



Status update on $B \rightarrow hh'$

Mia Tosi, Martino Margoni, Paolo Ronchese, Franco Simonetto, **Stefano Lacaprara**

Infn Padova

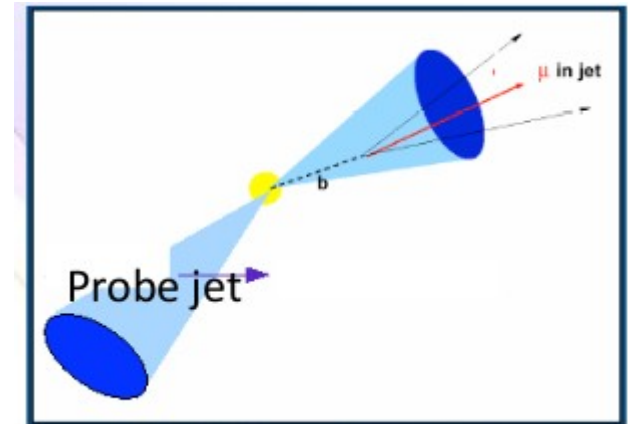
B $\rightarrow$ mumu check point
CERN, 15 February 2013



Strategy

- **Strategy Jet-based**

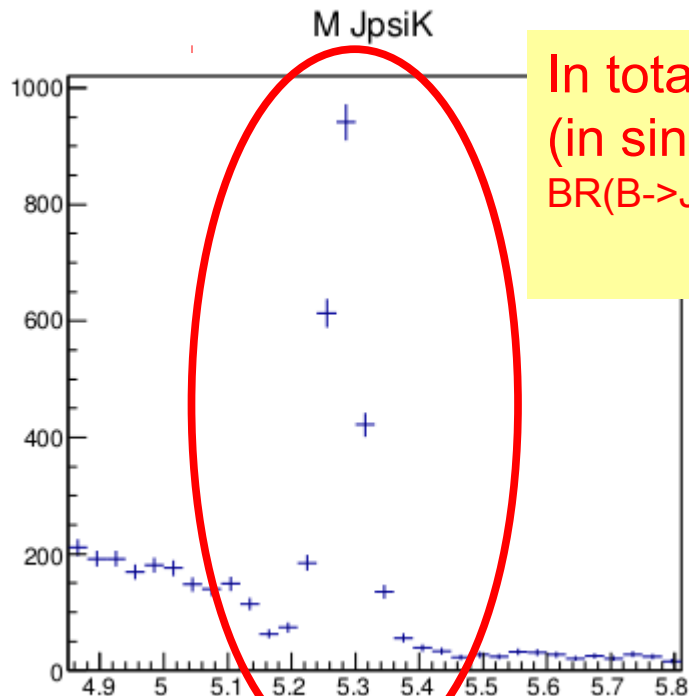
- **Use** `HLT_Mu12_eta2p1_DiCentral_40_20_DiBTagIP3D1stTrack`,
 - The displaced J/Psi path will be added.
 - Two sample largely independent
 - Overlap $\sim 1.12\%$
- Consider b-Jets (loose CSV) w/o the triggering muon inside, to avoid bias
- Consider tracks inside jets
- Consider the secondary vertex inside jets
 - For $B^+ \rightarrow J/\psi K$ events with 3 muons
 - For $B^0 \rightarrow hh'$ events with 1 muon





B $\rightarrow$ J/Psi K

- **First step:**
 - Consider all muons, including the triggering one
 - Take a pair of muons and build a J/Psi
 - Associate an h to J/psi with K mass hypothesis
 - Same secondary vertex as J/psi



