Update on D^+ reconstruction

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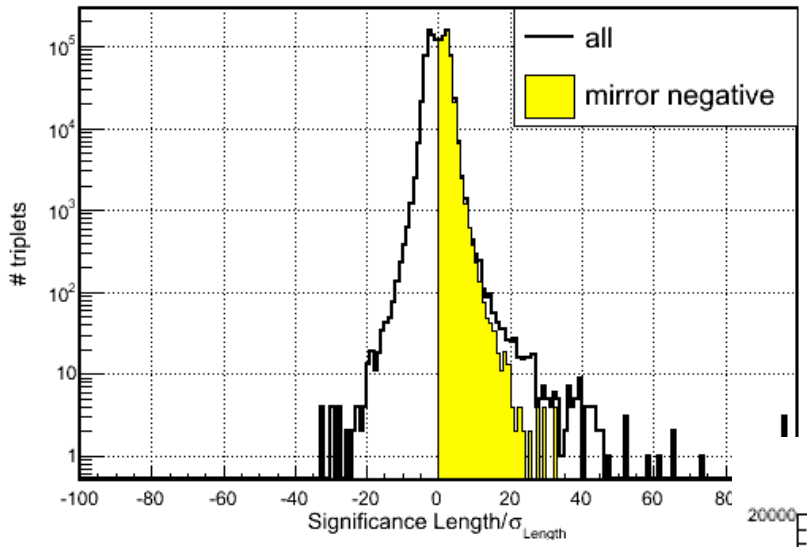
news

- Compared to friday, I rerun with the following cuts
- The main differences are :
  - the cut on the dca of tracks to primary vertex (|dca|>50μm, CD0 has a cut at 100μm
  - Tpc hits >20
  - Silicon hits >1
  - p_T >. 5
- Run over 5k events

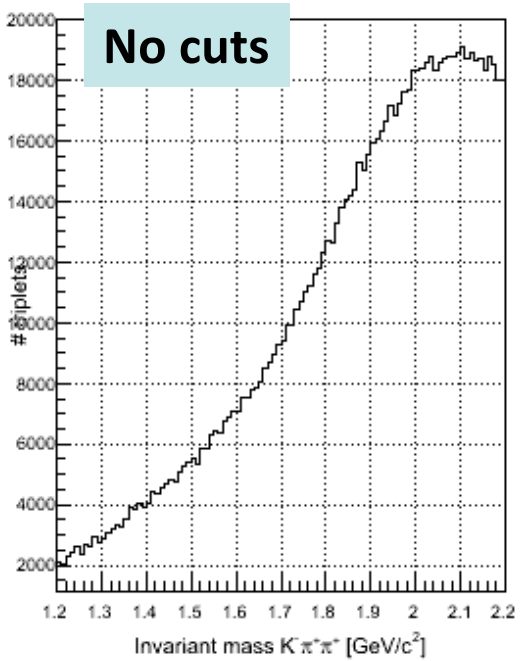
```
static const Double_t pTCut          = 0.5 (0.7*) ;  // transverse momentum cut
static const Double_t mKpipiMin      = 1.2;  // min mass of (Kpipi) association
static const Double_t mKpipiMax      = 2.2;  // max mass of (Kpipi) association
static const Double_t DcaCut         = 0.005 (NA) ;  // single track DCA to PV
static const Int_t    TpcCut         = 20 (30);   // TPC hits fitted
static const Double_t TrackLengthCut = 40;   // min value for dEdxTrackLength
static const Int_t    SiCut          = 2 (4) ;    // (PIX+IST+SSD) hits fitted
static const Float_t  SigmaPionCut   = 2.5;    // ndEdx for pion
static const Float_t  SigmaKaonCut   = 2.5;    // ndEdx for kaon
static const Double_t EtaMin         =-1.0;  // min track pseudorapidity
static const Double_t EtaMax         = 1.0;  // max track pseudorapidity
static const Double_t zcut           = 10;    // zvertex cut
static const Double_t PrimZResCut    = 0.02; // sigmazvertex cut
static const Double_t sigmaTCut      = 2.0;  // ratio single track dca/sigmaDca
static const Double_t ProbKFCut      = 0.05 (0,1); // probability of fit
static const Int_t    writeHisto     = 1;    // flag to write histos
static const Int_t    refit          = 0;    // flag to refit daughters
```

