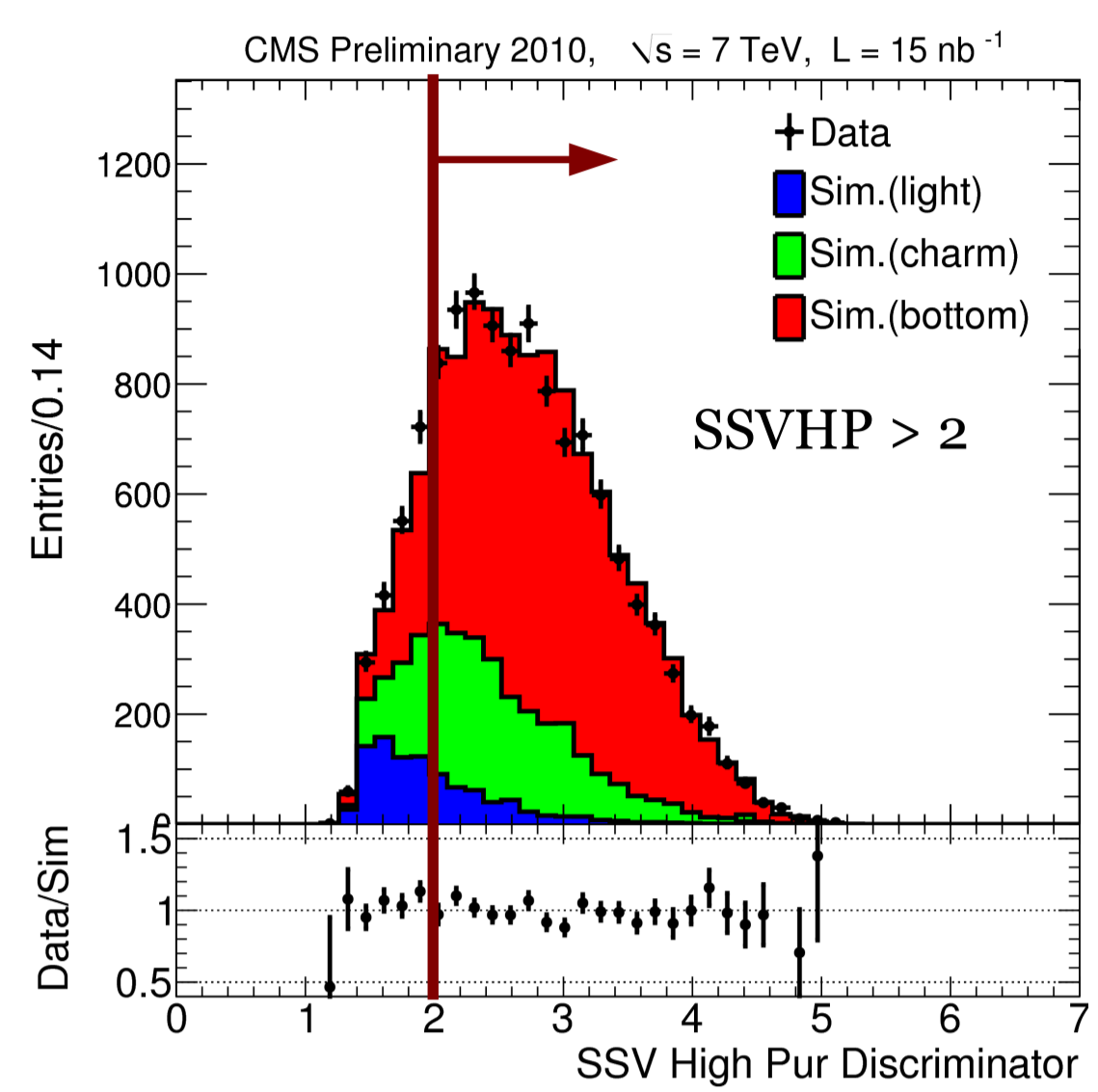


## b-jet tagging:

- simple secondary vertex high purity tagger
- needs secondary vertex with at least 3 tracks
- 3D flight distance > 2
- tight working point (light mistag rate ~0.1%)



