



# Short Decay Search

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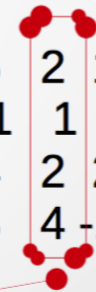
- Study short decay efficiency with charm sample
- A new selection is applied on 1mu events (2010-2012)
- Perform Data/MC comparisons
- Measure charm production rate using all charm sample (2008-2012)

```
20 68564.3 37432.3 47530.3 5
200 126913 190060 0.029 0.063 68570 37445 47728 0.3 -1 -1 1
200 126890 230105 -0.043 0.156 68556 37463 47728 0.2 -1 -1 1
200 126953 180049 -0.423 0.062 68481 37446 47728 1.5 -1 -1 -1
200 127082 170026 0.280 0.013 68620 37433 47728 1.9 1 -1 1
200 126897 200060 -0.171 0.232 68532 37483 47728 5.0 -1 -1 1
```

No ID flags

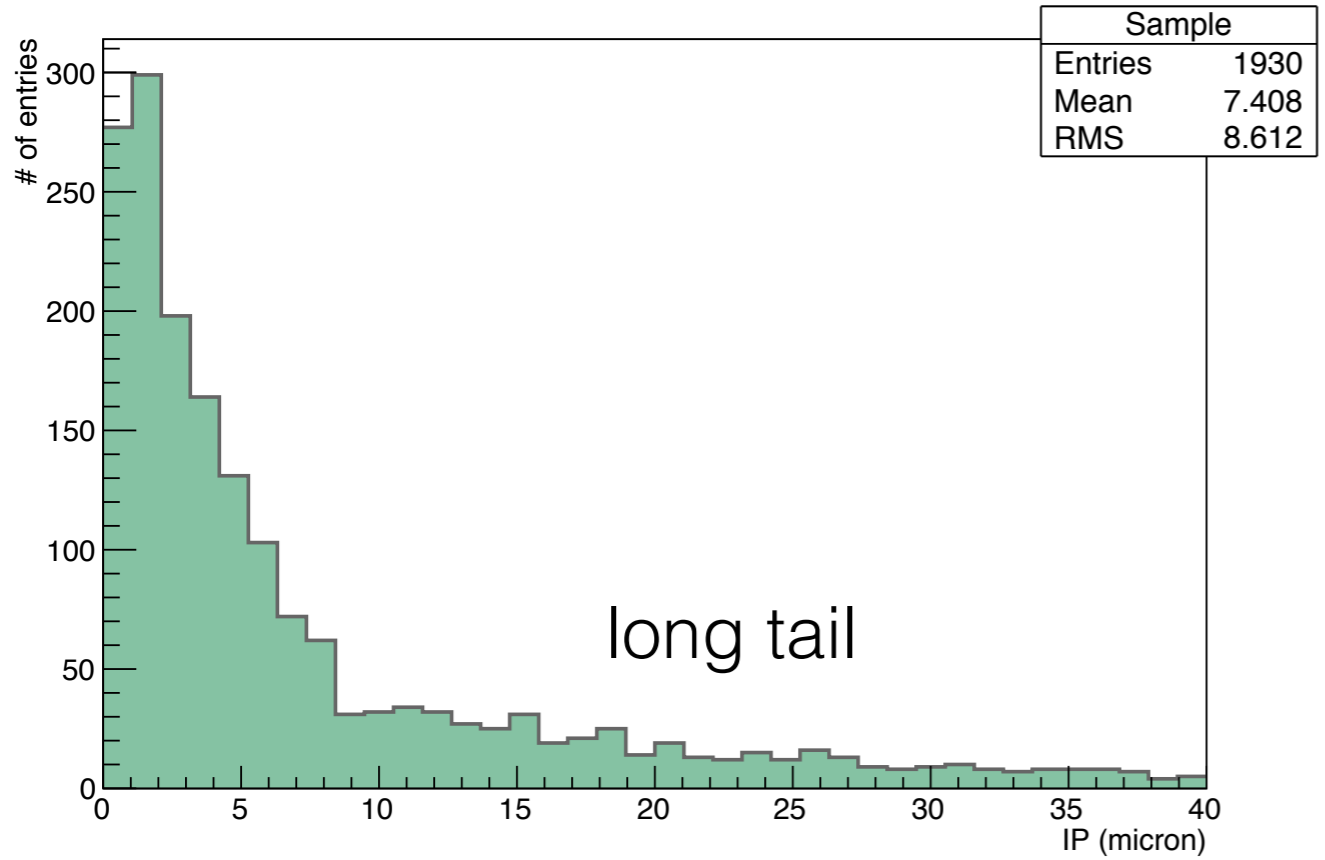
2010-2011-2012  
Data sample is used for  
event selection

```
32 102653.6 57629.0 32222 7.3 4
300 59708 200038 0.0565 -0.0155 102803.9 57593.5 34859.0 5.5 2 1 1 -1
290 85353 190032 0.1947 -0.1518 103430.8 57044.8 36159.0 17.1 1 2 1 -1
310 72616 160012 -0.0764 0.1040 102550.6 57763.7 33559.0 4.4 2 2 -1 -1
320 75661 310333 0.4127 -0.2855 102669.7 57617.7 32259.0 0.8 4 -1 -1 -1
```