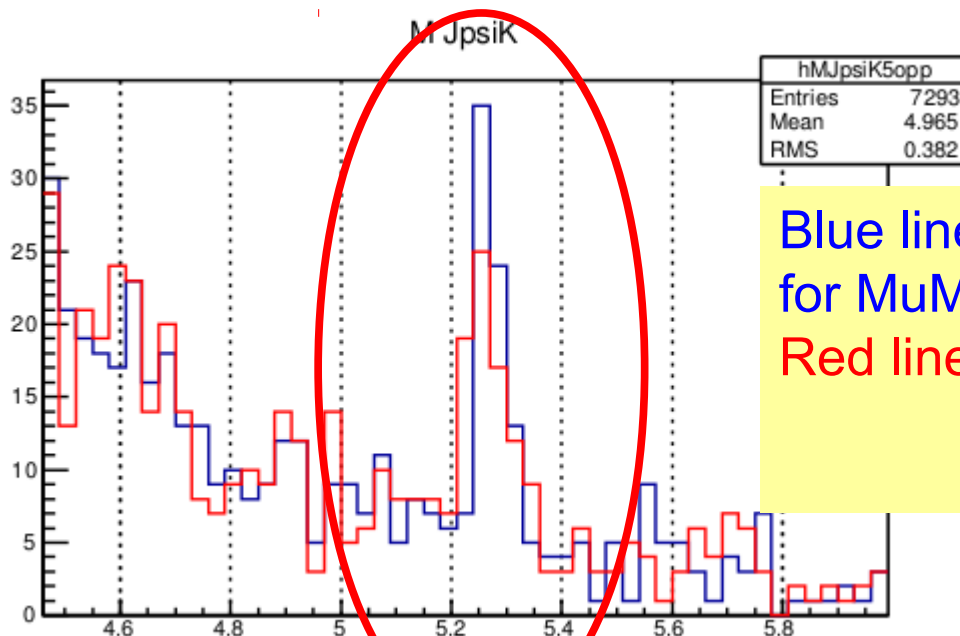
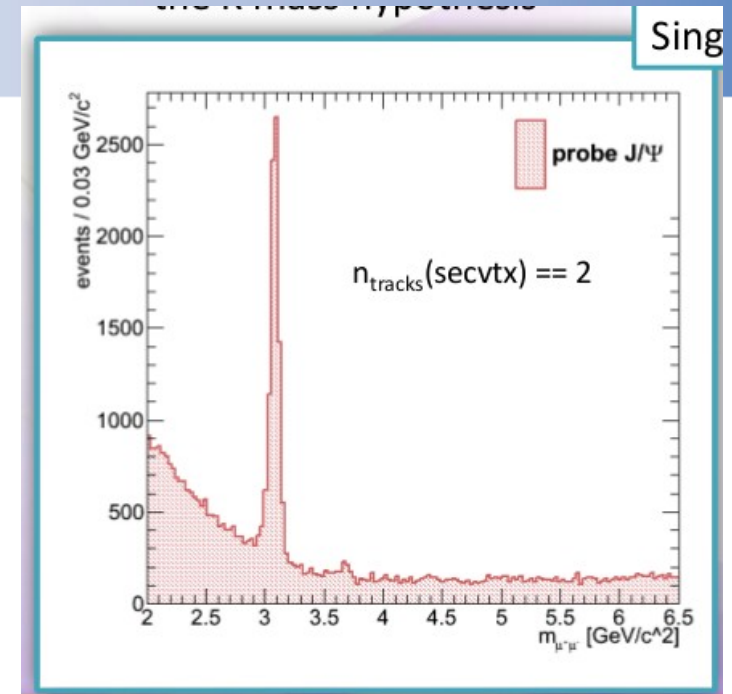
In total, roughly 2000 events
(in singleMu dataset only)
 $BR(B \rightarrow J/\psi K) \sim 6 \times 10^{-5}$

- Cannot use these candidates due to trigger bias
- not present in B $\rightarrow$ hh
- Consider only probe jets



B→J/Psi K unbiased

- **Events with 3 muons.**
 - Build a J/psi with the two non triggering muons
 - Associate an h to J/psi with K mass hypothesis
 - same secondary vertex for J/psi(mu,mu) and K. #track(sec vtx)==3



Blue line: With J/psi mass hypothesis for MuMu candidate
Red line: w/o mass hypothesis

