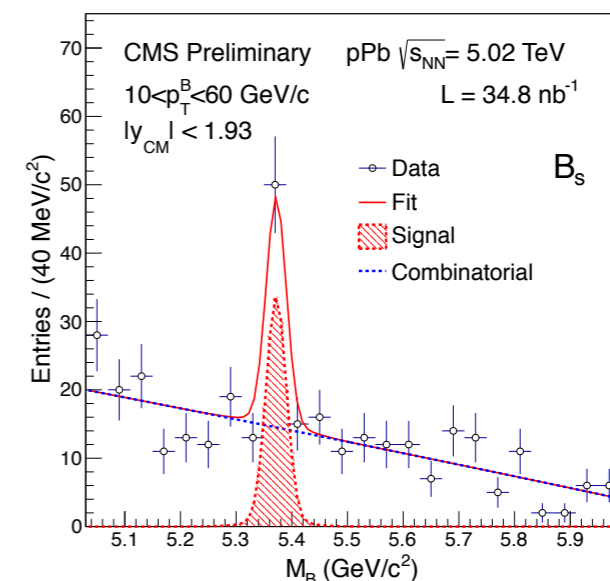
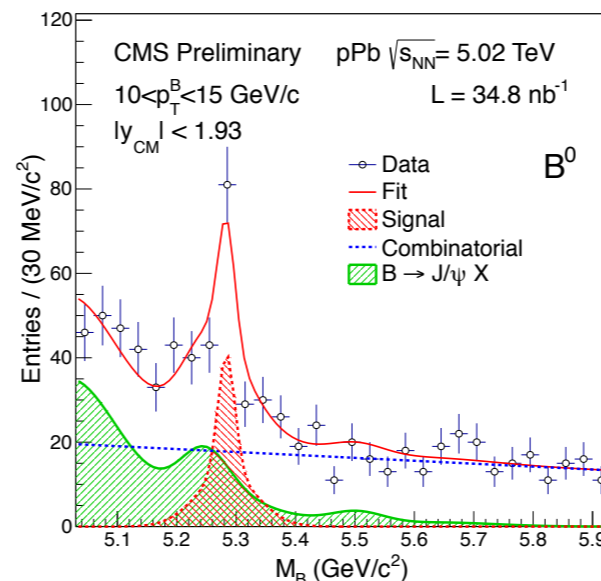
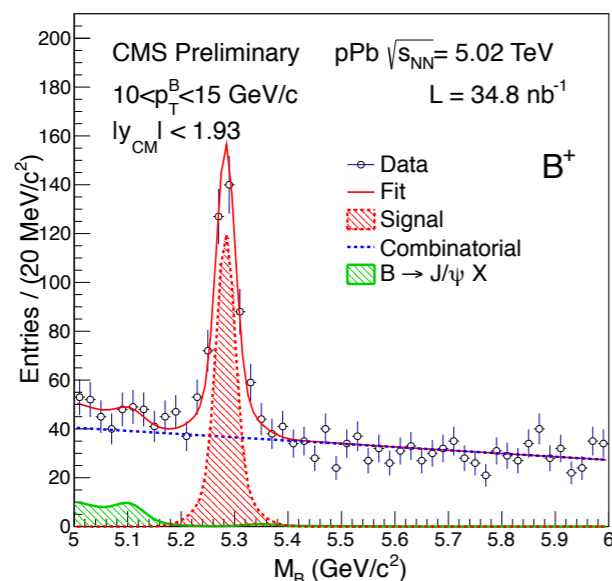


# B-meson reconstruction performance and spectra in (pp and) pPb collisions in CMS

Gian Michele Innocenti on behalf of the CMS Collaboration  
Massachusetts Institute of Technology (MIT)

Quark Matter 2014, Darmstadt (Germany)  
Flash talk session

<http://cms-physics.web.cern.ch/cms-physics/public/HIN-14-004-pas.pdf>





# Why exclusive B-meson measurements?



- in PbPb collisions effective probes to study in-medium parton energy loss properties
- in pPb they allow us to study cold nuclear matter effects + reference for PbPb analyses