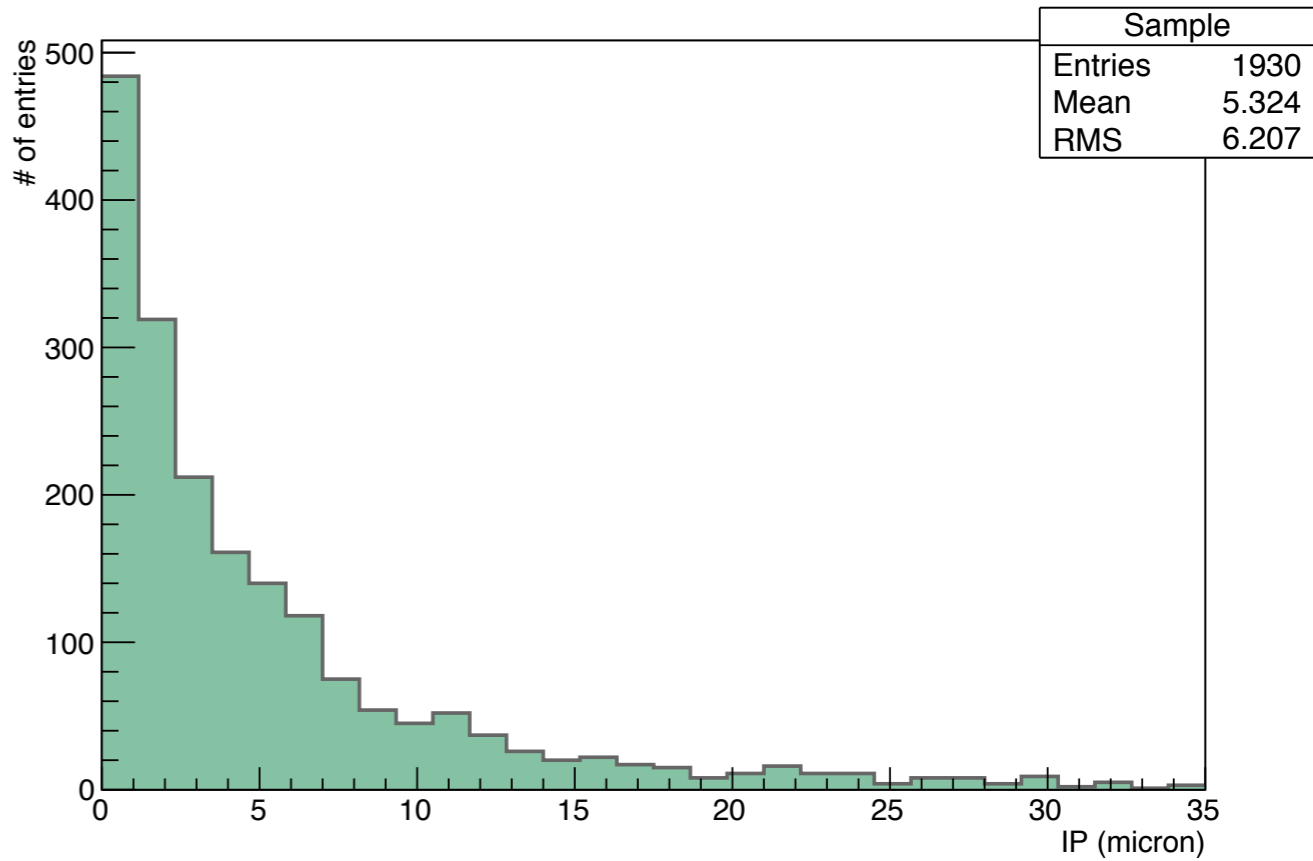


Events with Track ID flags are selected

IP - Hadrons



IP wrt to muon - Hadrons



- 1) MuonID==1(muon is attached to vertex)
- 2) Multiplicity>1
- 3) The last segment of hadron track must be in the two most downstream plate



- 4) Slopex<0.4 && Slopey<0.4



- 5) IP (wrt muon) / deltaZwM >0.004




event selected

**deltaZwM :**  
the distance between muon  
segment and vertex position  
+  
hadron segment position and  
vertex position

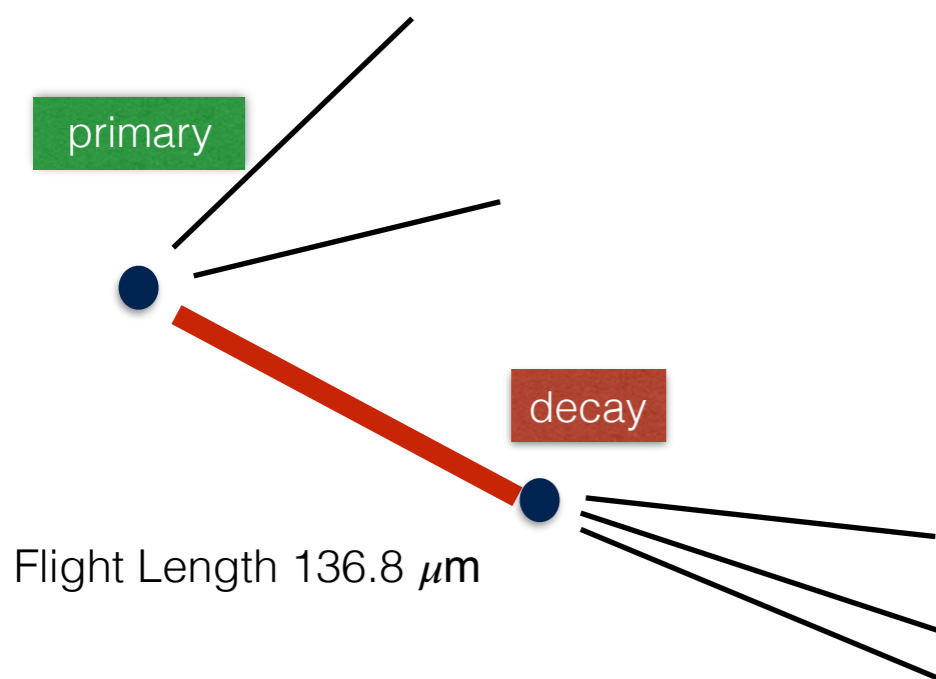
## Event Selection

Starting sample	604
Selected events	68
Manual checked and analyzed events	68
Short Charm Candidates (newly found)	2
Long Charm Candidates	2
Total Charm Candidates	4