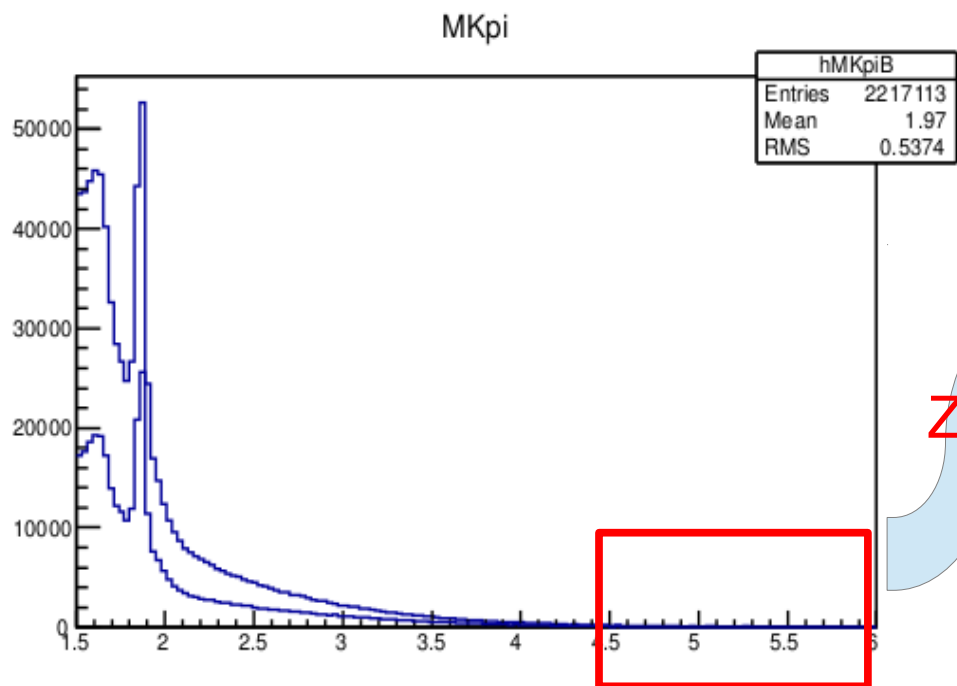
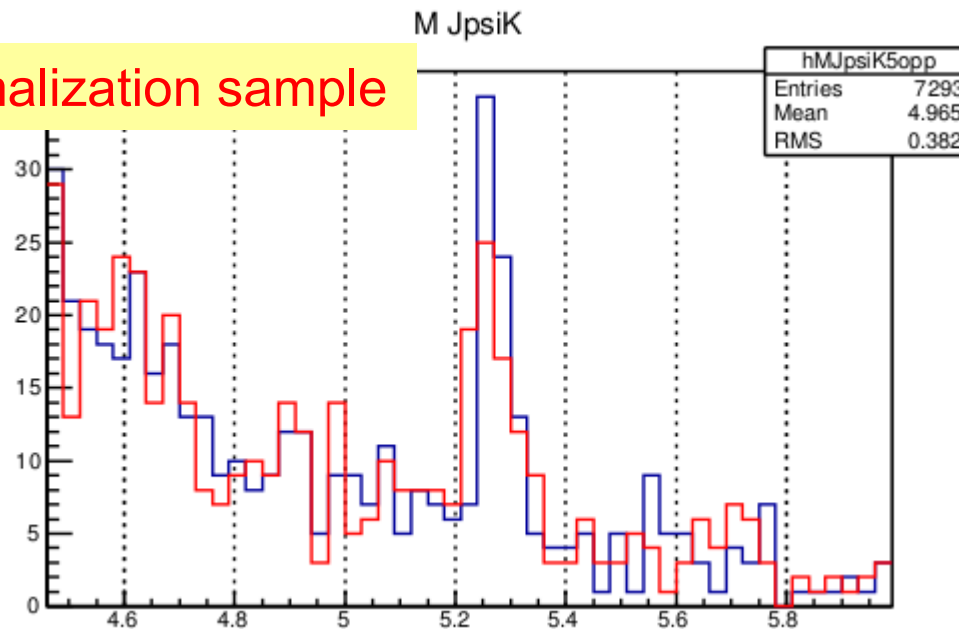