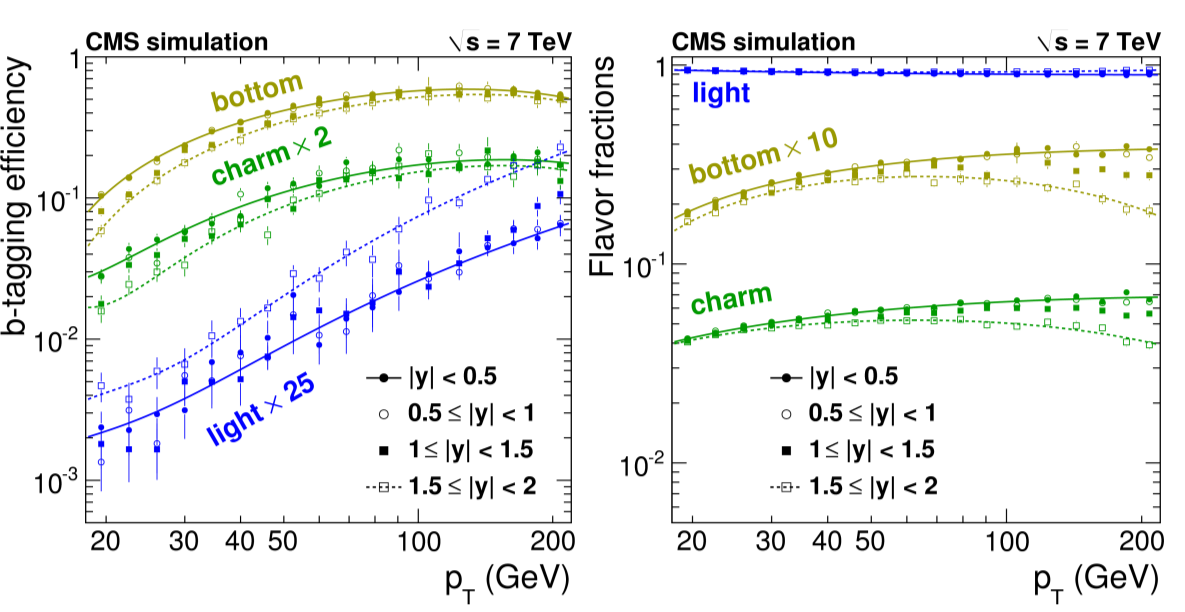
## b-jet purity:

- 2 different approaches by:
  - template fit
  - tagging efficiencies

tagging efficiencies:  
• purity calculation using MC fractions and tagging efficiencies