# Short Charm Candidate -1003674-trident

	Sx	Sy	x	y	z
Muon	0,102	0,063	71301,9	5110,5	41243,0
Hadron	-0,075	0,046	71141,4	5093,5	41243,0
d1	0,143	0,051	71323,9	5116,7	41243,0
d2	0,194	0,142	71367,3	5186,6	41243,0
d3	-0,046	0,202	71181,0	5234,7	41243,0



	single Vertex case	Two Vertex case		
	IP wrt $V_0$ ( $\mu\text{m}$ )	IP wrt $V_1$ ( $\mu\text{m}$ )	IP wrt $V_2$ ( $\mu\text{m}$ )	IP wrt muon
Muon	9.6	0.8	17.3	-
Hadron	11.7	0.8	25.5	0.8
d1	10.8	23.5	2.4	6.0
d2	5.6	19.7	1.6	7.6
d3	9.0	13.3	1.4	3.9

Invariant mass ~ 1.89 GeV  
(all decay daughters considered as pion)

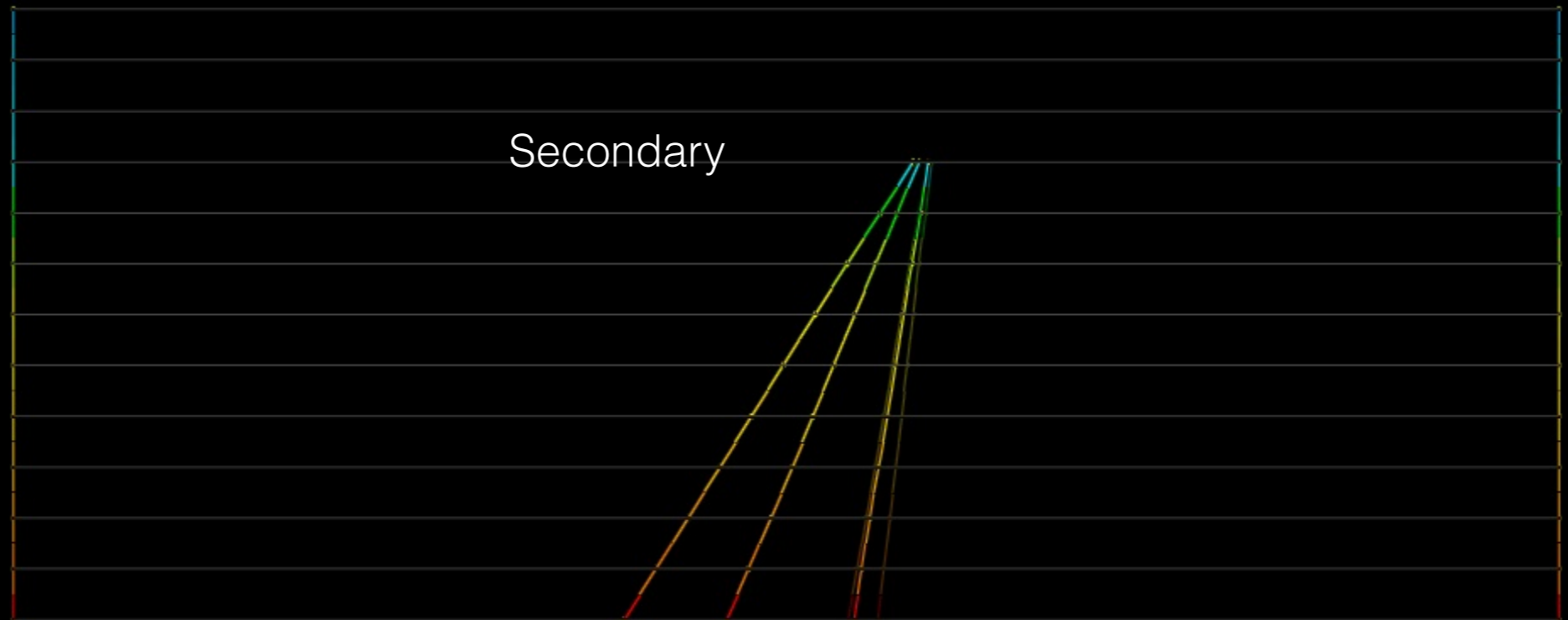
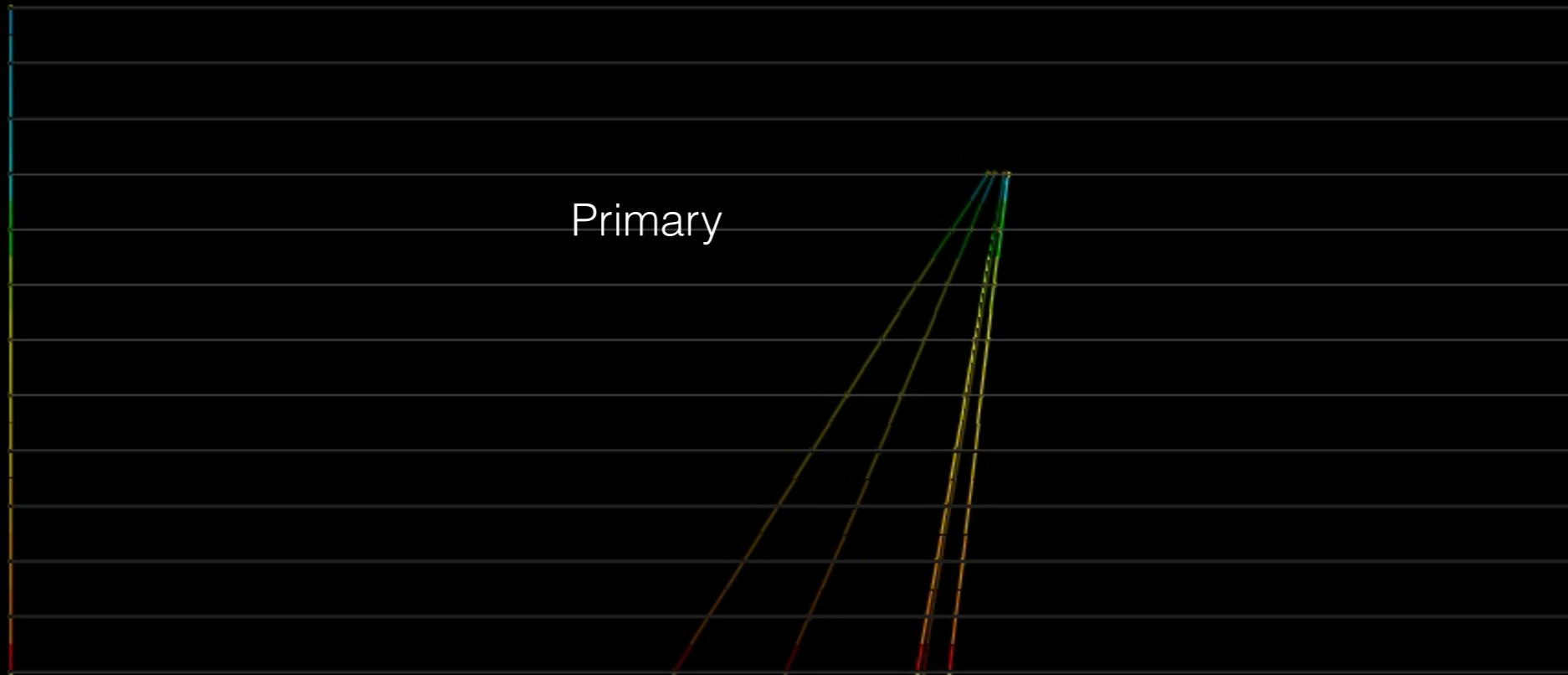
	Estimated PB(GeV)
d1	3.70
d2	4.76
d3	6.74



