Measurement of D^0 decays to $K_L{}^0\pi^0$ and $K_S{}^0\pi^0$

Charm group meeting

Status Report

04/04/06

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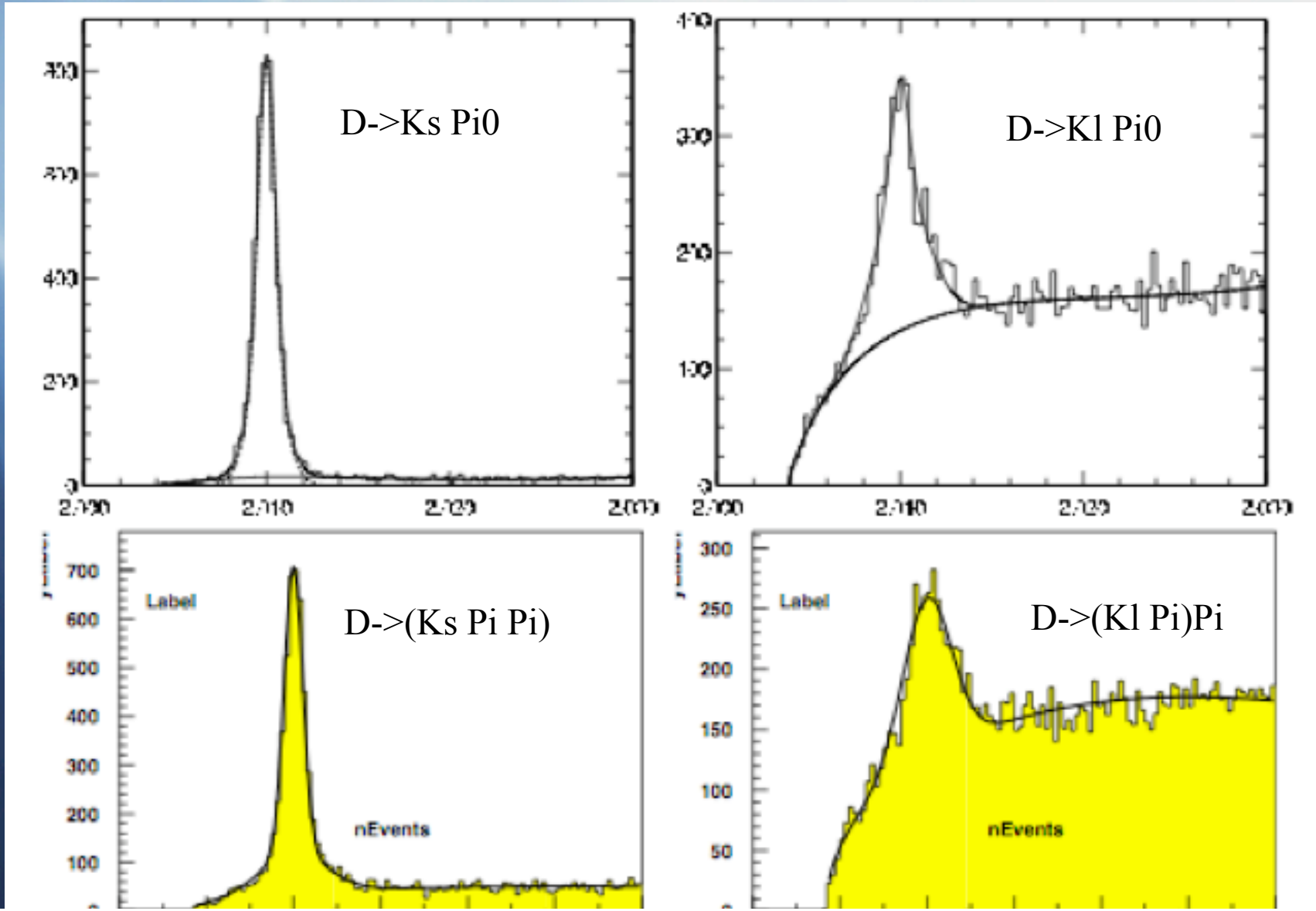
Recapitulation…..