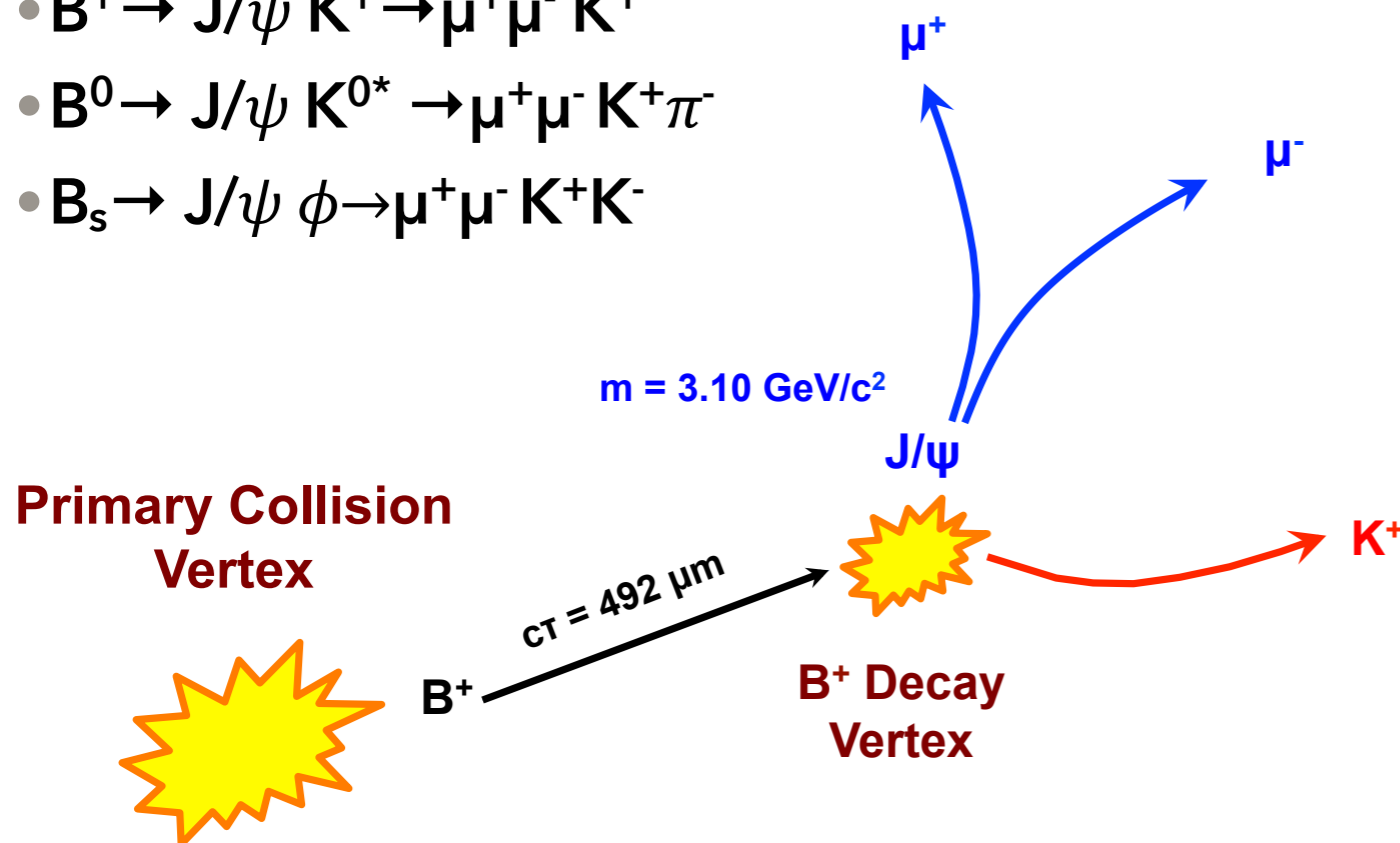
Is energy loss flavour-dependent?  $\Delta E_g > \Delta E_{u,d,s} > \Delta E_c > \Delta E_b$