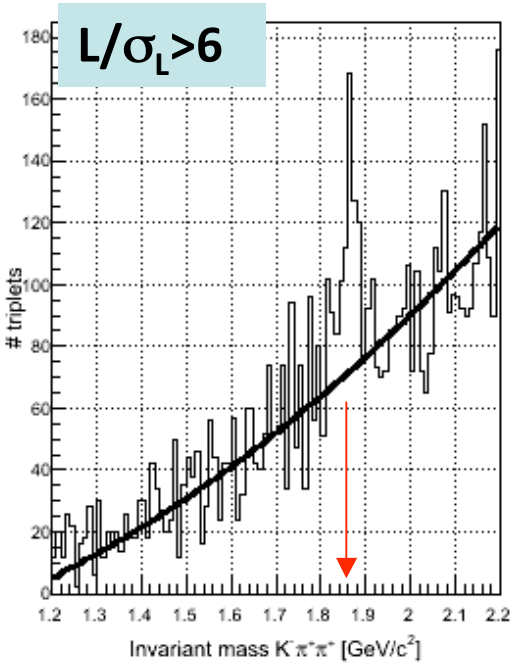
**Values in bold are the old cuts I used*

Decay length significance

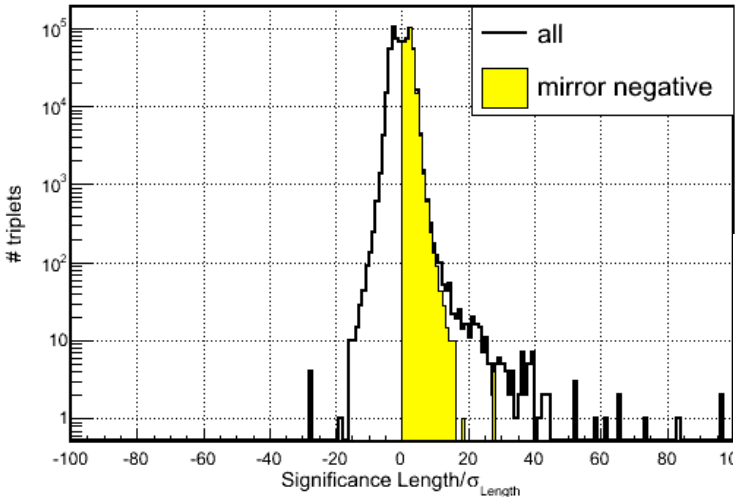


- the cut on |dca|>50 microns is needed to reject background
- A peak is seen at the D^+ mass

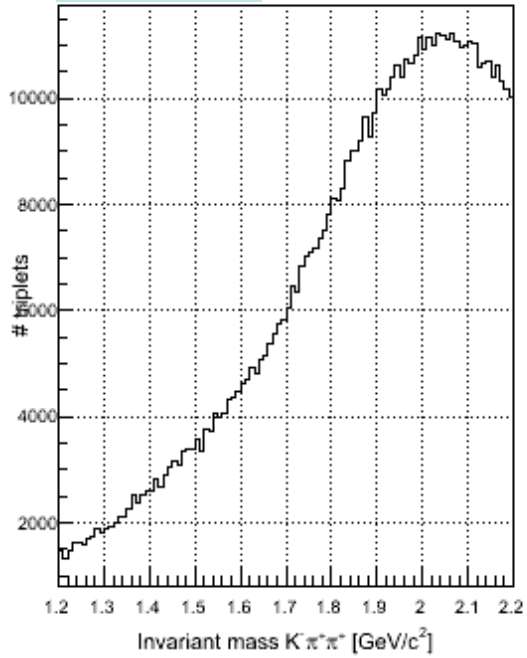




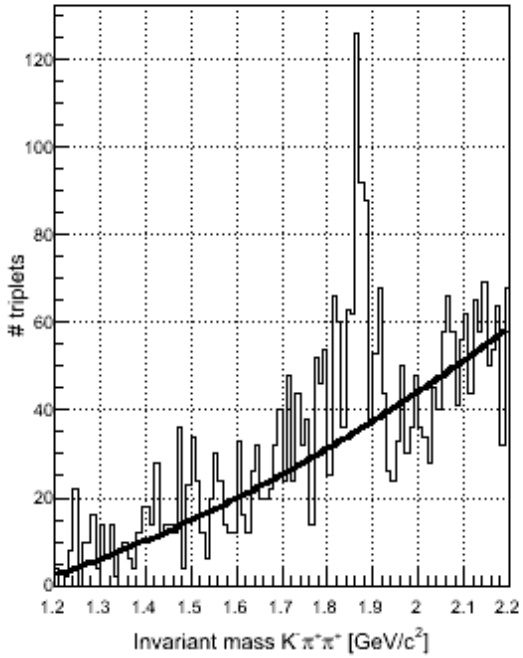
Impact of pixel hits



No cuts



L/σ_L>6 && pixHits=2



- In these plots, I required PixelHits =2 for all the 3 daughters
- The signal (height of the peak) is reduced but the background line too)