- We had this measurement in Belle with a small data set (23/fb)

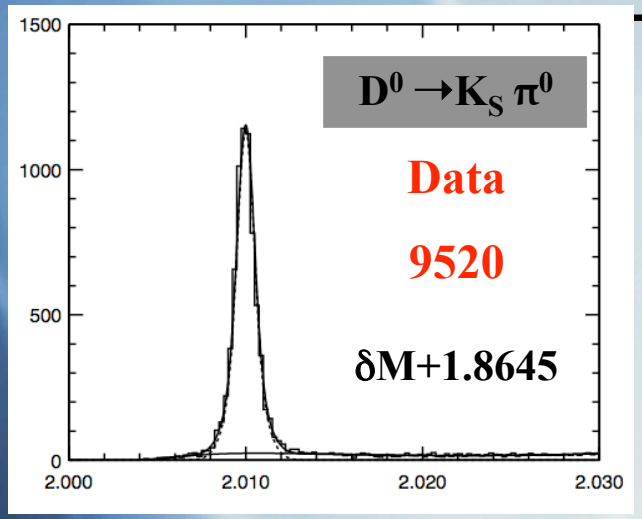
that produced a conference publication ref. ***ArXiv: hep-ex/ 0107078 v2***

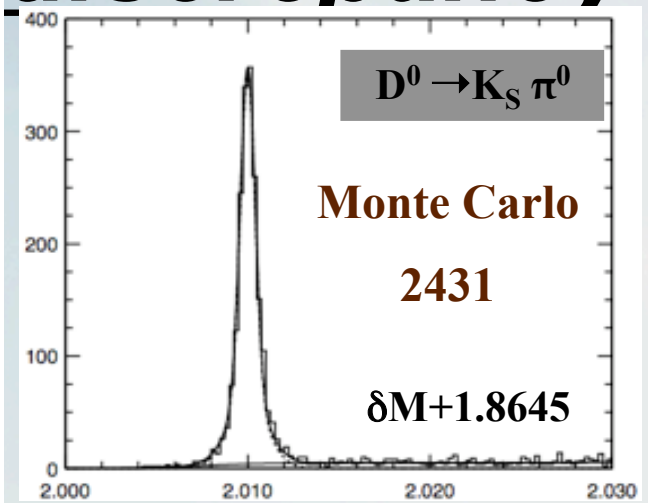
- My measurement improved the yields noteciably especially for the K0L modes at the same background level, plots will follow
- I studied data/MC, MC being roughly 3 x data size (32/fb)
- Presented in BAM, sept 2005. There was a data/MC discrepancy
- The discrepancy was due to missing large amount of MC data(Thanks Sakai san who spoted the reason), presented in charm mtg in october

