

Fast Simulation Vertex Study with $B^0 \rightarrow D^* K$

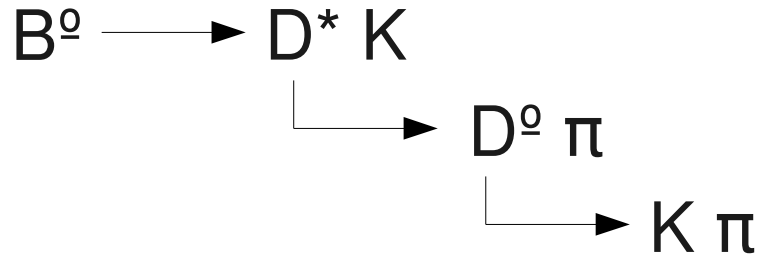
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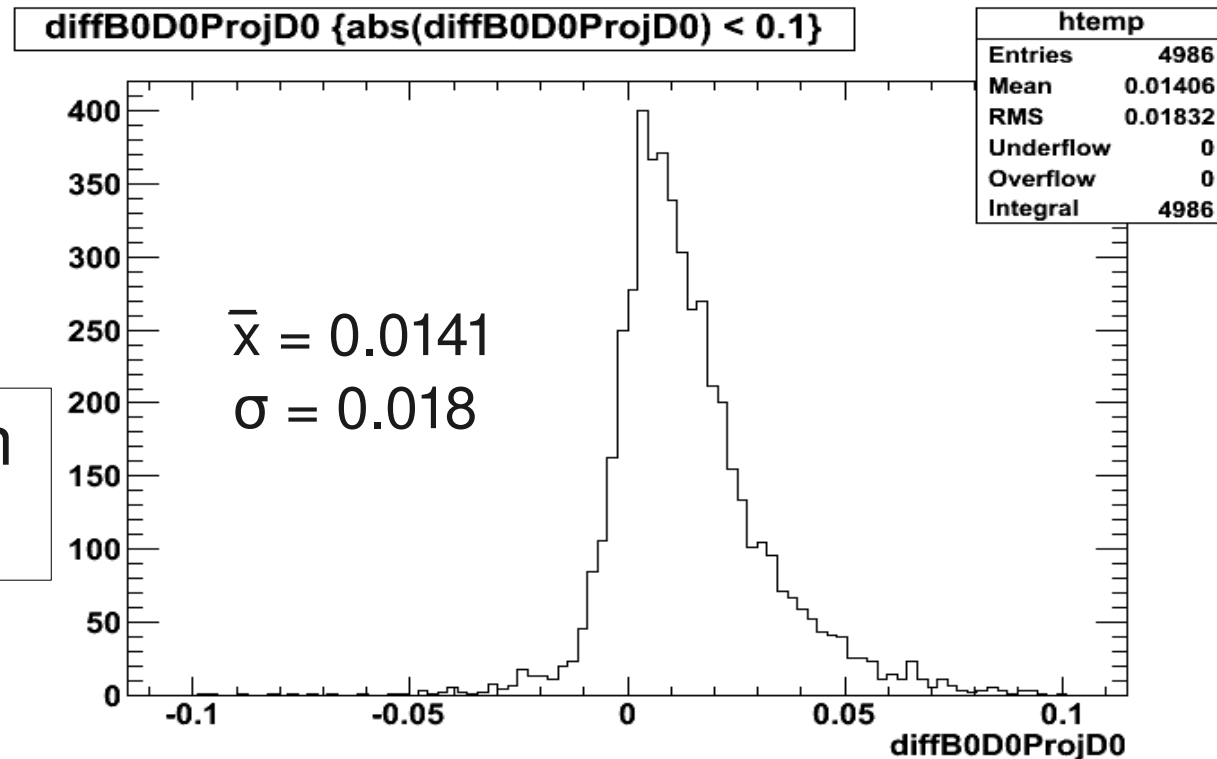
March 19th 2009