**x- projection**  
**Ev\_Jp\_no:1003674**





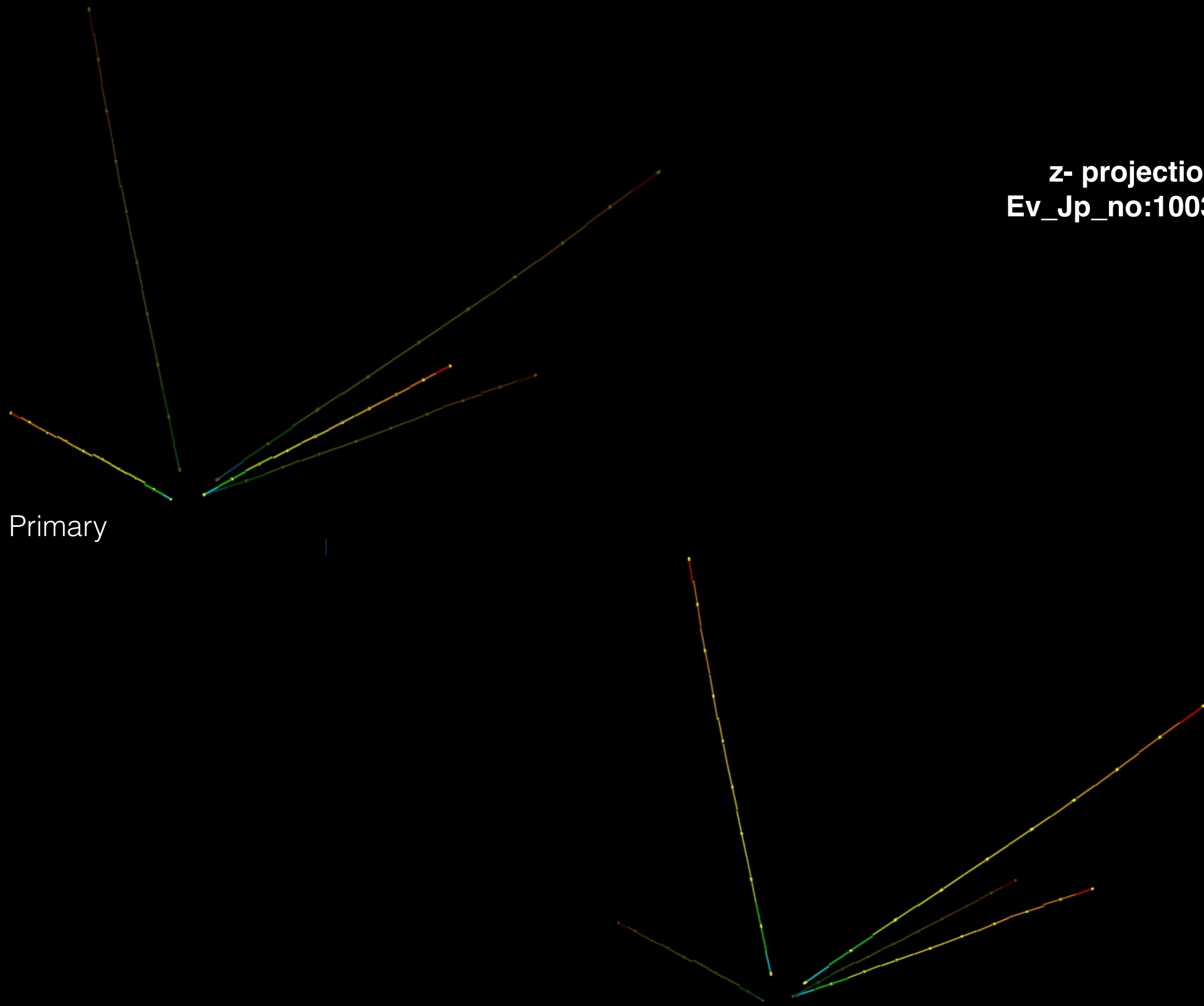


**y- projection**  
**Ev\_Jp\_no:1003674**

**z- projection**  
**Ev\_Jp\_no:1003674**

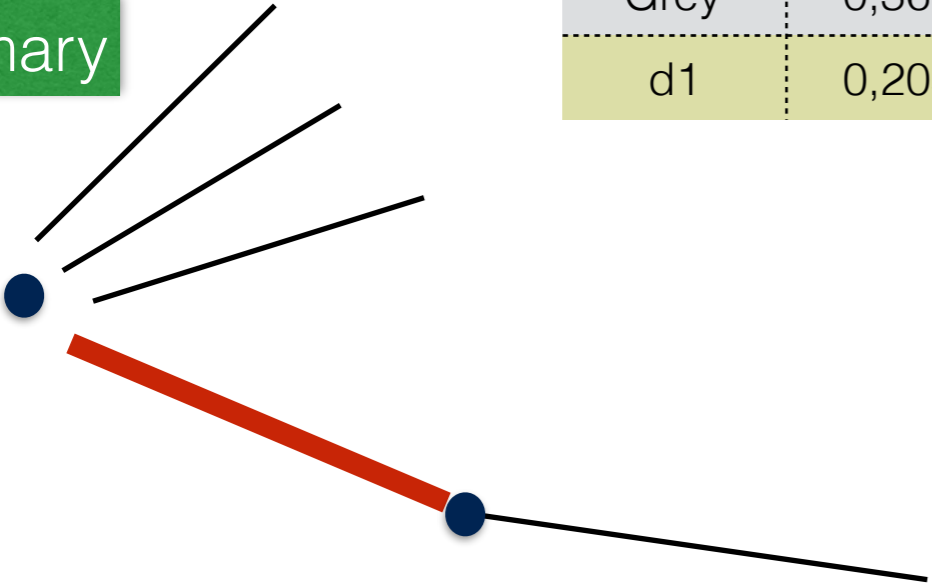
Primary

Secondary



	Sx	Sy	x	y	z
Muon	0,040	0,241	25921.4	89587.4	42545.0
Hadron	-0,174	0,048	25875.6	89524.7	42545.0
Grey	0,361	0,331	25995.0	89464.3	42545.0
d1	0,205	0,048	25903.5	89521.1	42545.0