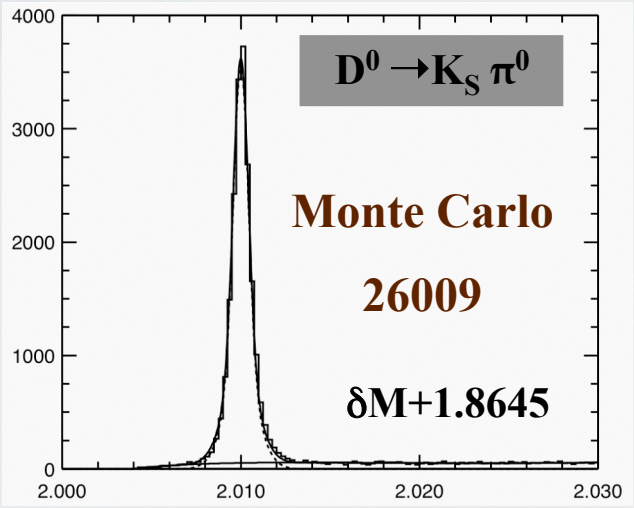
Recapitulation...., Improvement

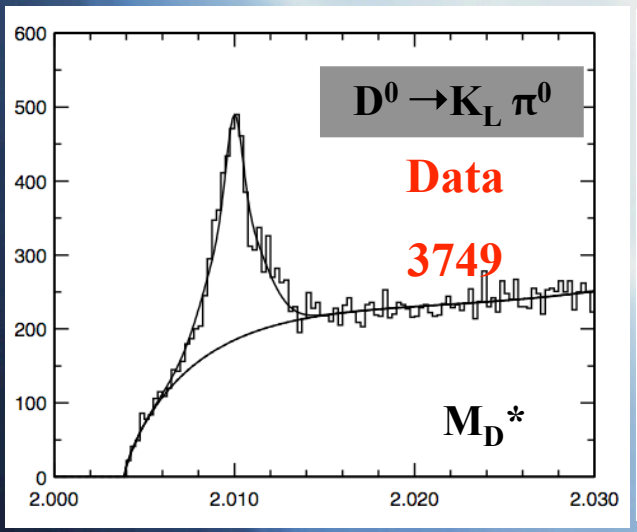


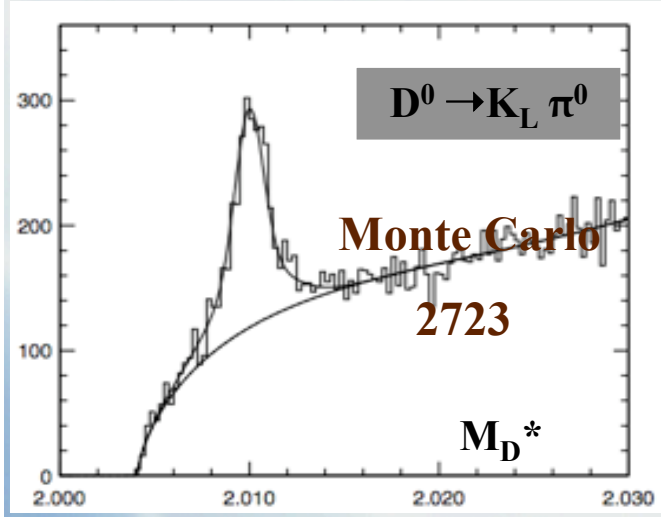
Recapitulation...., Data/MC discrepancy

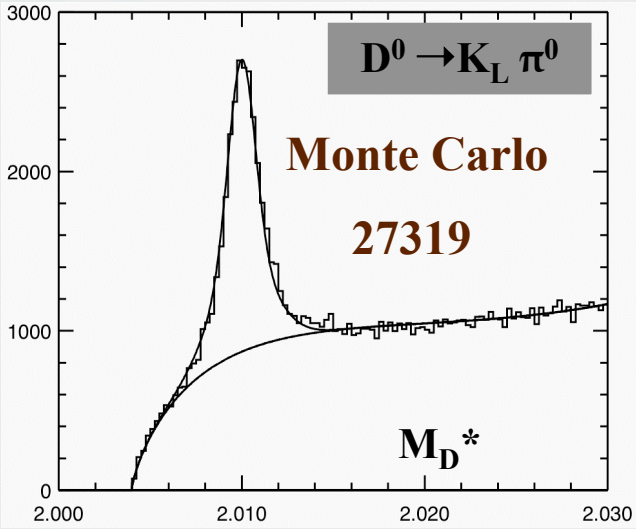








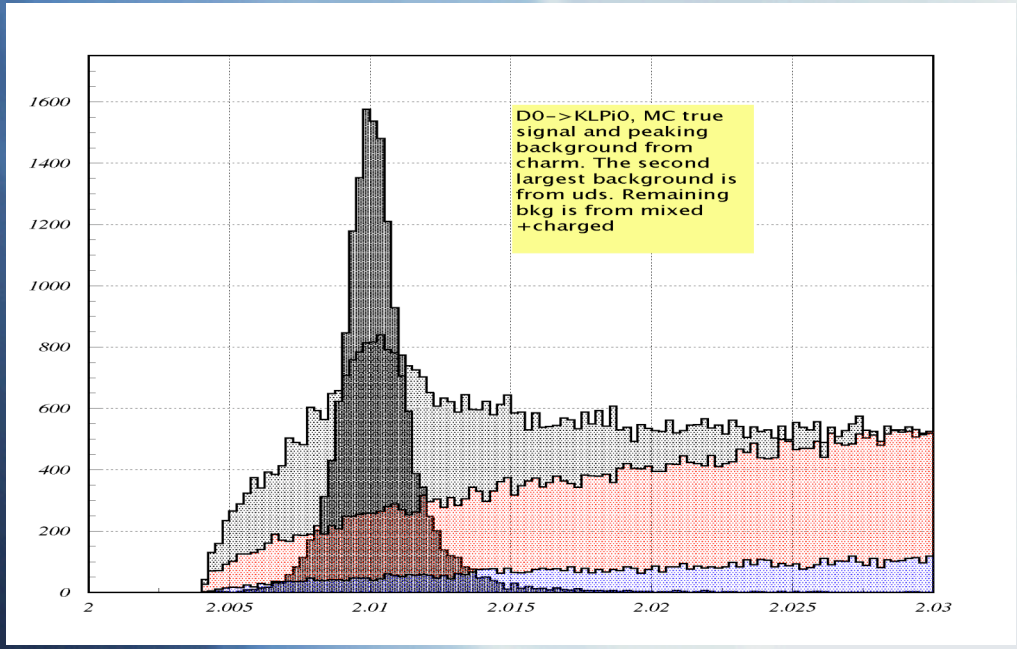


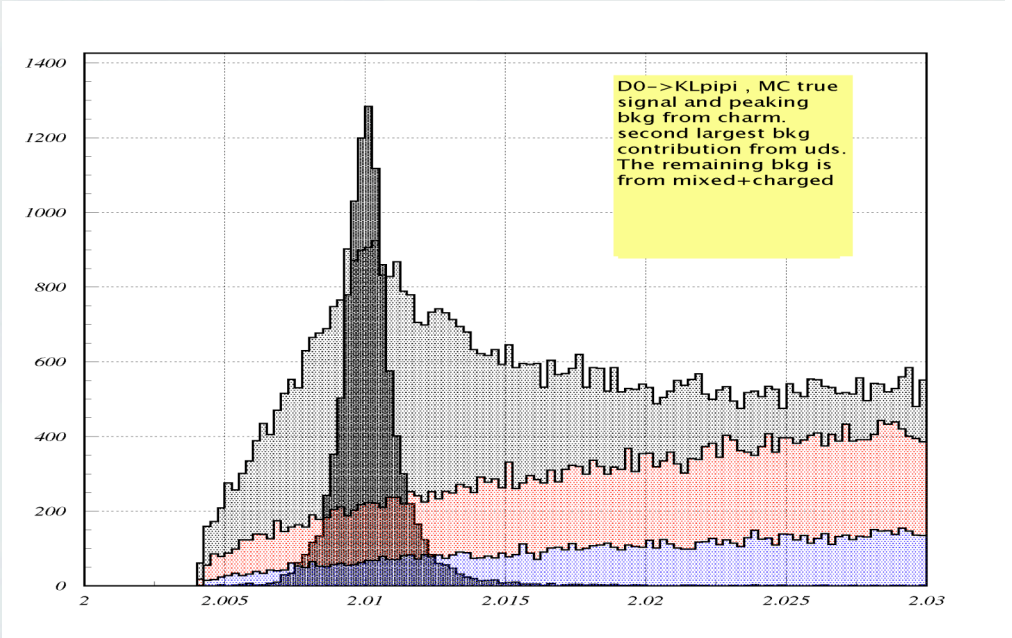