B $\rightarrow$ hh' very preliminary

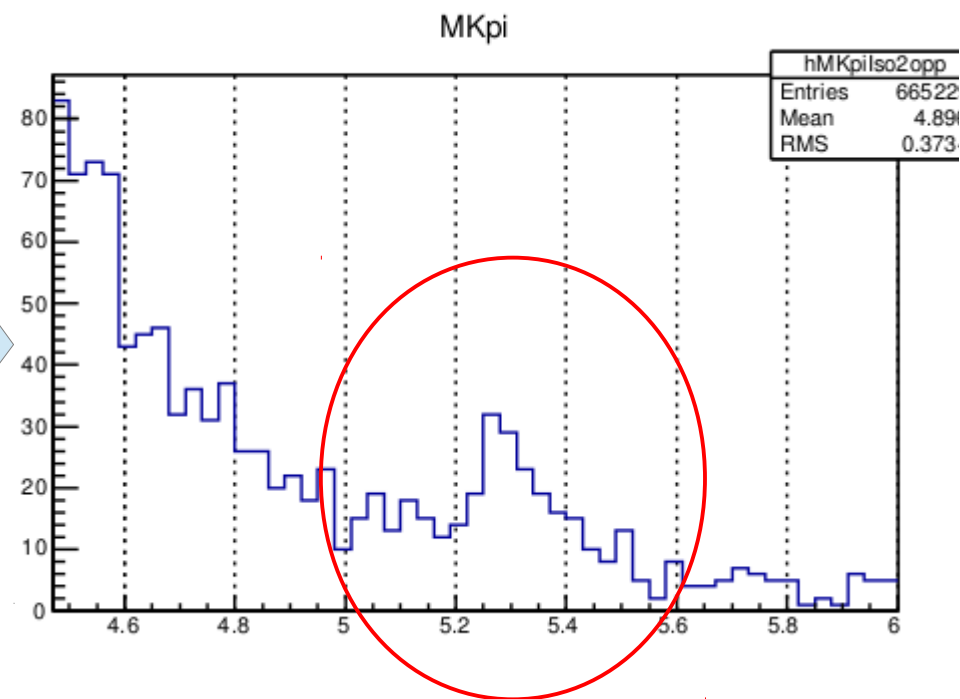
- Events with 1 muons

- Consider jet w/o triggering muons
- Select two h, $pt > 3$, $pt(hh) > 5$
 - Leading h: K-mass hypothesis
 - Sub-leading h: pi-mass hypothesis
- same secondary vertex,
- #track(secondary vertex)=2
- Isolation as studied on B $\rightarrow$ J/psiK candidates,
 - sum(pt) over a cone of $\Delta R < 0.3$

