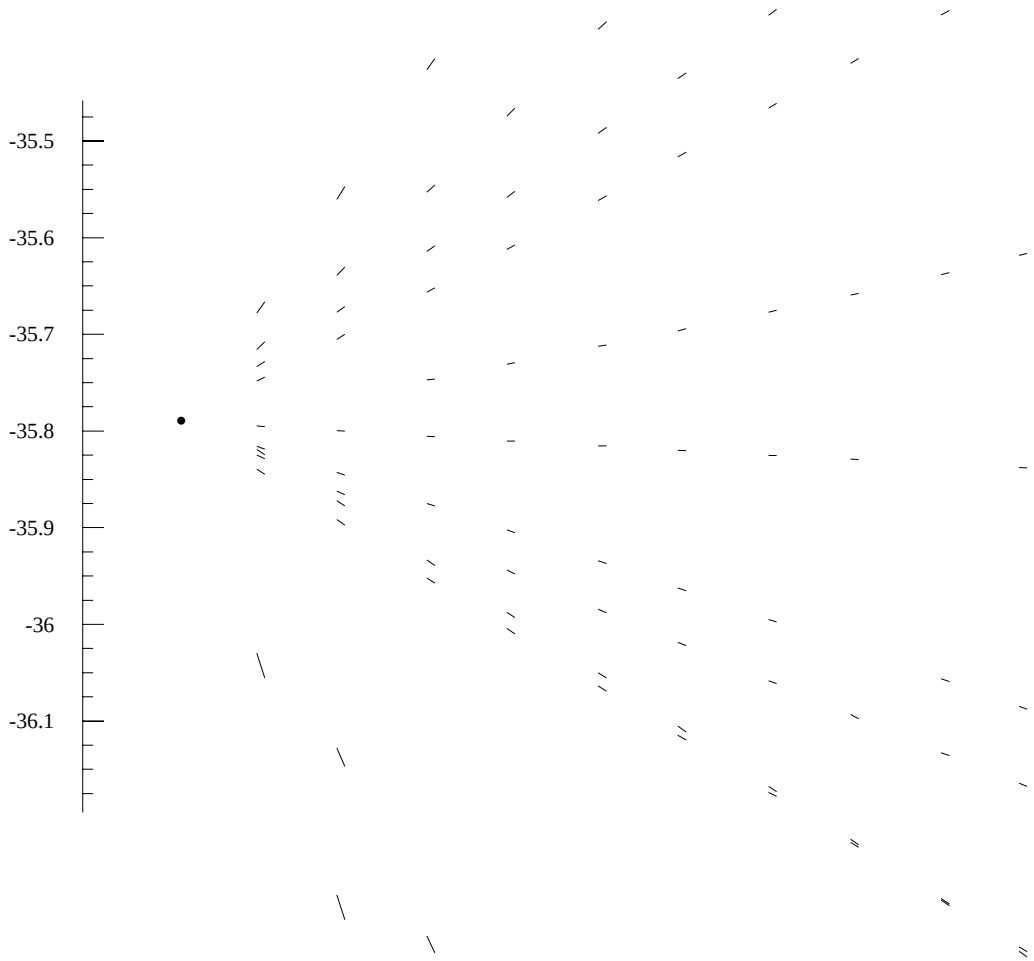


3263 25102

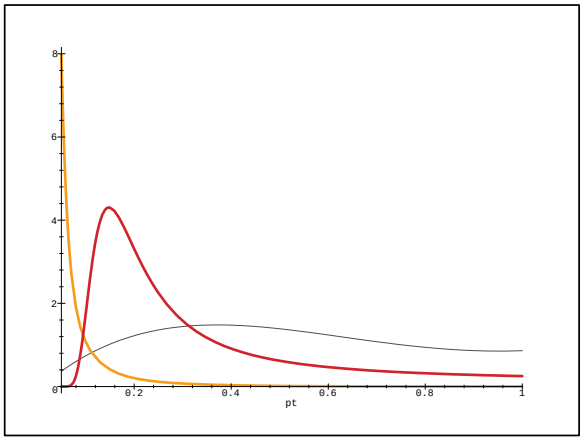
Material	:	Fe
Daughter	:	hadron
Momentum	:	2.0 GeV/c
Kink dist	:	1.8 mm
Scatter bkg	:	0.029
Charm bkg	:	0.2
EPA	:	t c s



3356 17099



Material	:	Fe
Daughter	:	hadron
Momentum	:	5.7 GeV/c
Kink dist	:	<0.9 mm
Scatter bkg	:	0.23
Charm bkg	:	0.2
EPA	:	t c s



Scattering Background

Estimate using a total measured track length of

$$L_{202} = 3.12 \text{ m}$$

and the background density function from the MC, normalized to

$$N_{scat} = 0.93 \text{ cm}^{-1}$$

p_T cut GeV/c	all scat (m^{-1})	all scat mfp (m)	WSK (m^{-1})	WSK mfp (m)	203 ev all scat	203 ev WSK	203 ev plastic
0.	93	0.011			290		
0.10	1.38	0.72	0.57	1.75	4.3	1.78	0.14
0.20	0.42	2.38	0.045	22.	1.3	0.14	0.04
0.25	0.27	3.70	0.013	77.	0.84	0.04	0.03
0.30	0.18	5.56	0.004	270.	0.56	0.012	0.02

Depends on

- Material (where kink is found)
- Type of module (WSK applies)

Charm Background

$$n_{charm} = \frac{\left(\frac{\text{CC}}{\text{TOT}}\right)\left(\frac{\text{charm}}{\text{TOT}}\right)\left(\pm\right)\left(\text{C1}\right)\left(\frac{lep}{\text{lost}}\right)\left(\frac{\text{2ry}}{\text{found}}\right)}{\left(0.75\right)\left(0.07\right)\left(0.4\right)\left(0.4\right)\left(0.2\right)\left(0.5\right)}$$

$$\boxed{n_{charm} = 8.3\times10^{-4}}$$

For 203 unbiased events the estimated number of charm background events is

$$\boxed{n_{charm} \times 203 = 0.17 \text{ events}} \Rightarrow \geq 2 \text{ events } 0.02$$

Given one "charm-like" event, a kink without lepton, one can only say it has 0.2 probability. So the observation of many is inconsistent.

"203" Sample Composition

N = 203	
N(μCC) = 76 to 78	38%
N(*e*CC) = 51 to 75	25 to 37%
N(NC) = 50 to 74	25 to 36%
N(τCC) = 3 to 5	1.5 to 2.5%