

## The LHCb

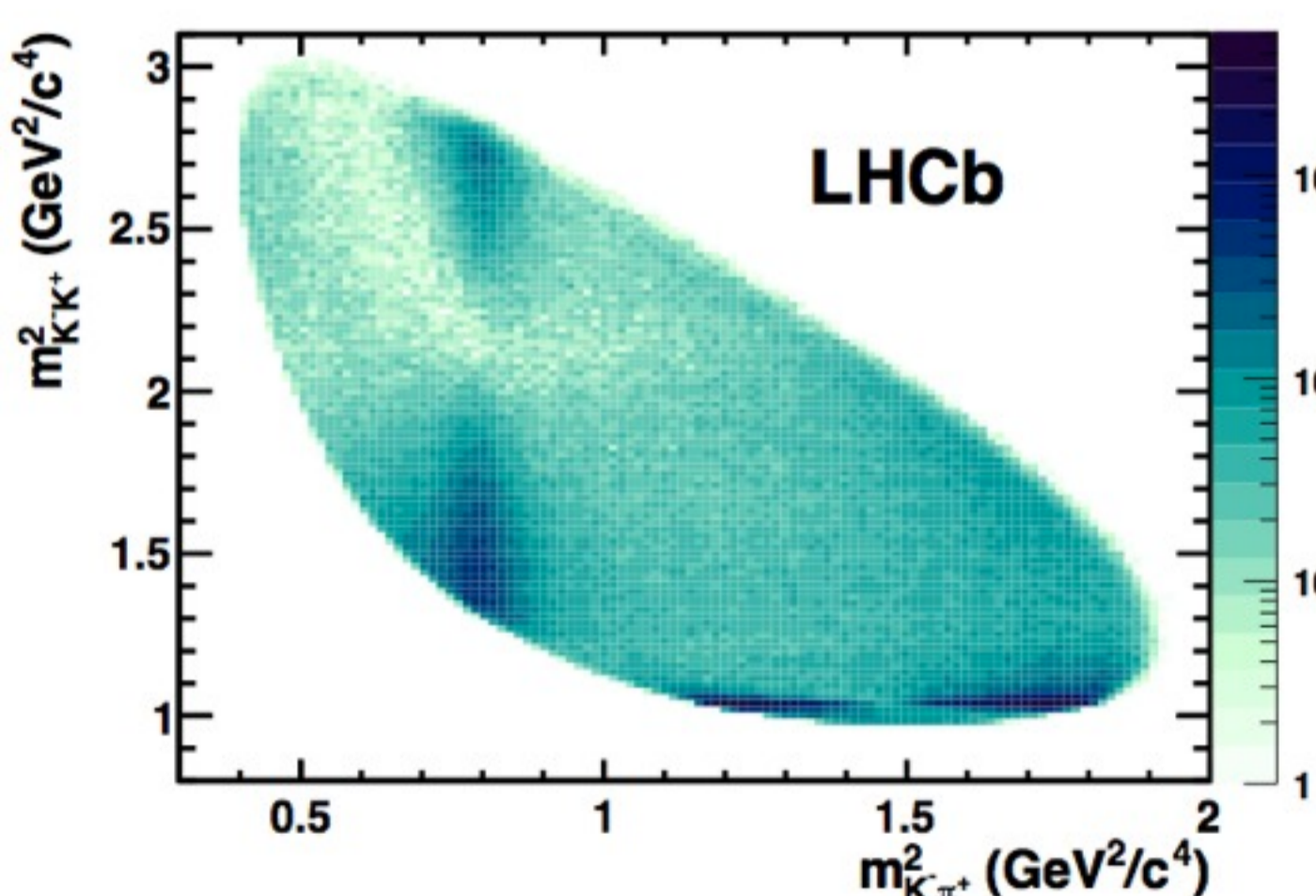
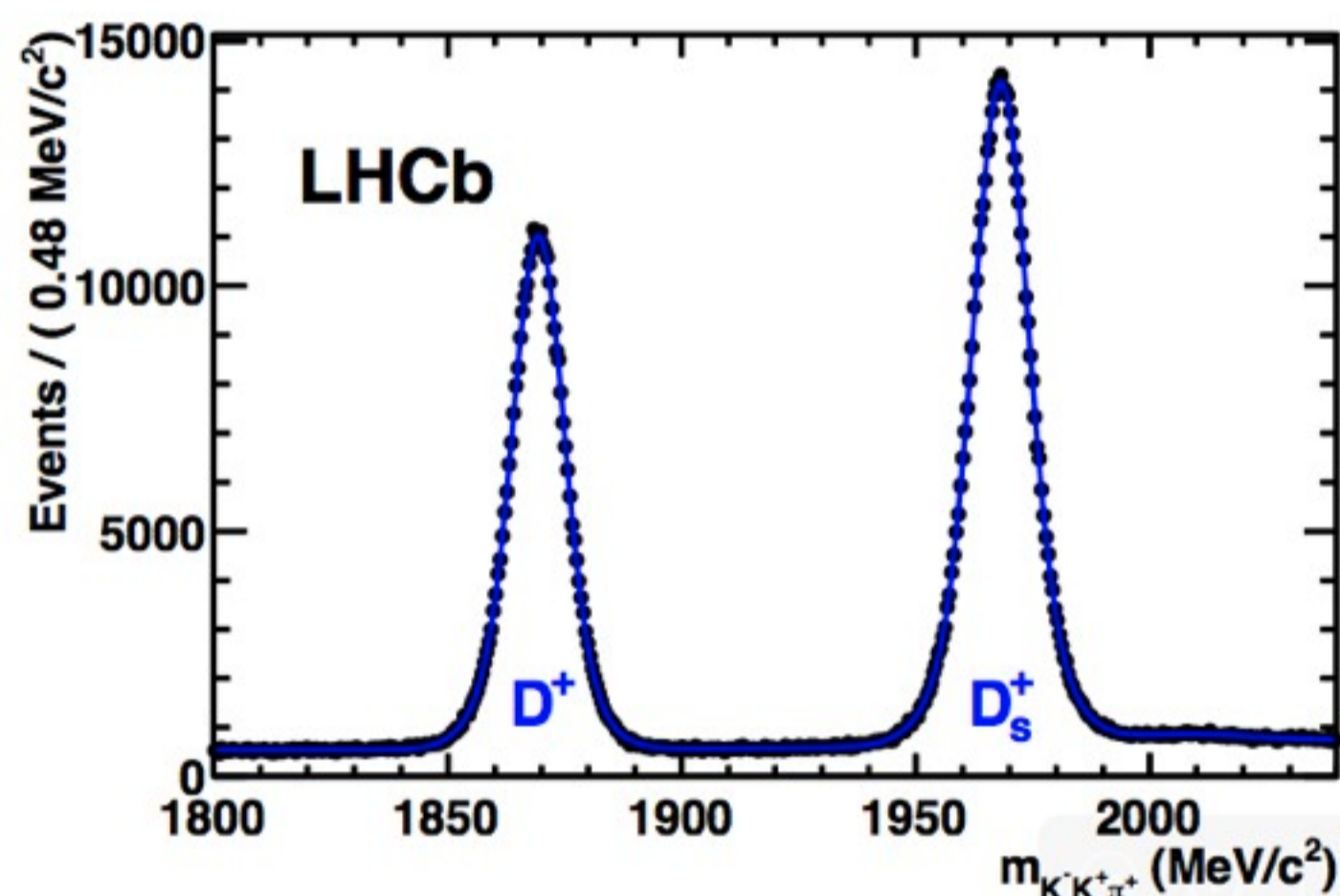