Normalization sample



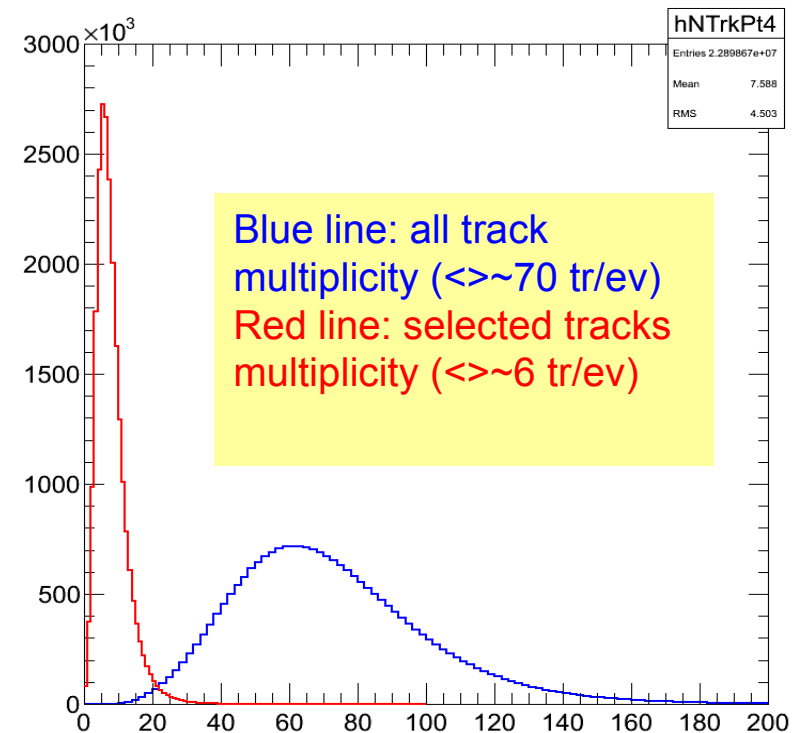
Zoom





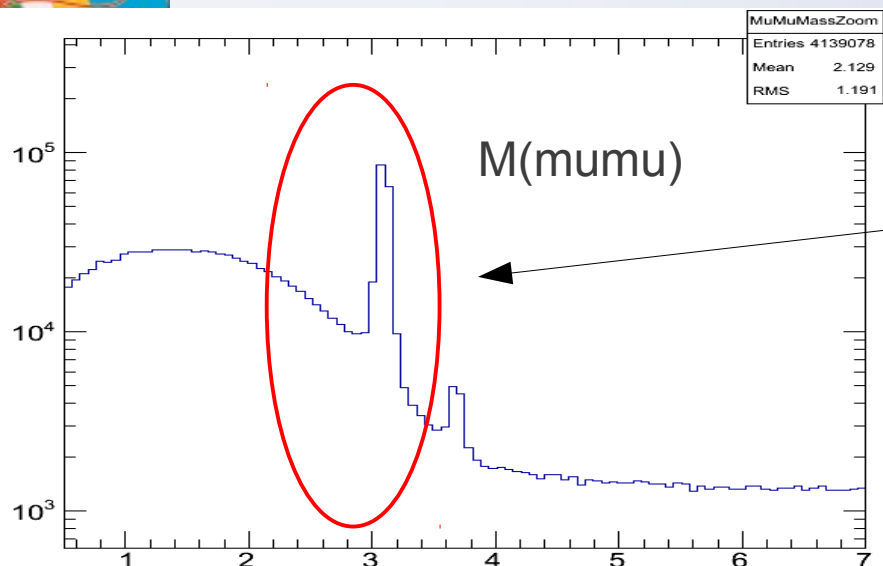
Second approach

- **Does working with jets introduce a bias?**
 - Try a different approach, starting from tracks
 - Consider all tracks but those in the jet with the triggering muon
 - $pt > 4$ GeV
- **Combinatorics still affordable even w/o muons**





$B^+ \rightarrow J/\psi K$

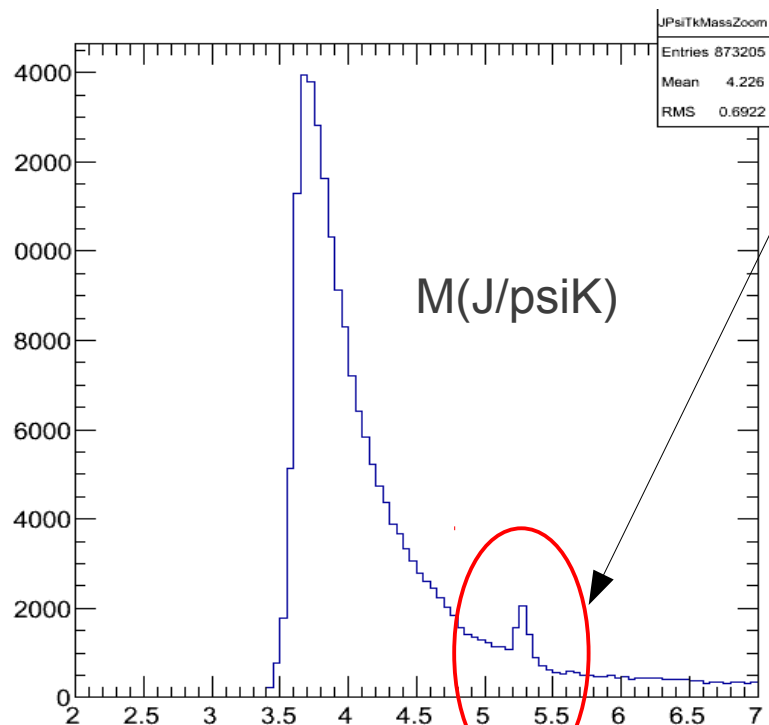


- **Build a J/ψ from two muons**

- Not necessarily inside a jet
- Associate a third track (not a muon) with K-mass hypothesis