primary

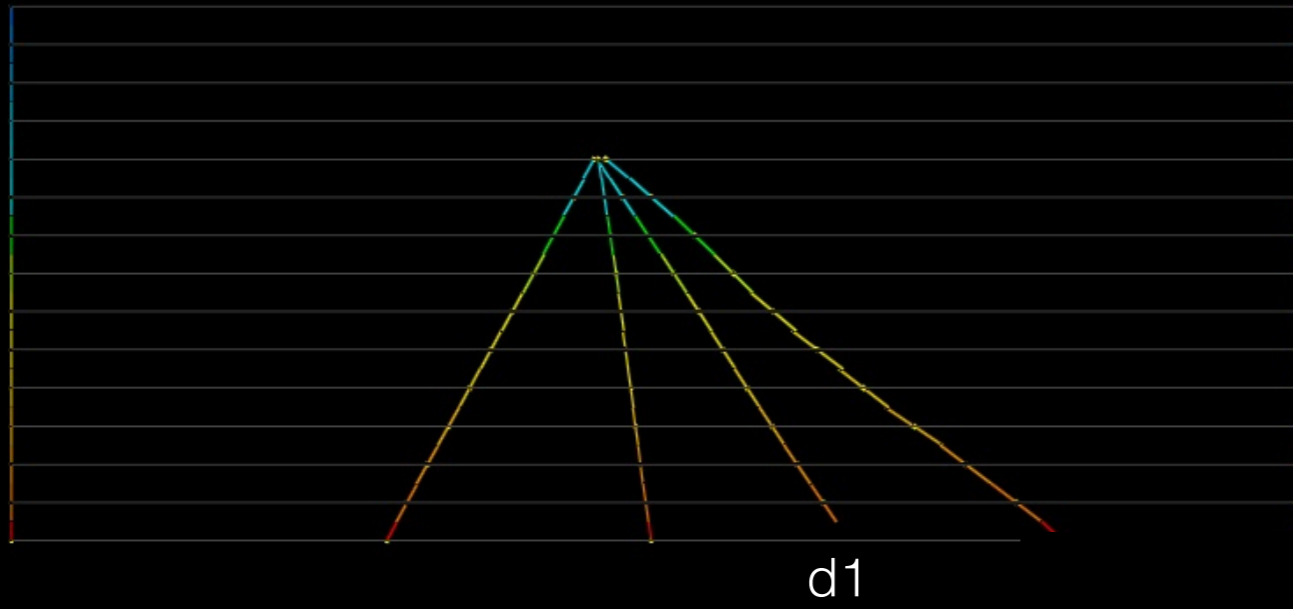


decay candidate

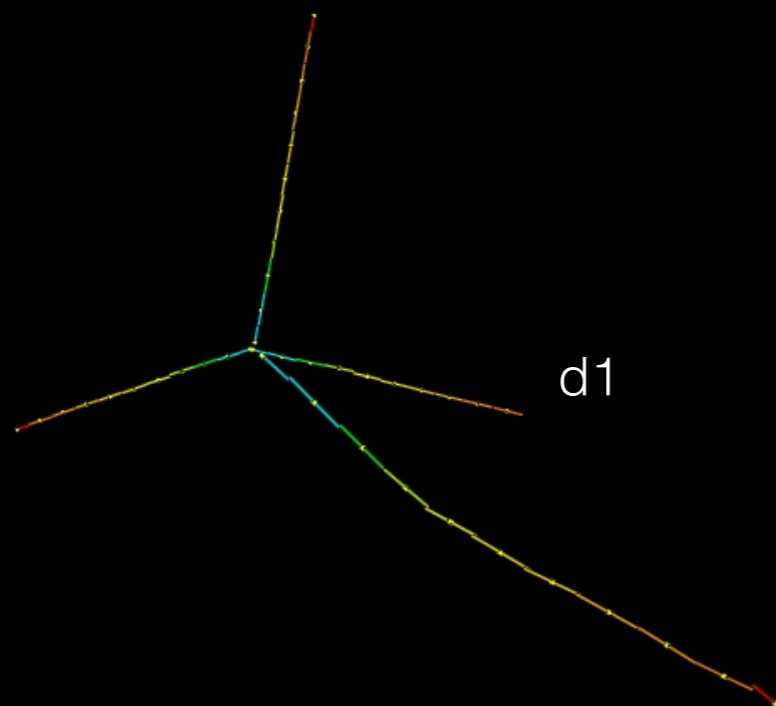
	single Vertex case	Two Vertex case	
	IP wrt $V_0$ ( $\mu\text{m}$ )	IP wrt $V_1$ ( $\mu\text{m}$ )	IP wrt muon
Muon	24.0	0.3	-
Hadron	6.5	0.3	0.8
Grey	47.9	4.0	2.0
d1	24.2	52.7	24.2