→ Hints of flavour dependence at low  $p_T$   $R_{AA}(\text{non-prompt } J/\psi) > R_{AA}(\text{D mesons})$

→ No flavour dependence observed at high  $p_T$  (b-jet  $\approx$  inclusive jet  $R_{AA}$ )

Exclusive B mesons can span the full range and solve the puzzle!

- $B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+$
- $B^0 \rightarrow J/\psi K^{0*} \rightarrow \mu^+ \mu^- K^+ \pi^-$
- $B_s \rightarrow J/\psi \phi \rightarrow \mu^+ \mu^- K^+ K^-$



## How do we reconstruct B mesons in CMS?

→ Clean and high statistics sample collected by triggering on muons!

- $J/\psi \rightarrow \mu^+ \mu^-$  reconstruction
- Tracks are associated to  $J/\psi$  candidate to build B-meson candidates
- No PID selection is applied to tracks

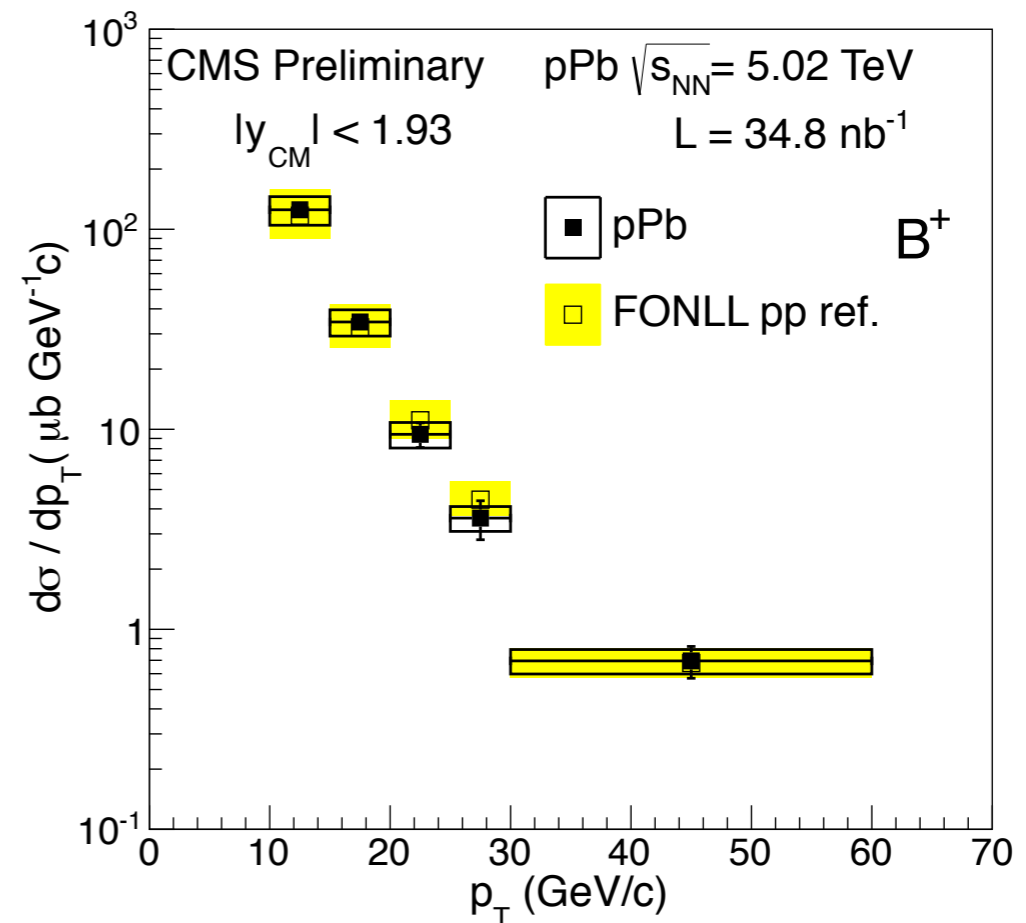
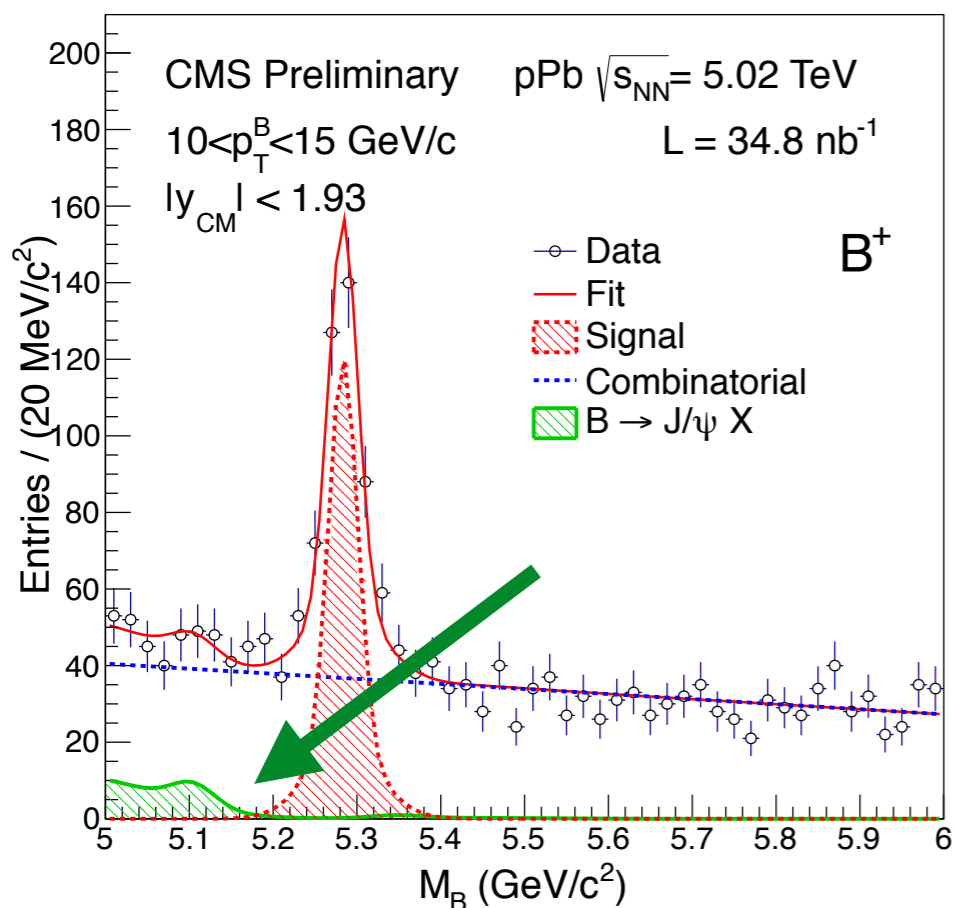
## Candidate selection variables:

- $\chi^2$  confidence level of B-vertex fit
- standardised decay length in XY plane
- cosine of the pointing angle