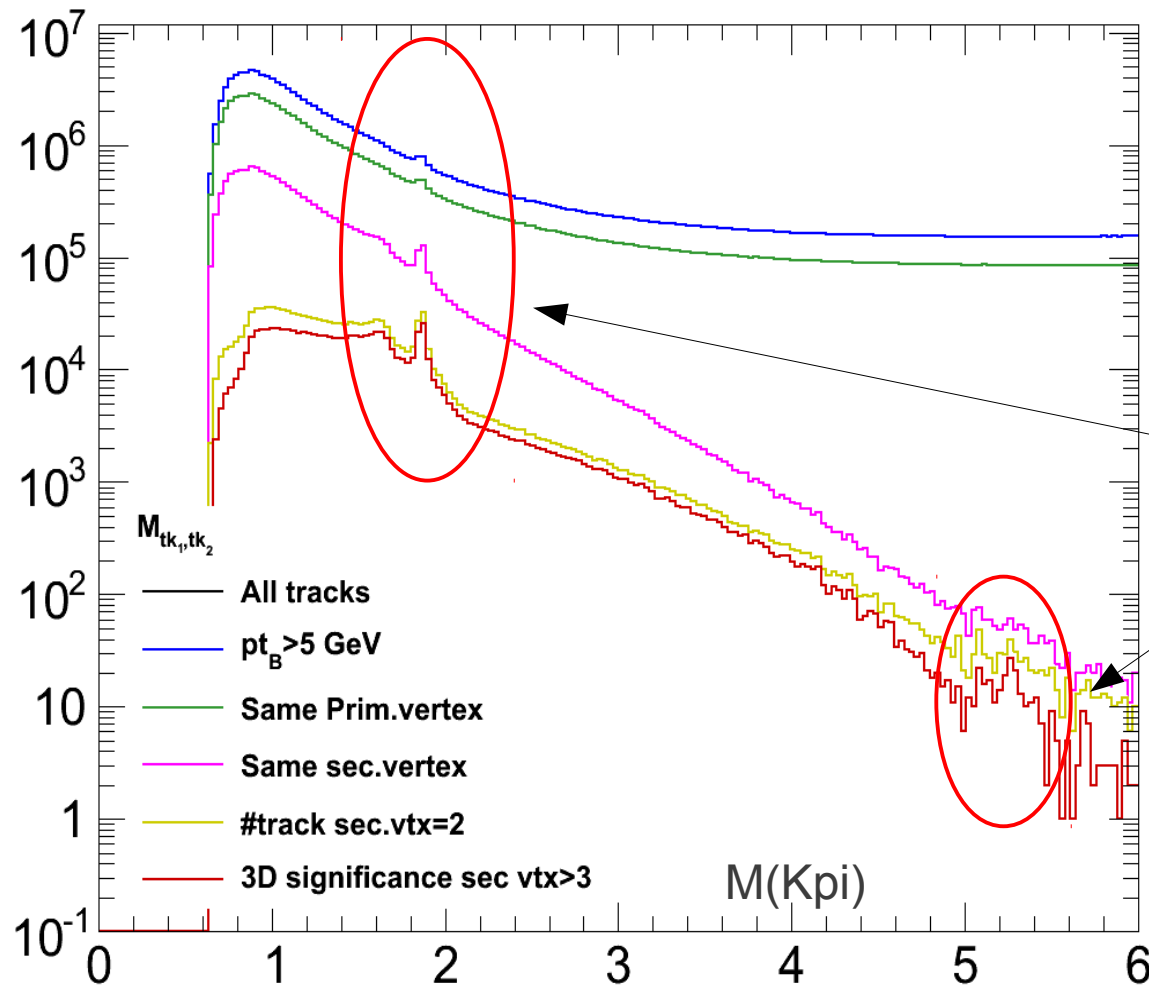
- **Plot here (and next slide) we still have problem in excluding correctly the triggering muons.**

- So, still results with trigger bias
- Handle with care





$B \rightarrow hh'$



- **Consider two hadrons**

- Not inside the triggering jets
- Not muons
- Leading: K-mass, sub-leading: pi-mass

- **With a set of cuts**

- $D0 \rightarrow K\pi$
- $B0 \rightarrow K\pi$?



Summary

- **Progress on Jet-based approach:**
 - We do have $B^{\pm} \rightarrow J/\Psi K$ normalization sample
 - We do have $B^0 \rightarrow hh'$ signal sample ~ 30 events
 - Using only SingleMu Primary dataset
 - Usage of MuOnia should $\sim$ double the statistics
 - **Some progress on study of possible Jet-based approach bias**
 - Preliminary $B^{\pm} \rightarrow J/\Psi K$ seen
 - Maybe also $B^0 \rightarrow$
 - Still very preliminary
 - **Next:**
 - Repeat study on MC
-