Some comparison

	No cuts on pixel hits	Pixel hits >2
L/dL >6	s/b = 1.5 significance = 10.3	s/b = 2 significance = 11.9
L/dL >8	s/b = 2.8 significance = 14.5	s/b = 5 significance = 14.8

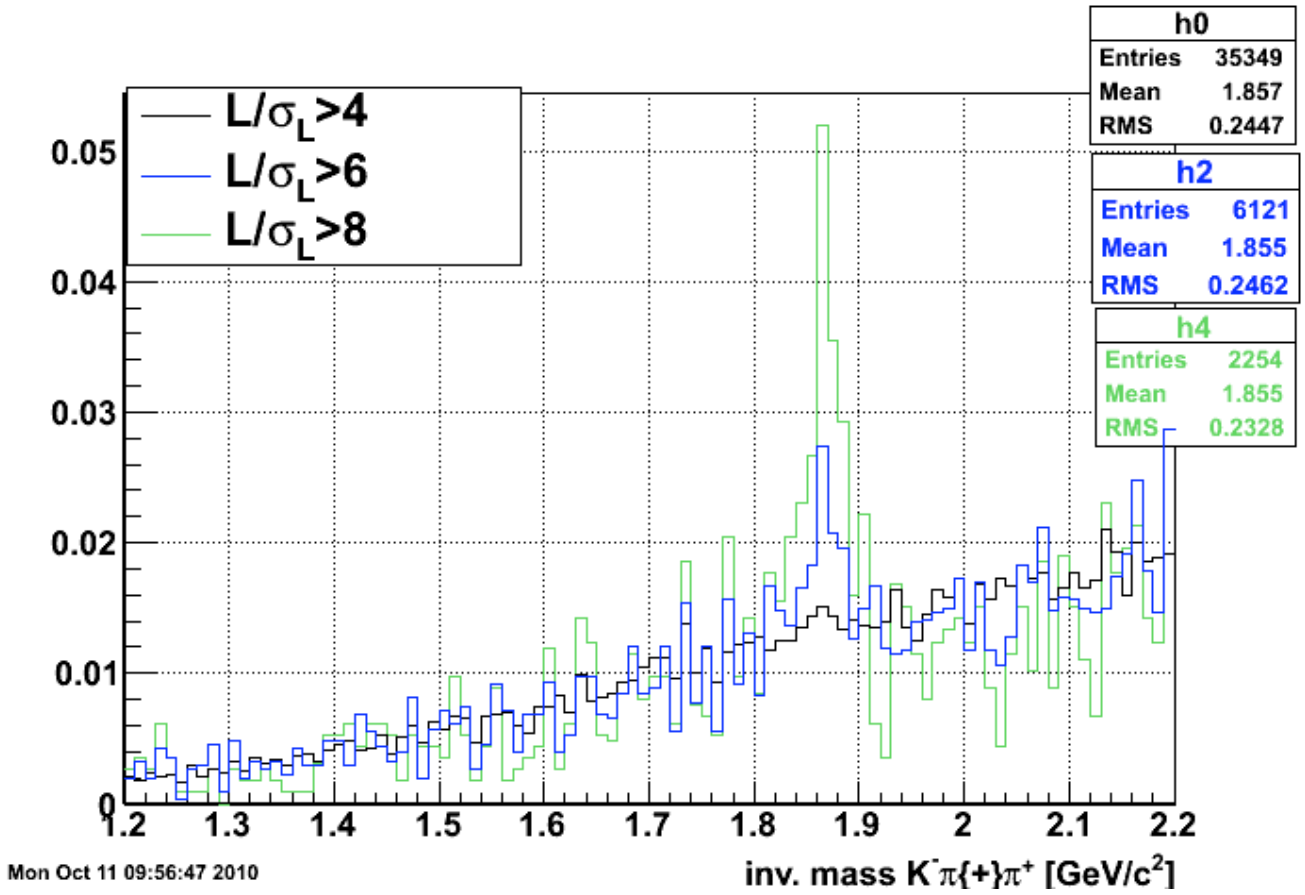
Comments :