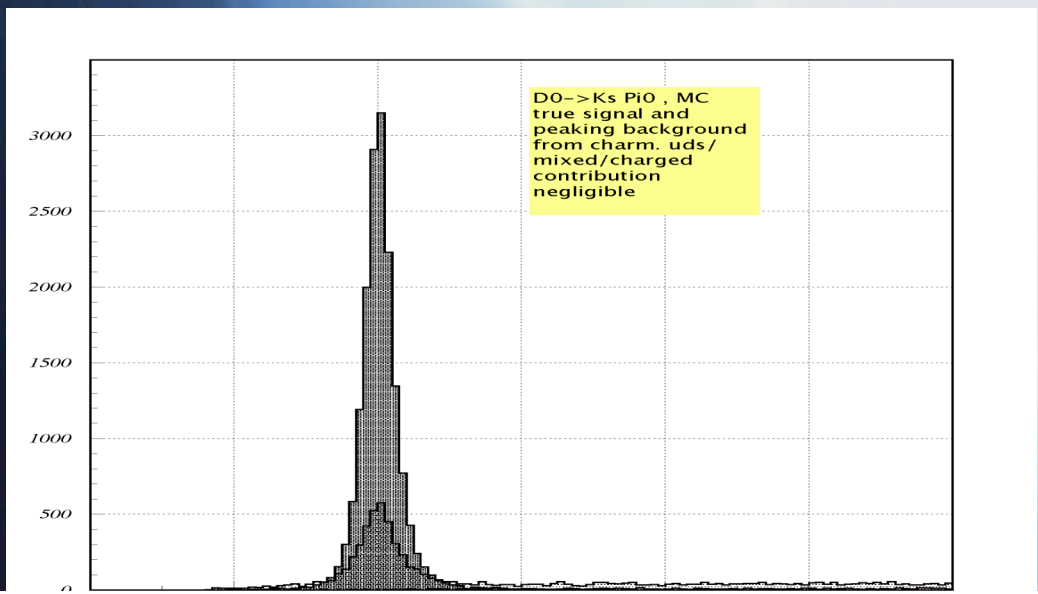
Whats new?..., MC Truth and background

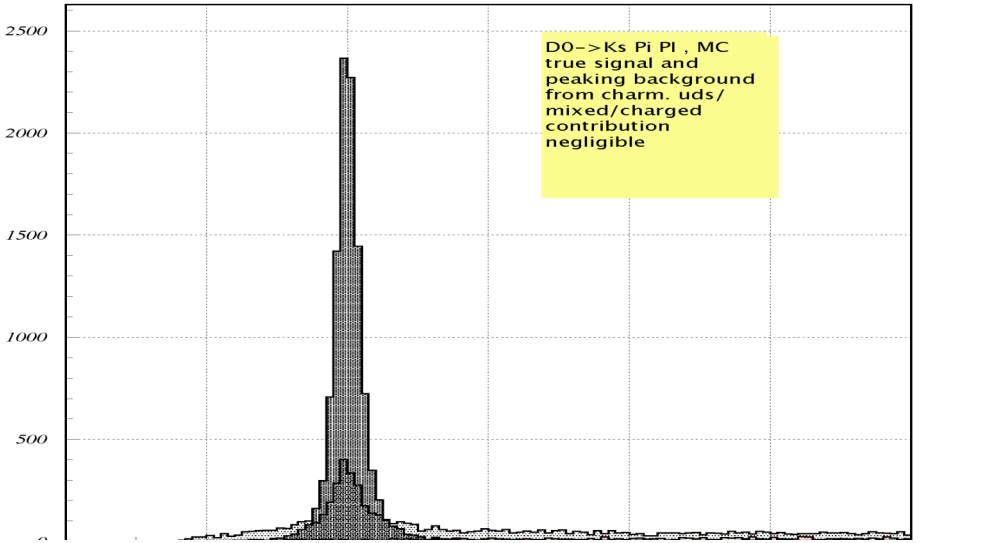
- I have done MC truth studies where I match reconstructed final state particles with a closely matching generated particle
- For the mdst charged/ gamma I used standard belle routine. For K0l s I have used an angular matching of 0.1 radian
- If the matched final state particles in the constitute a signal decay in the generated table I identify it as true signal
- I have categorised background into charm/uds/mixed+charged
- The charm component seems to contribute a peaking component right under the signal.