Ev\_Jp\_no:1106407

<- x- projection



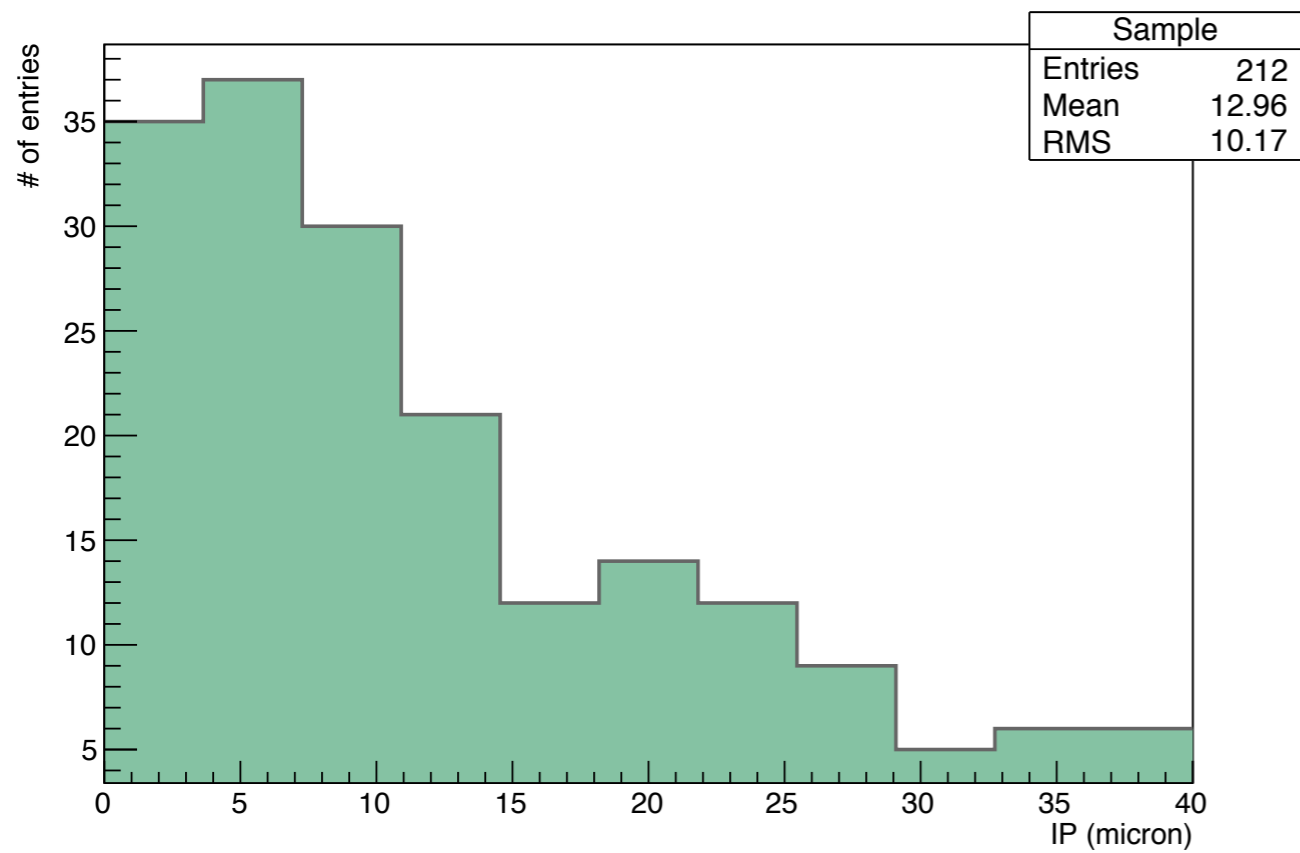
y- projection ->



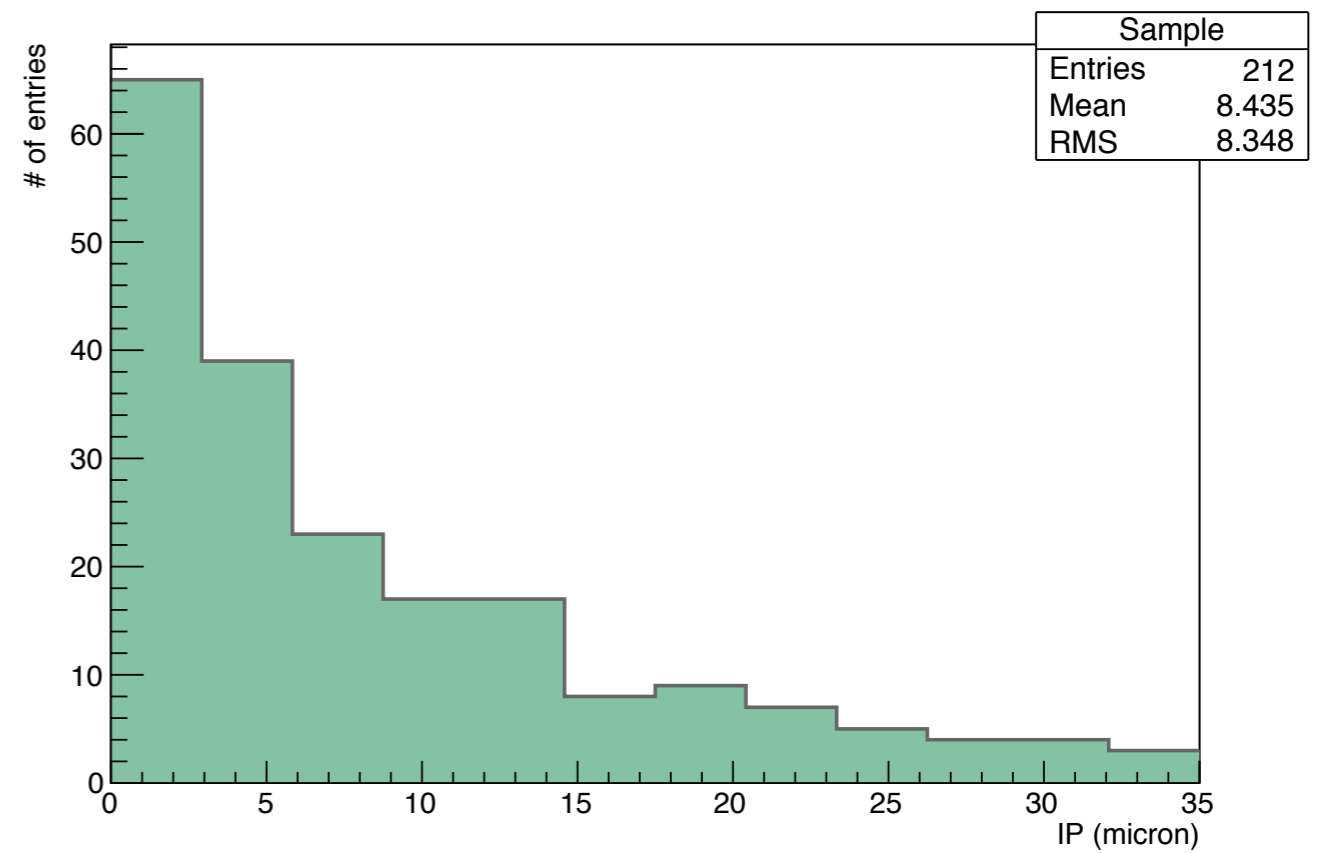
<- z- projection

# Impact Parameter before and after new measurement

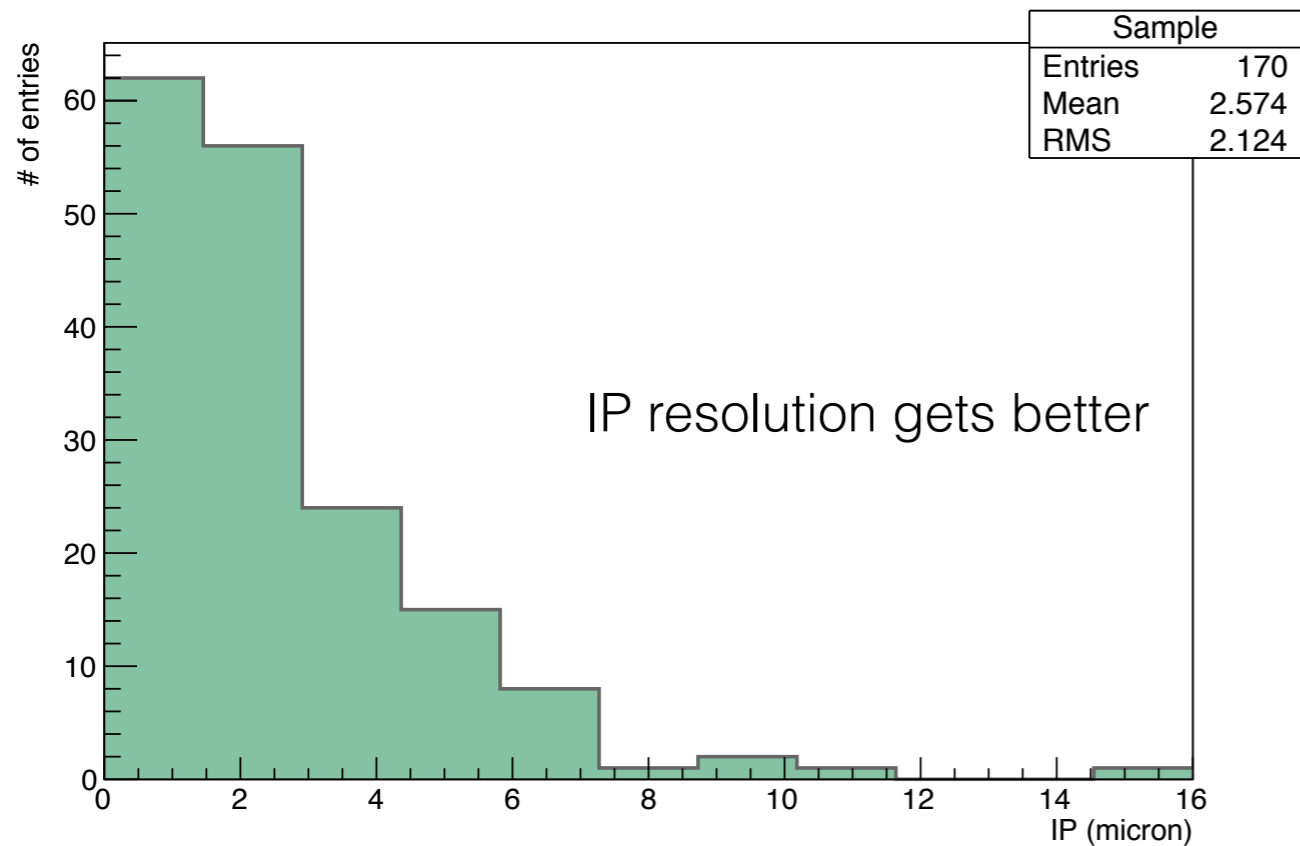