Vertex Separation

Analysis Decay Chain

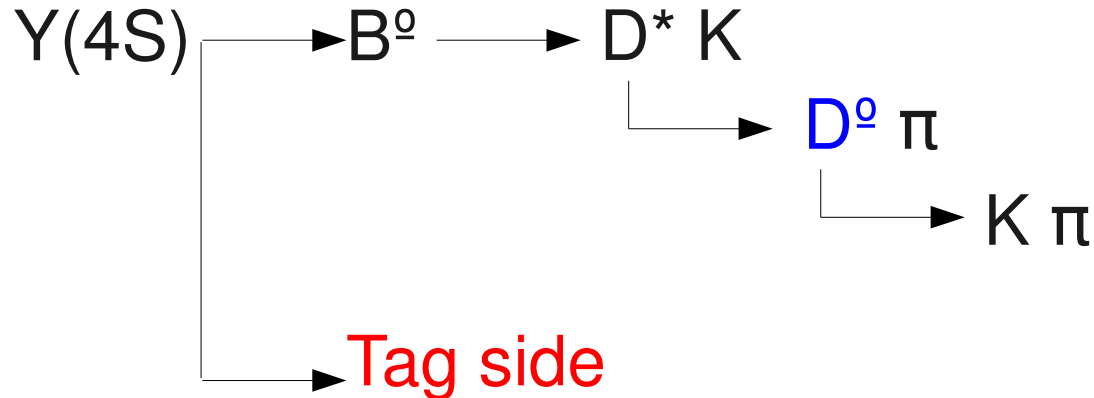


Detector vertex resolution
 ~ 0.004



- February talk showed vertex of B^0 and D^0 was separated by $\sim 3.5\sigma$ of detector resolution.
- $\rightarrow$ We can improve our single vertex algorithm to **multiple vertex** algorithm.

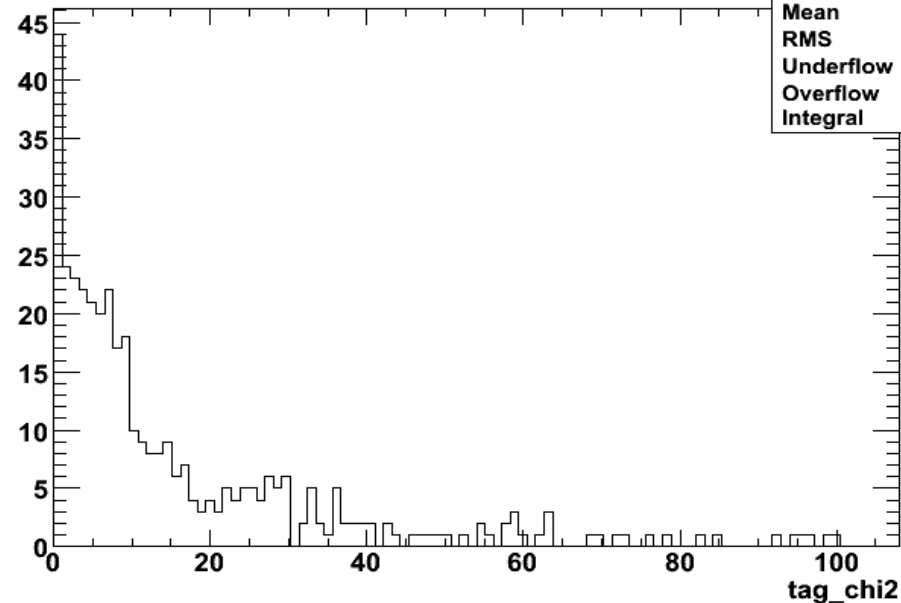
Tag-side Vertex



- Filtered out **signal side** charged tracks using mc-truth to perform vertex fit on tag side.
- Compared vertex quality to signal vertex of D^0
- Fitted with **Cascade** algorithm
- Fit was done with single vertex algorithm
→ Multi-vertex algorithm is yet to be implemented