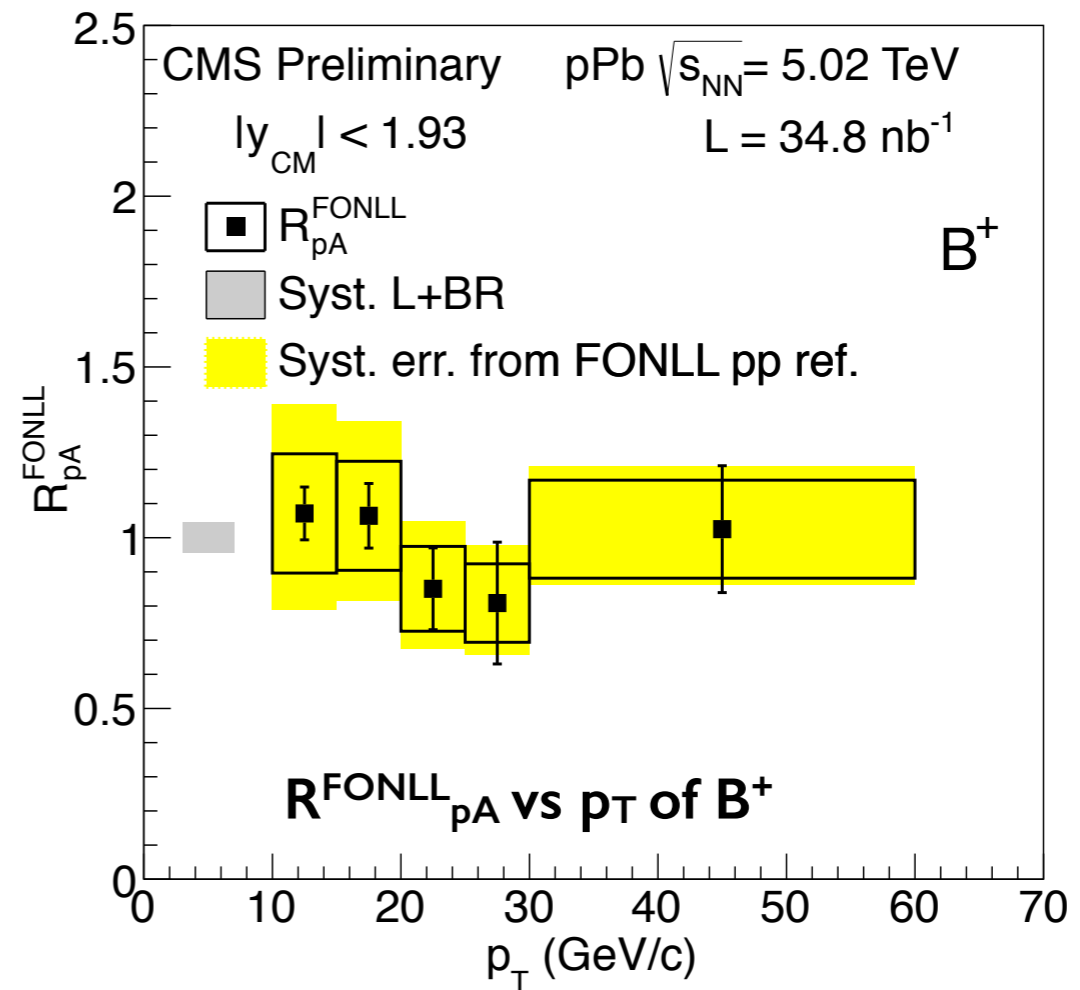
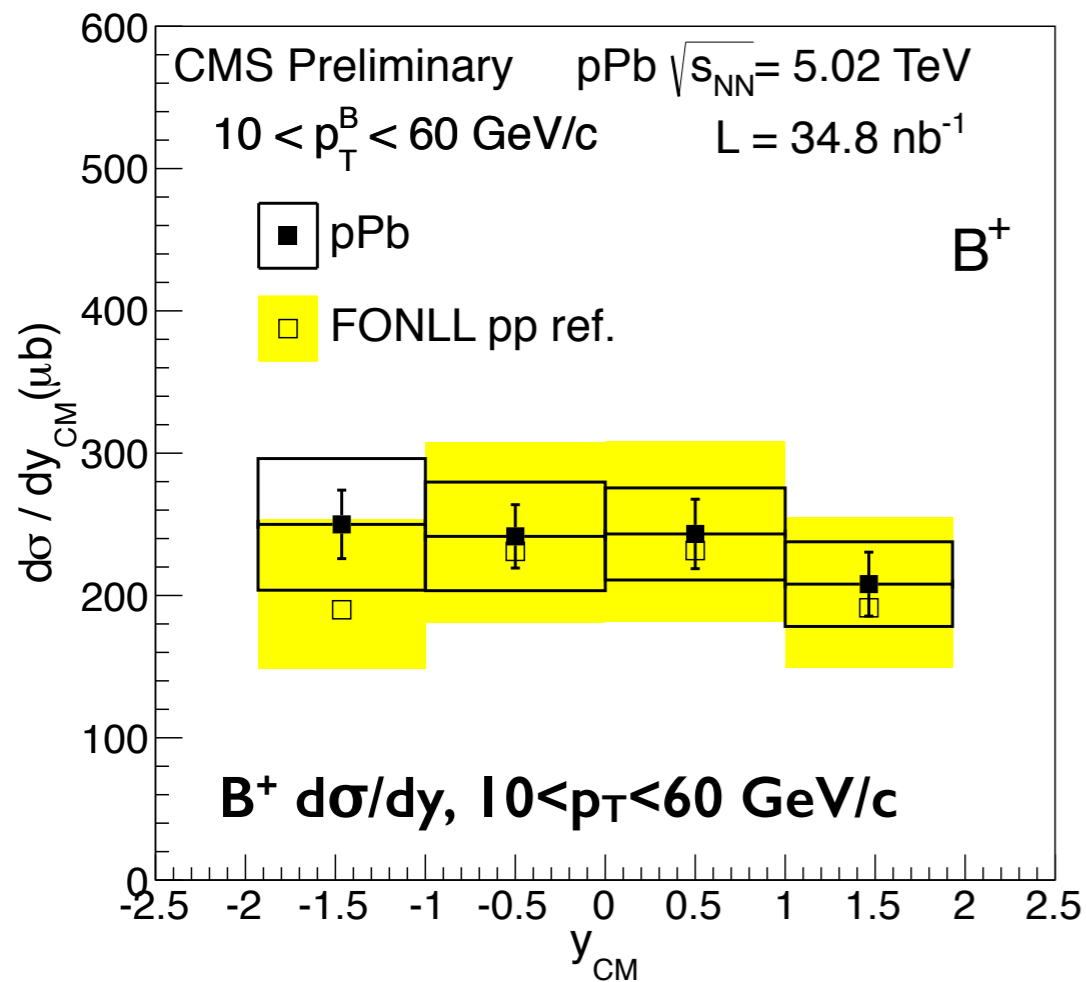
In  $B^0$  and  $B^0_s$  case, selection on the invariant mass of the track-track system w.r.t. mass of the resonance ( $K^{0*}$  or  $\phi$ )

## Signal Extraction

- Fit to the invariant mass distributions of B-meson candidates. Three components:
  - **Signal**
  - **Combinatorial background from  $J/\psi$ -track(s)**
  - **Non-prompt component from other B-meson decays that form peaking structures (e.g. in  $B^+$  analysis, bkg from  $B^0 \rightarrow J/\psi K^{0*}$ )**



- $d\sigma/dp_T$  of  $B^+, B^0, B_s^0$  and  $d\sigma/dy$  of  $B^+$  in  $|y_{CM}| < 1.93$  and  $10 < p_T < 60$  GeV/c
- $R_{pA}^{FONLL}$  vs  $p_T$  for  $B^+, B^0, B_s^0$  and  $R_{FB}$  using FONLL to build pp references



→ Nuclear modification factors and  $R_{FB}$  consistent with unity within uncertainties

→ First exclusive measurement of  $B^+, B^0, B_s^0$  in proton-nucleus collisions at LHC!  
 Preparing for high statistics PbPb in 2015:

→ new insights on the flavour-dependence of in-medium energy loss!