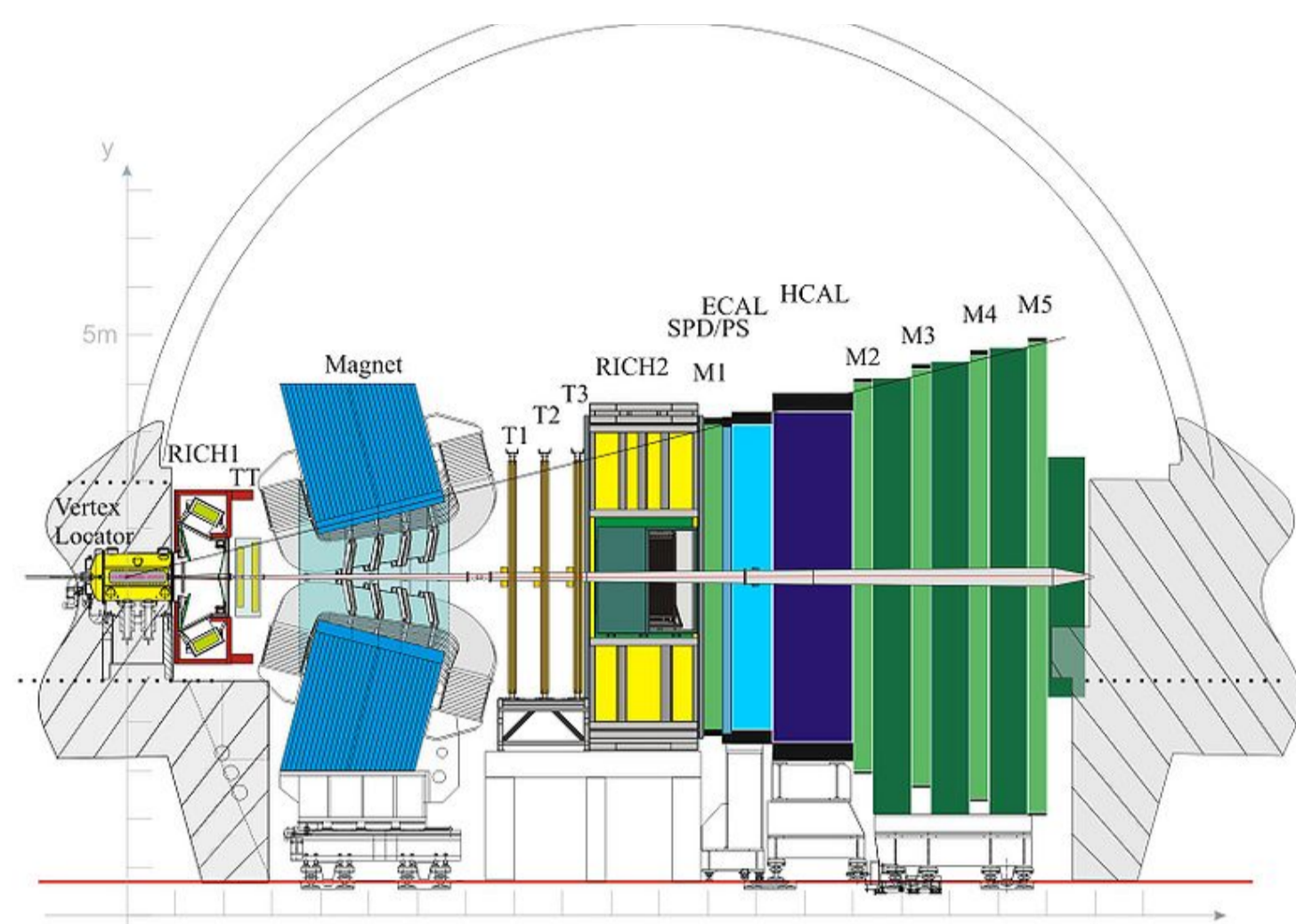
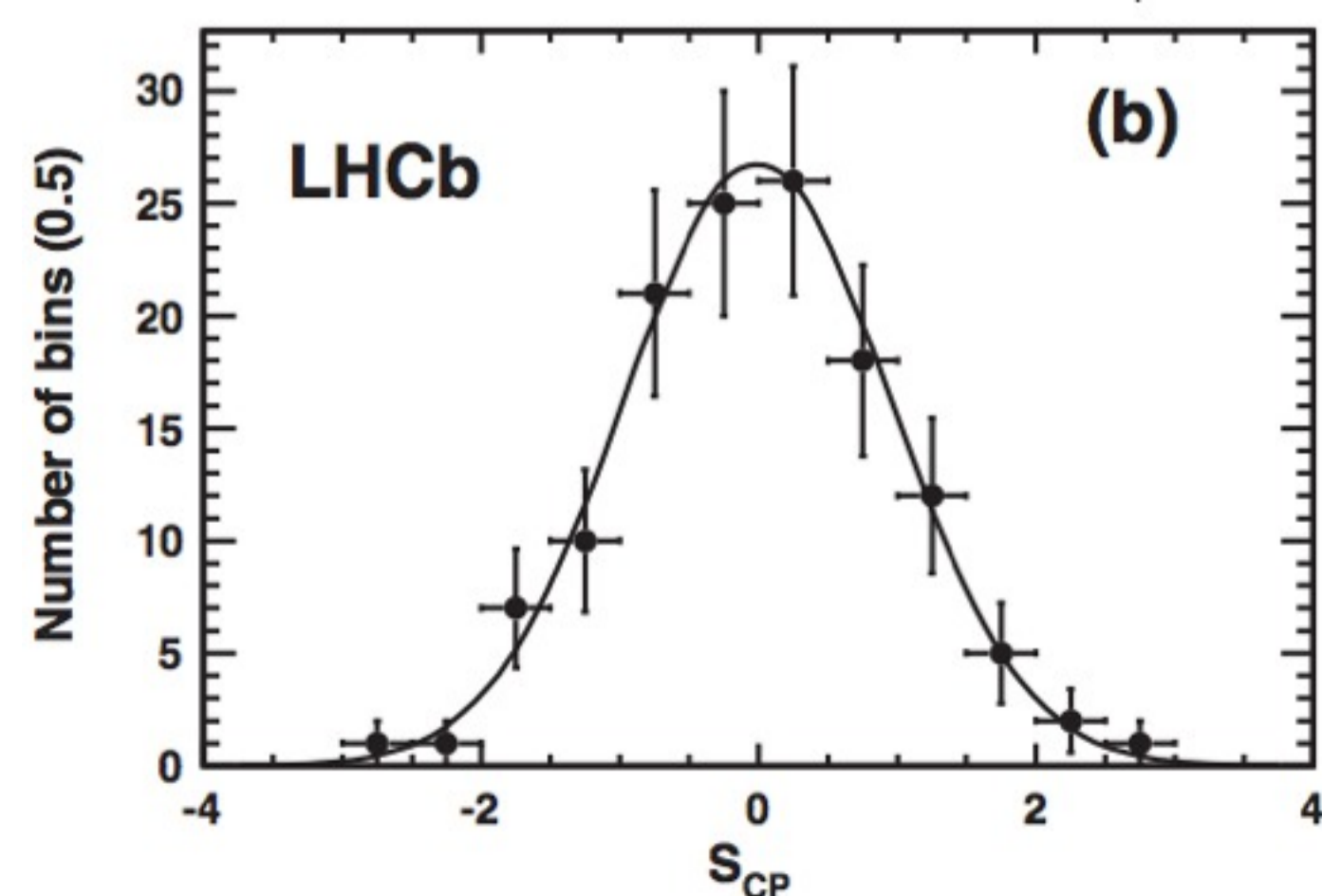
The main purpose of the LHCb experiment is to measure CPV effects and rare decays within charm and beauty processes. Its most important features for D meson measurements are a good particle identification system, high vertex and momentum resolution.