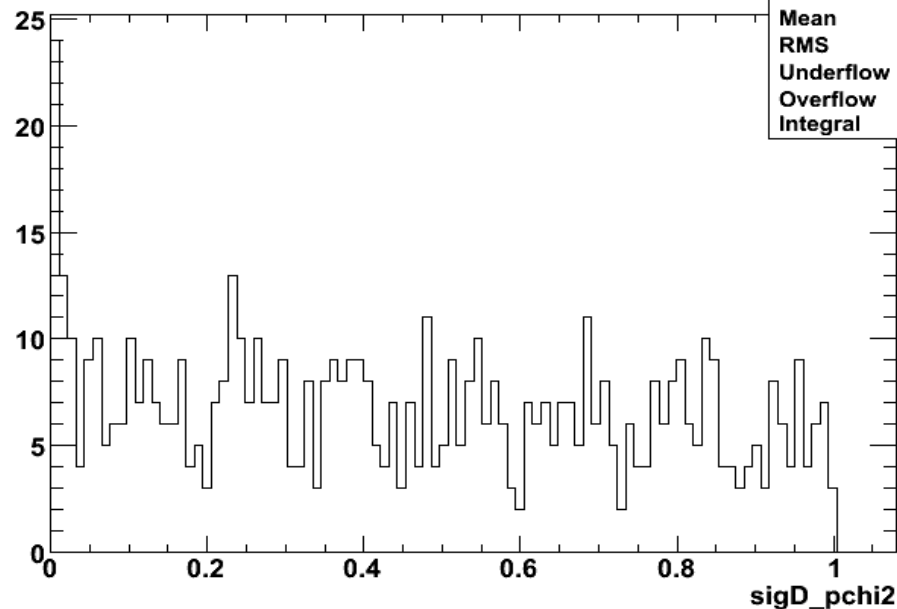
Signal D^0 & Tag-side Vertex Plot

tag_chi2 {tag_chi2 > 0 && tag_chi2 < 100}



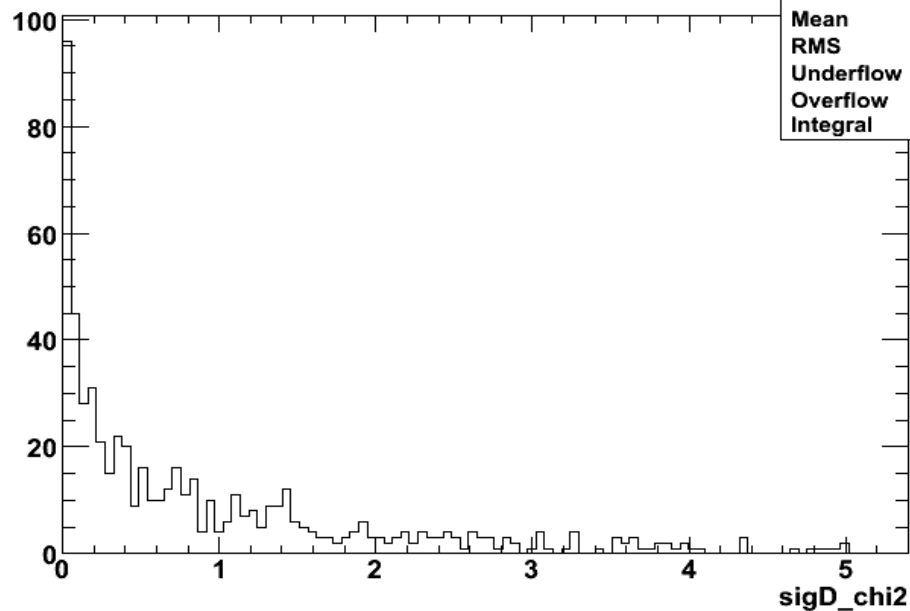
htemp	
Entries	381
Mean	16.14
RMS	19.58
Underflow	0
Overflow	0
Integral	381

sigD_pchi2 {sigD_pchi2 > 0 && sigD_pchi2 < 5}



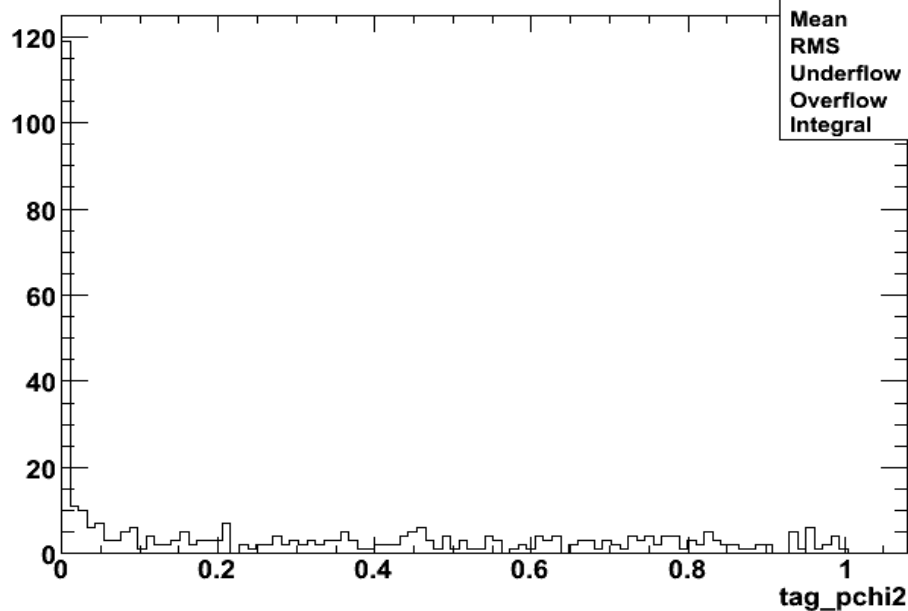
htemp	
Entries	629
Mean	0.4579
RMS	0.2956
Underflow	0
Overflow	0
Integral	629

sigD_chi2 {sigD_chi2 > 0 && sigD_chi2 < 5}



htemp	
Entries	589
Mean	0.9277
RMS	1.08
Underflow	0
Overflow	0
Integral	589

tag_pchi2 {tag_pchi2 > 0 && tag_pchi2 < 1}



htemp	
Entries	381
Mean	0.3029
RMS	0.3241
Underflow	0
Overflow	0
Integral	381

Conclusion / Plan

- We are seeing expected chi-square from single vertex algorithm
- Figure out best way to sort charged tracks into multiple vertices using best global chi-square.
- Tests are preformed under module “PacVertex”.
- Module is under development. It will be uploaded once multi-vertex algorithm is in place.