Results from Background study....,





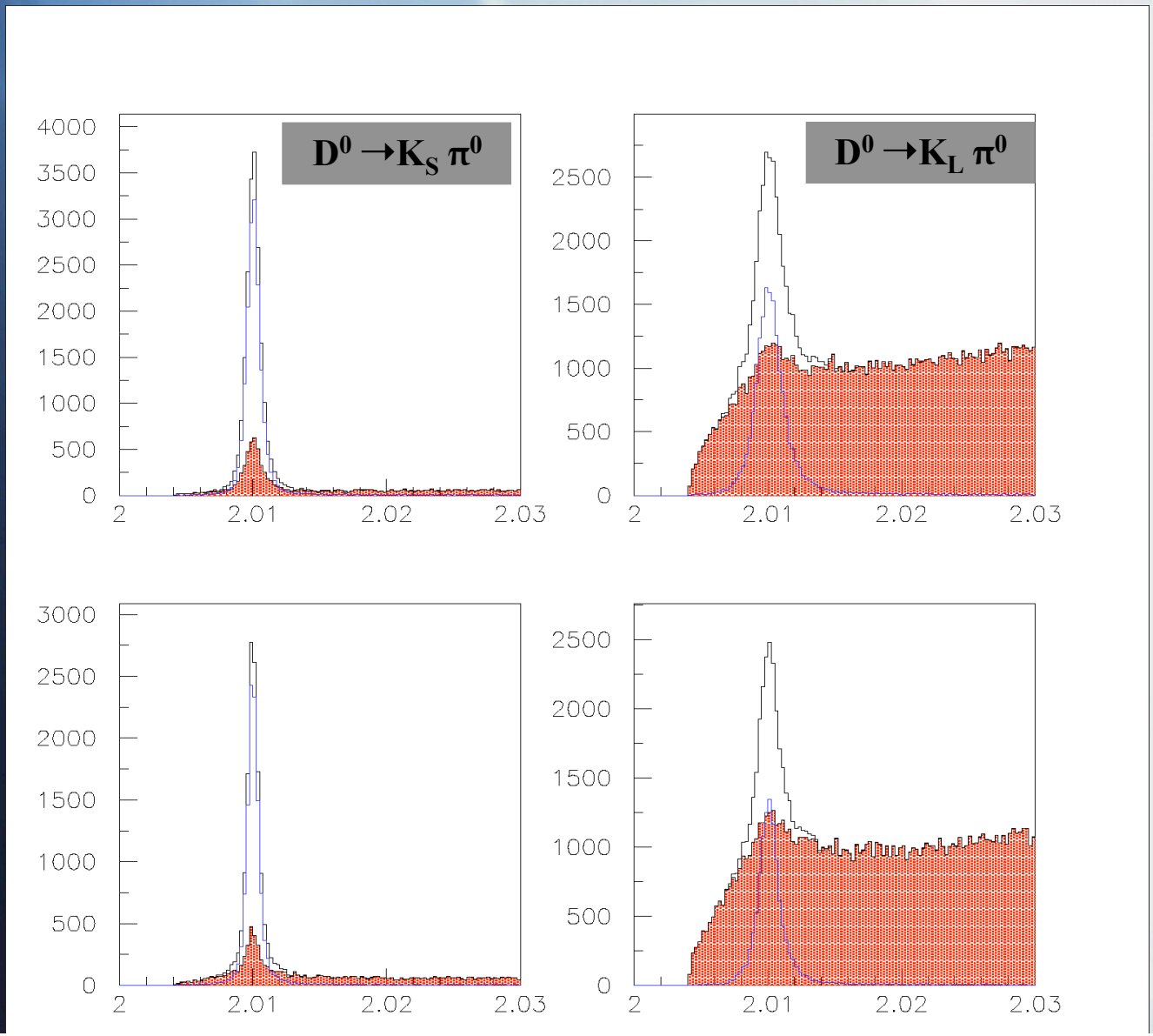


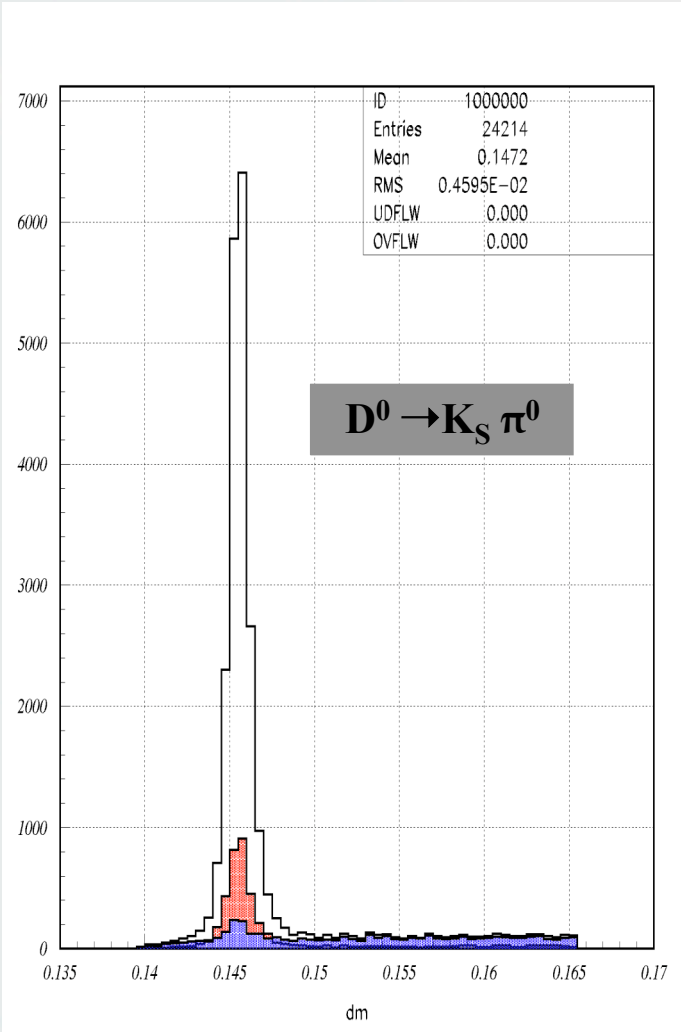


Results from Background study....,

- Now I regrouped the events into signal and background only and we see the peak in all 4-modes.
- I picked out the D->K0s Pi0 mode and it turns out that the peaking component sitting right under the signal is actually signal
- This happens because the decay conditions I applied assumed Pi0 decay into 2 gammas. But turns out in some cases the Pi0 undergoes pair production but I have been able to reconstruct the Pi0. Its true Pi0 and constitutes the signal. (Thanks to Leo) Good news!
- I guess rest of the cases are subjected to some kind of misidentification although they are also true signal although I

Background, whats peaking?....