## Data set

- 2010 LHCb data
- $35 \text{ pb}^{-1}$
- $\sqrt{s} = 7 \text{ TeV}$
- 370k  $D^+ \rightarrow K^- K^+ \pi^+$  events

## Method

By comparing the  $D^+ \rightarrow K^- K^+ \pi^+$  and  $D^- \rightarrow K^+ K^- \pi^-$  Dalitz plots bin by bin we were able to search for asymmetries. If the bin differences are caused only by statistical fluctuations, the  $S_{CP}$  distribution is a gaussian with mean value 0 and width 1.

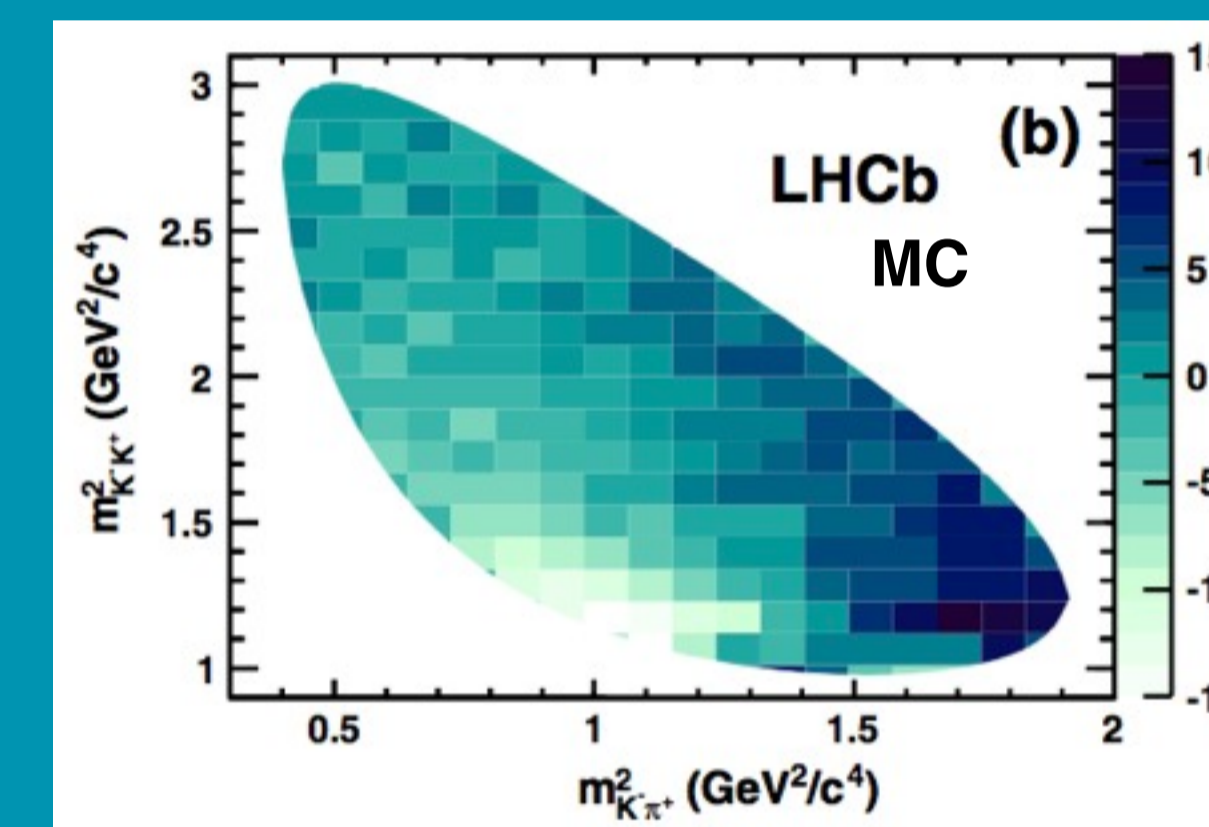
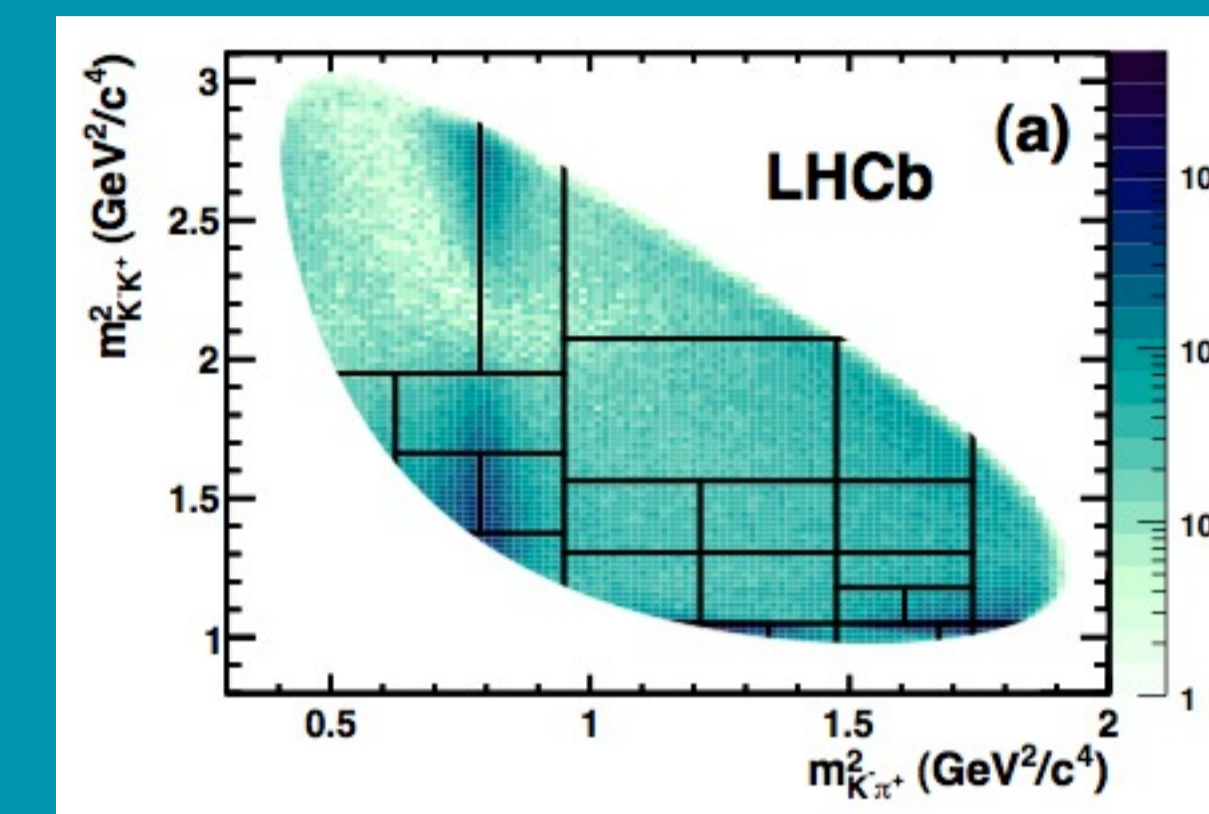
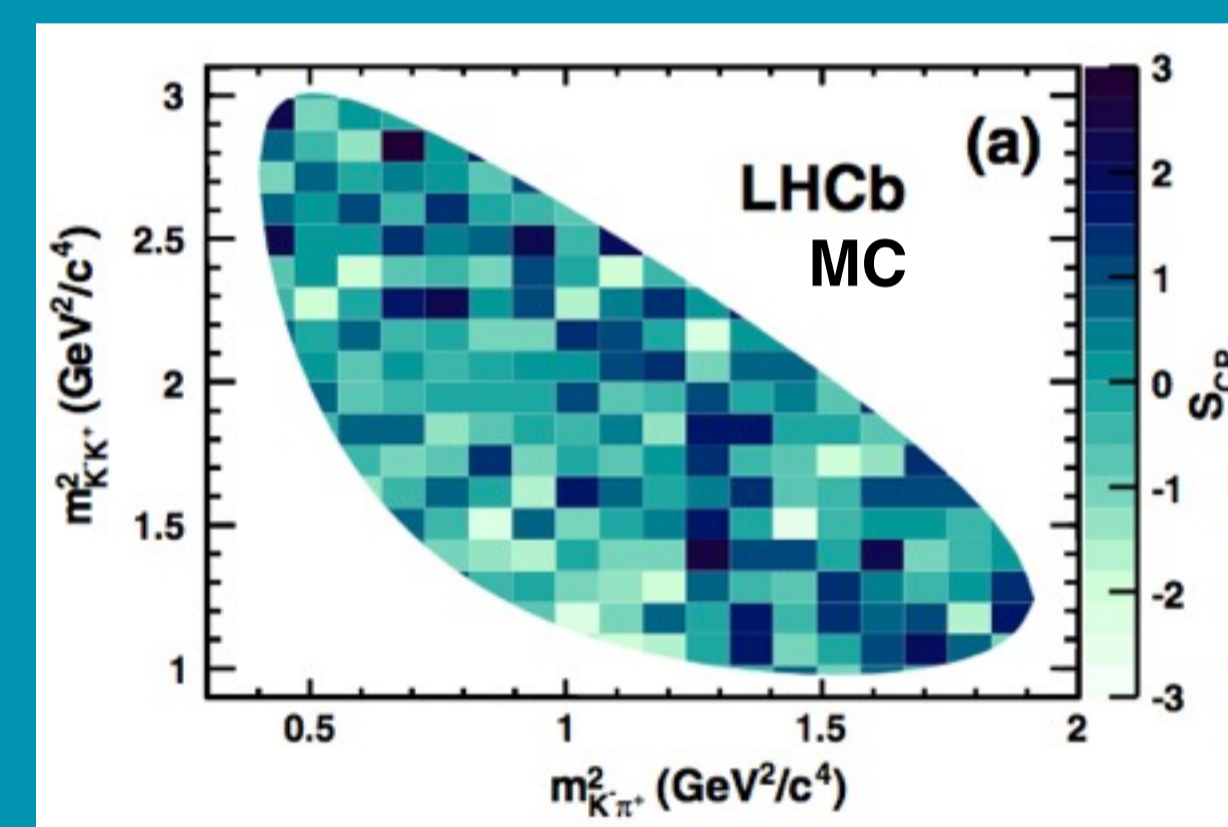


$$S_{CP}(i) = \frac{N_{D^+}(i) - \alpha N_{D^-}(i)}{\sqrt{N_{D^+}(i) + \alpha^2 N_{D^-}(i)}}$$

$$\chi^2 = \sum_{i=1}^{n_{bins}} S_{CP}^2(i)$$

## Sensitivity tests

Several binnings were tested in order to achieve better sensitivity to CP asymmetries and to make cross checks. These tests were generated with fast MC samples where CP violation may be introduced in the model. The CLEO-c model was used in the generations.



## Control Modes

$D^+ \rightarrow K^- \pi^+ \pi^+$  and  $D_s^+ \rightarrow K^- K^+ \pi^+$  were used as control channels. These processes are not suppressed and do not present CPV asymmetries within the SM. Therefore, we can use both channels to search for asymmetries not related to CPV. No evidence of asymmetries was found in these processes.

## Results and conclusions

No CP asymmetries were found in the  $D^+ \rightarrow K^- K^+ \pi^+$  decay (010.1103/PhysRevD.84.112008). LHCb has acquired  $\sim 2 \text{ fb}^{-1}$  in 2011 and 2012 (so far) and this method may be applied again for greater resolution. A full Dalitz plot analysis may also provide new information on CPV for this channel.