## IP - Hadrons



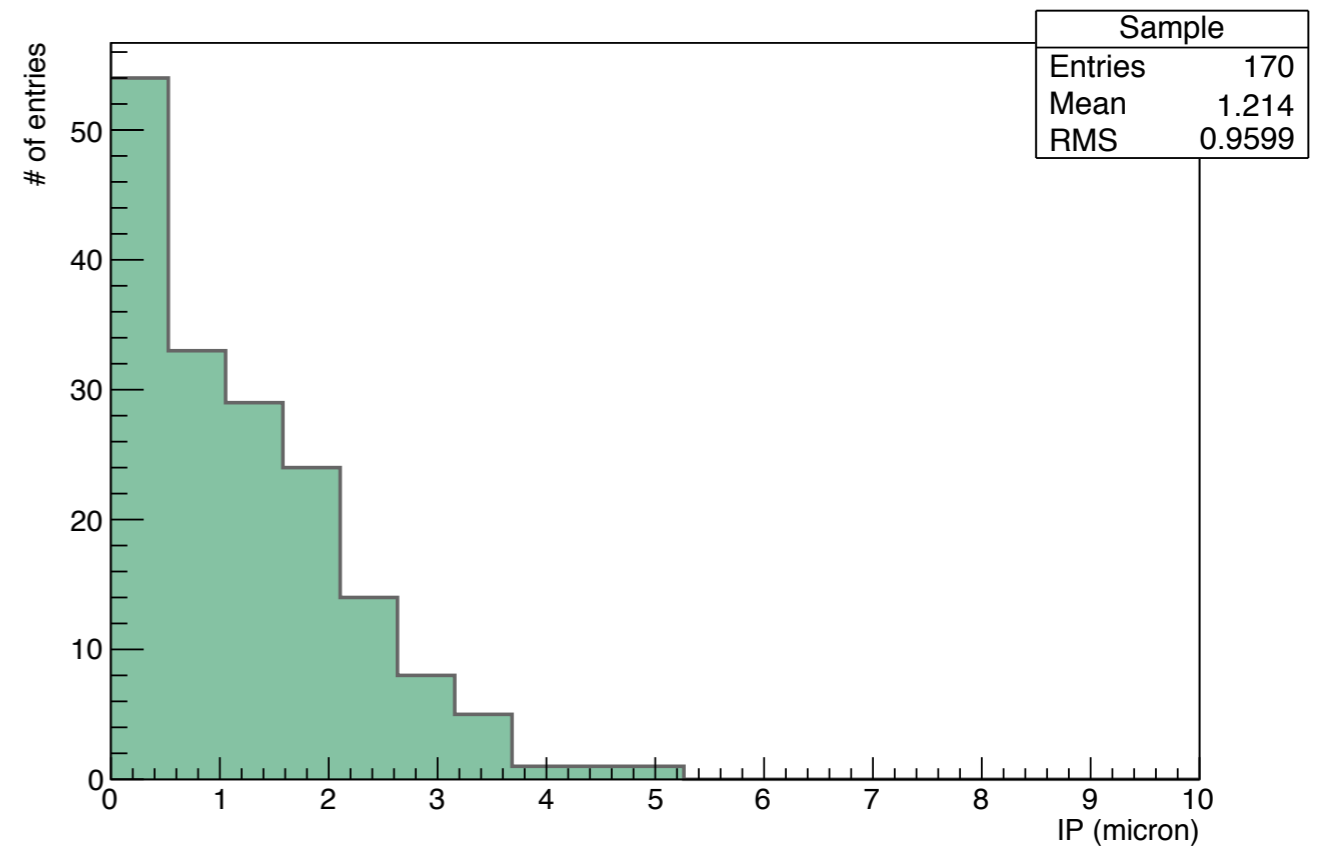
## IP wrt to muon - Hadrons



## IP - Hadrons



## IP wrt to muon - Hadrons



- IP distribution of primary tracks has long tail.
- After re-measurement, IP distribution gets much better
- Out of 68 selected events 4 charm candidate events found.
- Estimate BG and selection efficiencies.
- Estimate the charm production rate using all charm events found so far.

*THANK YOU*