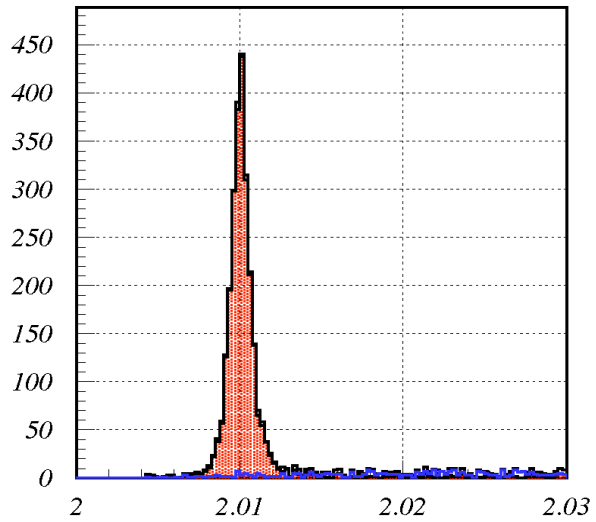


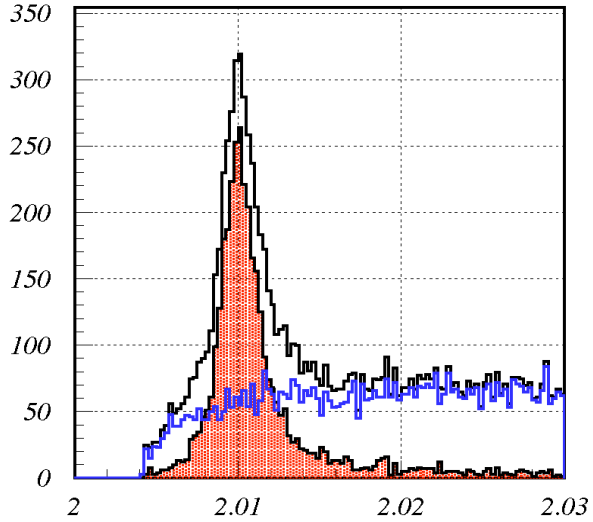


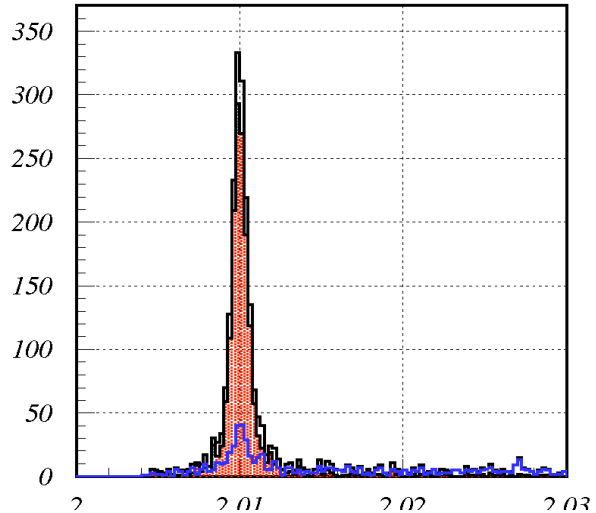
Simpler alternative....

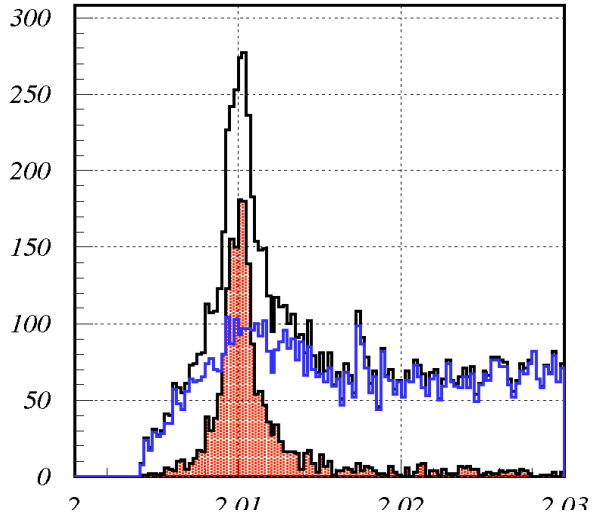
- Pasha suggested to remove the signal in the generated table and study the signal and background shape
- Had to code in some variables and conditions and rerun analysis jobs. Analysed charm MC (on-resonance from exp 07 only for faster result) as this was the only source for the peaking component.
- Lets us look at the result, freshly squeezed out of analysis farm.