- the pixel hits cut give the same significance but improves the s/b ratio

Note :

- I used a pol2 fit and evaluate the signal and background in the mass range : [1.82,1.9]
- these numbers are only for a qualitative comparison : I need more stats to make proper studies (as a function of p_T of D^+, optimization of cuts,etc …)

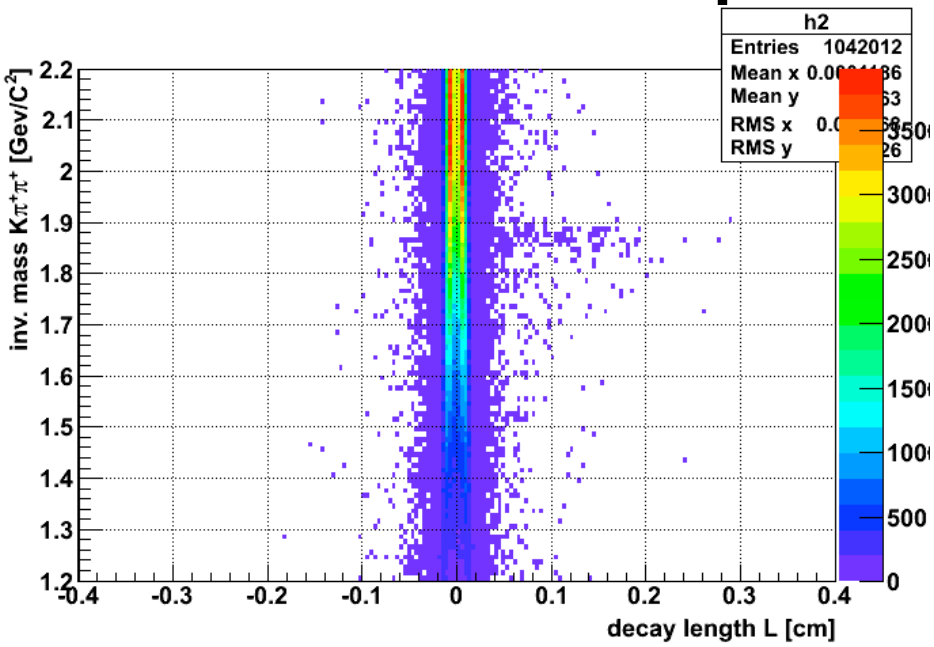
Inv. Mass vs L/dL cut



- histograms are normalized with their number of entries

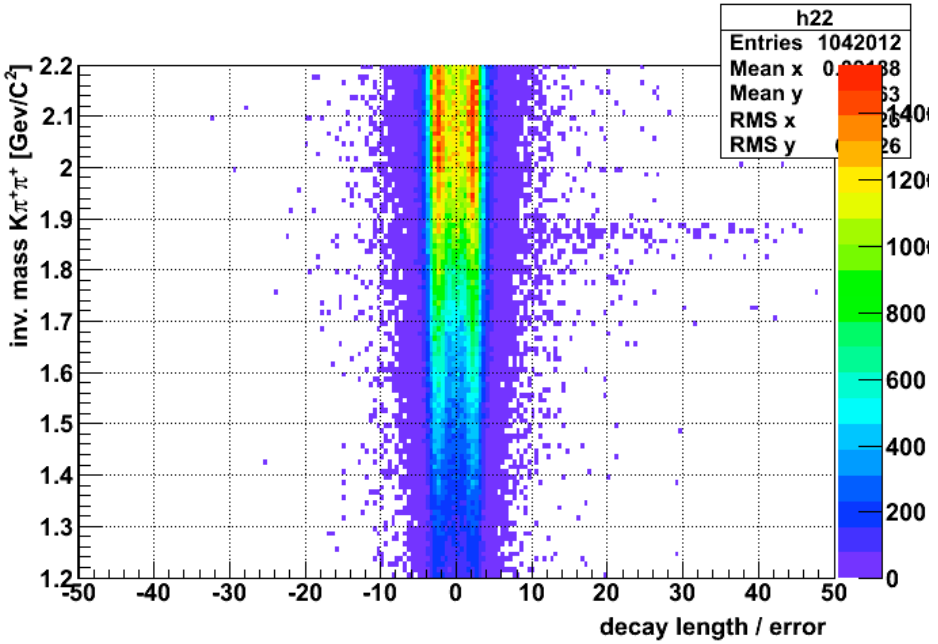
- Even with the low statistic, it shows the improvement due to the decay length significance cut.