Background and Signal in MC

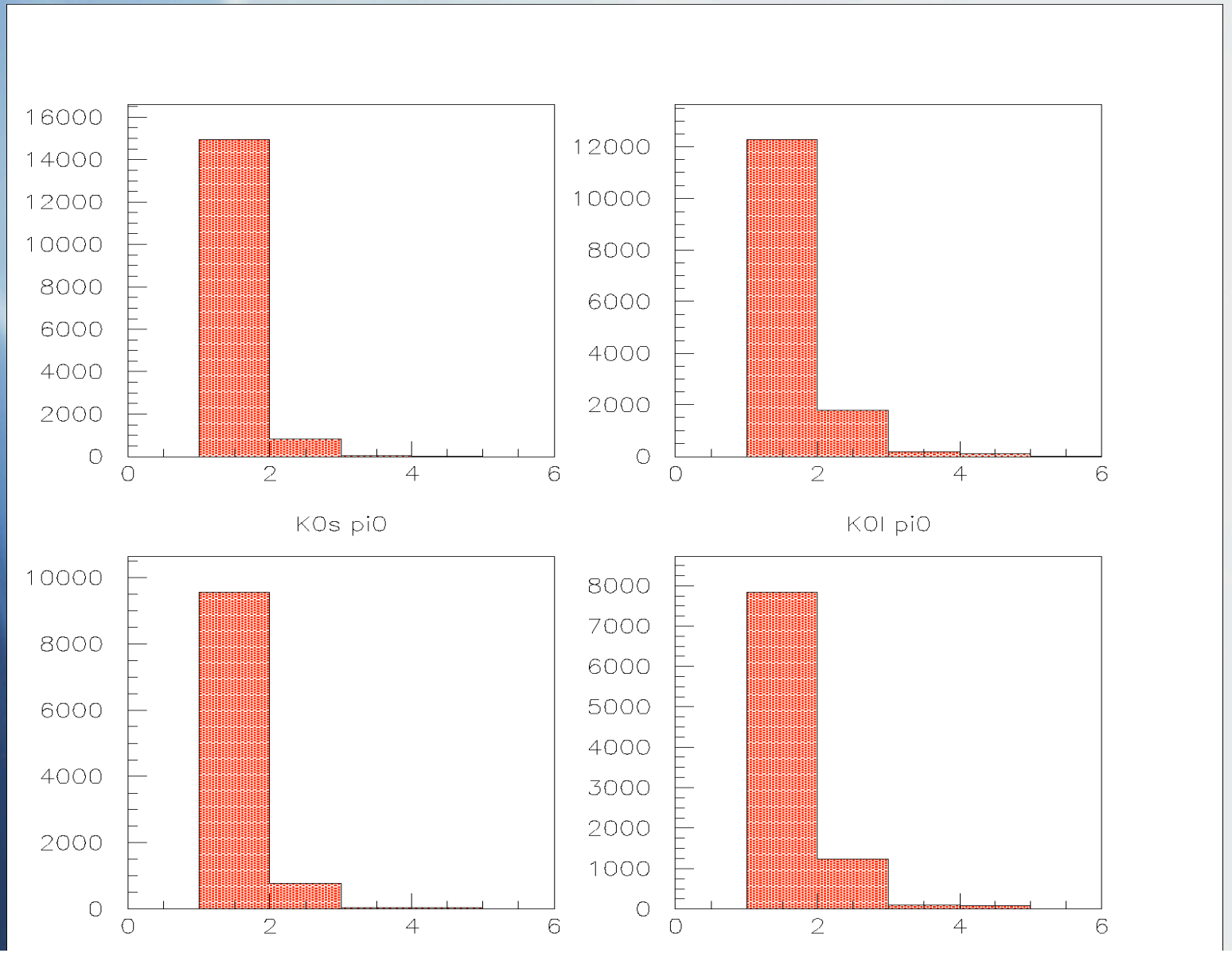








Multiple candidates??....



Next in the Agenda…..

- Now is the right time to update to the full data-set (450/fb ?) and systematics/statistics error estimations from fit.
- I plan at a conference publication with the above and will work towards the update as fast as possible.
- The next step would be to improve the systematics by studying several options. With the possible improvements I aim at a Journal publication and thesis.
- Everybody's suggestions for improvement are welcome