Comparison of cuts

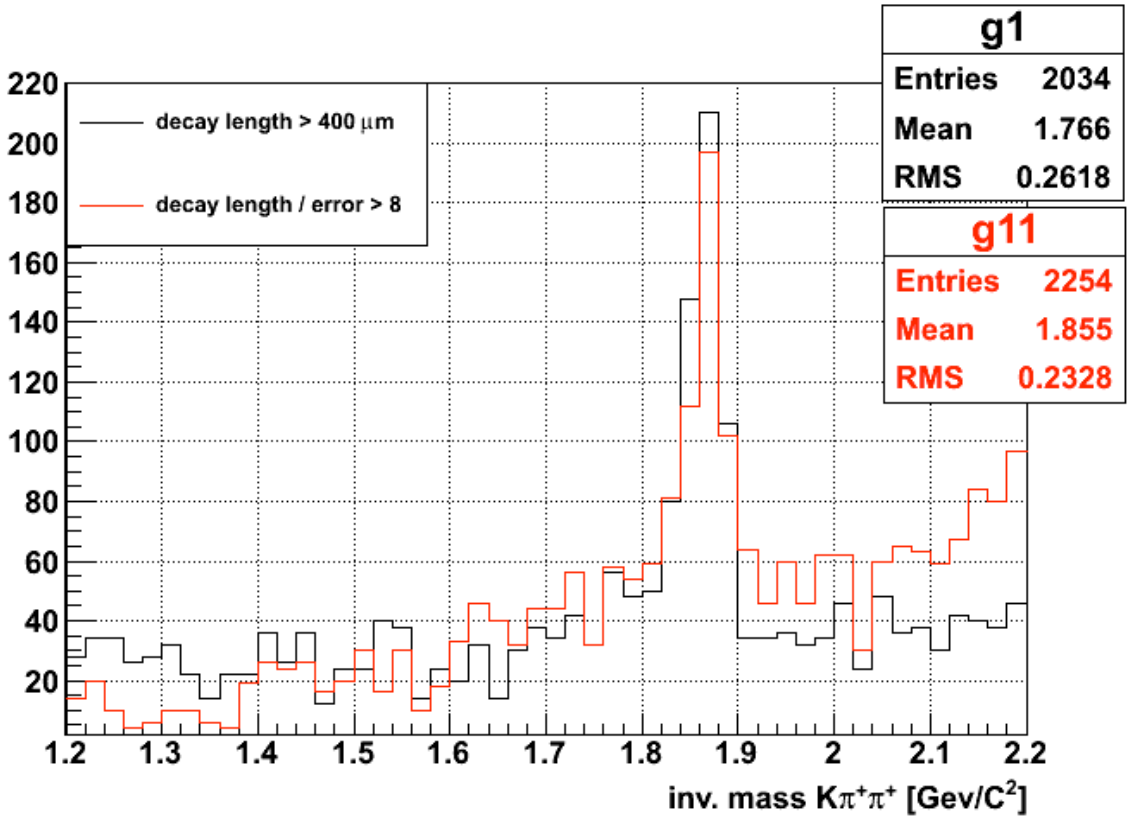


- Left : inv. Mass vs decay length
- A fixed cut at decay length > 400 microns may be suggested by the plot

- right : inv. Mass vs decay length /error
- A fixed cut at decay length /error > 8 may be suggested by the plot to remove background



Comparison of cuts



- Assuming a decay length error ~ 25 microns, a fixed decay length > 400 microns would lead to a decay length /error cut equal to 16.
- This idea of this plot is to show that a cut based on the decay length significance (instead of decay length) may be better
- Note : this is the advantage of the Kalman Fitter method (to know the error associated to the decay length)

summary

- Rerun with cuts to remove background (as quoted in the CD0 document).
- Inv. Mass peak seen by applying a “simple” L/dL cut.
- Requiring pixel hits =2 improved the signal/noise ratio