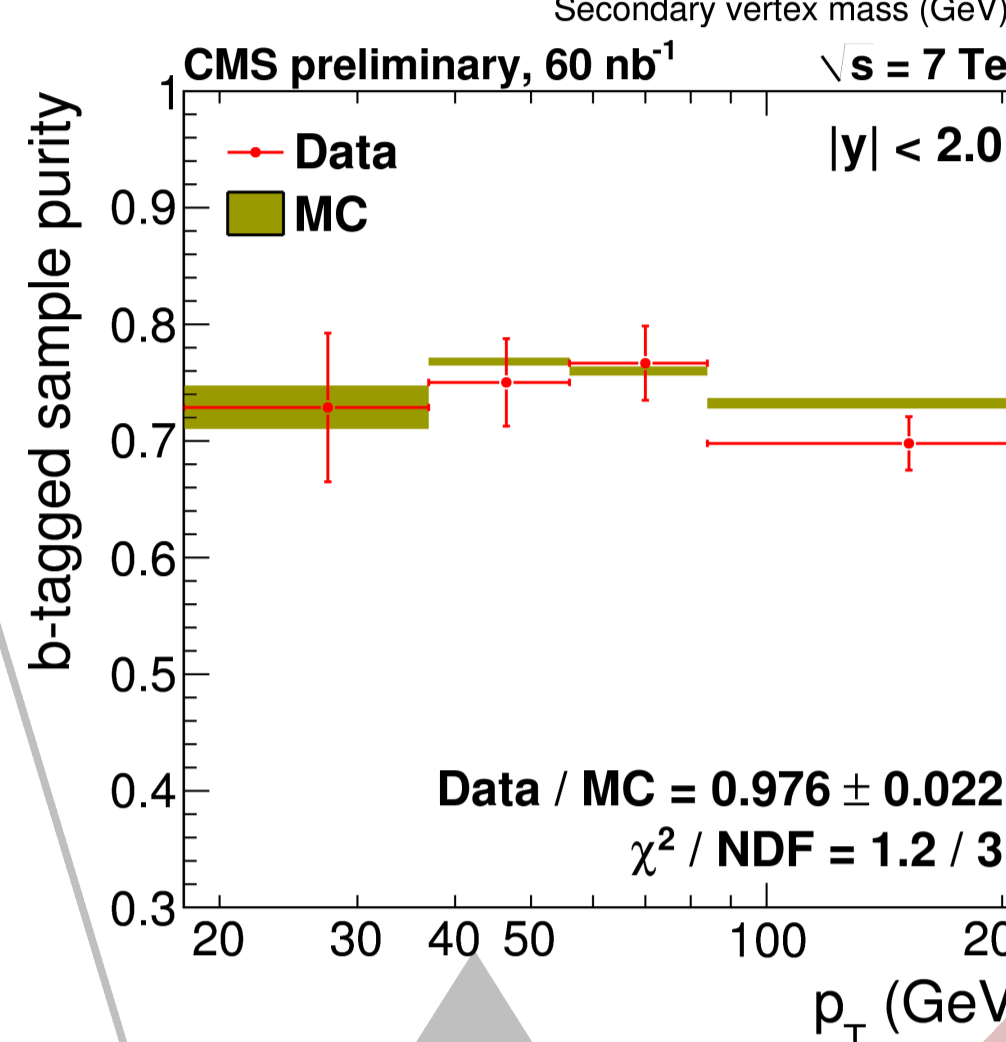
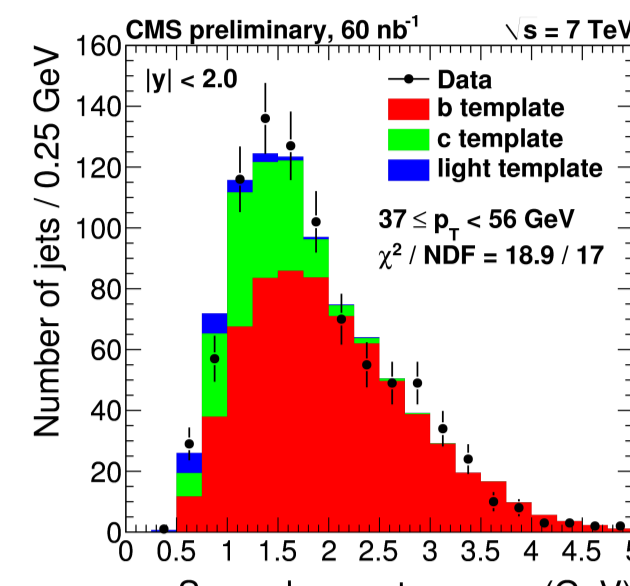
$$f_b = \frac{\epsilon_b F_b}{\epsilon_b F_b + \epsilon_c F_c + \epsilon_l F_l}$$

- allows estimate of systematic uncertainties
- independent light efficiency measurement available



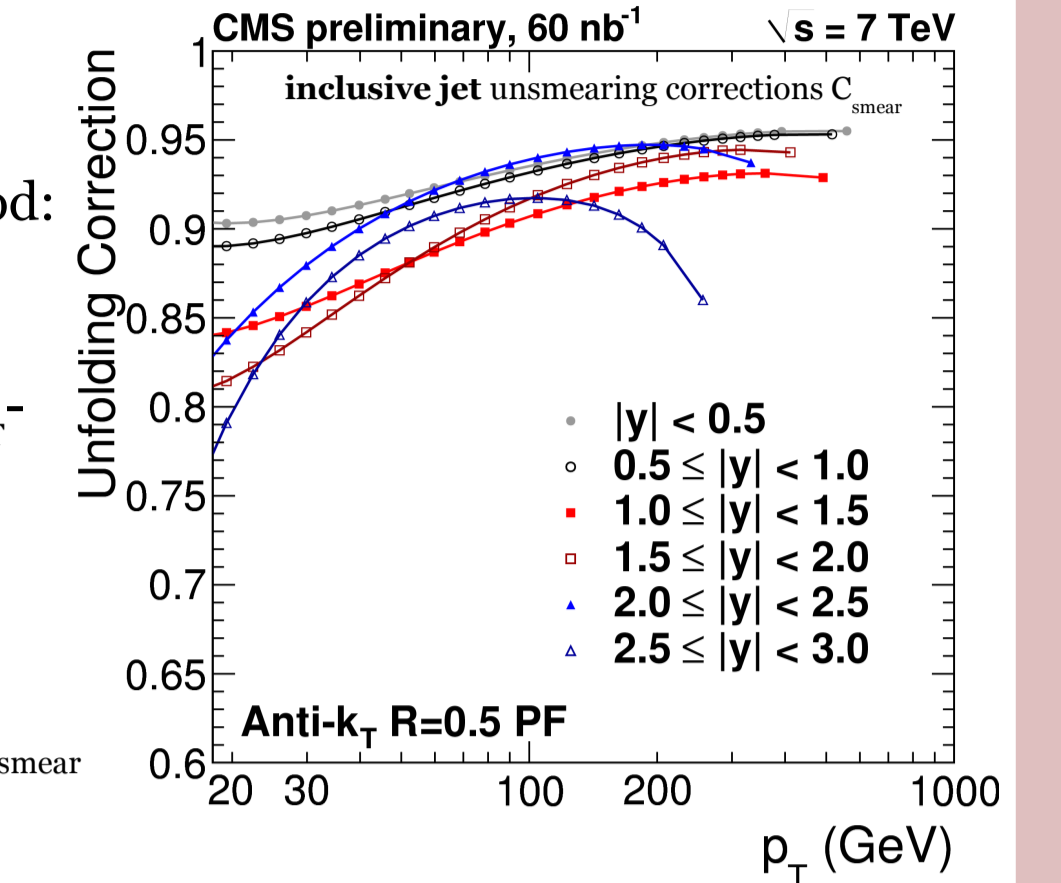
## template fit:

- template fit using secondary vertex mass
- fixed light/c-jet ratio
- good agreement between data and MC



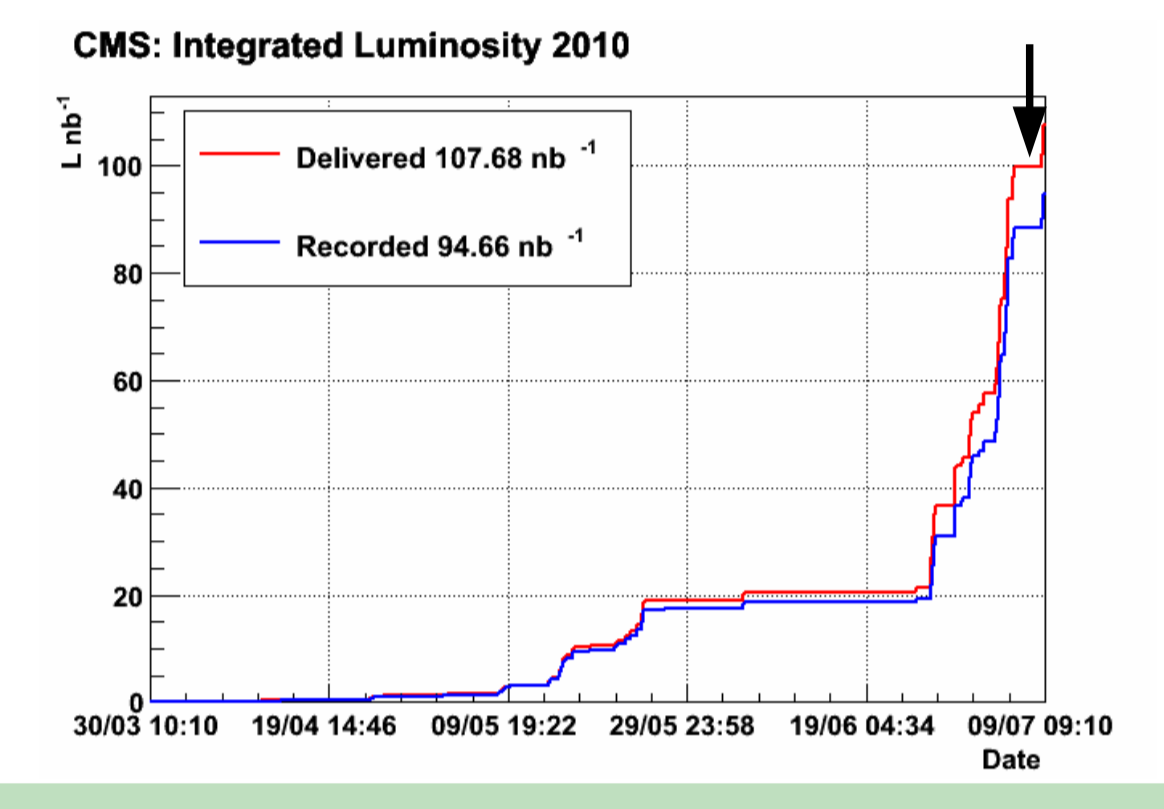
## unfolding:

- unfolding using ansatz method:
  - parameterized function for true pT spectrum
  - fitting of the smeared pT spectrum to data
- same function used as in the inclusive jet cross section measurement
- extracting C<sub>smear,b</sub> instead of C<sub>smear</sub>



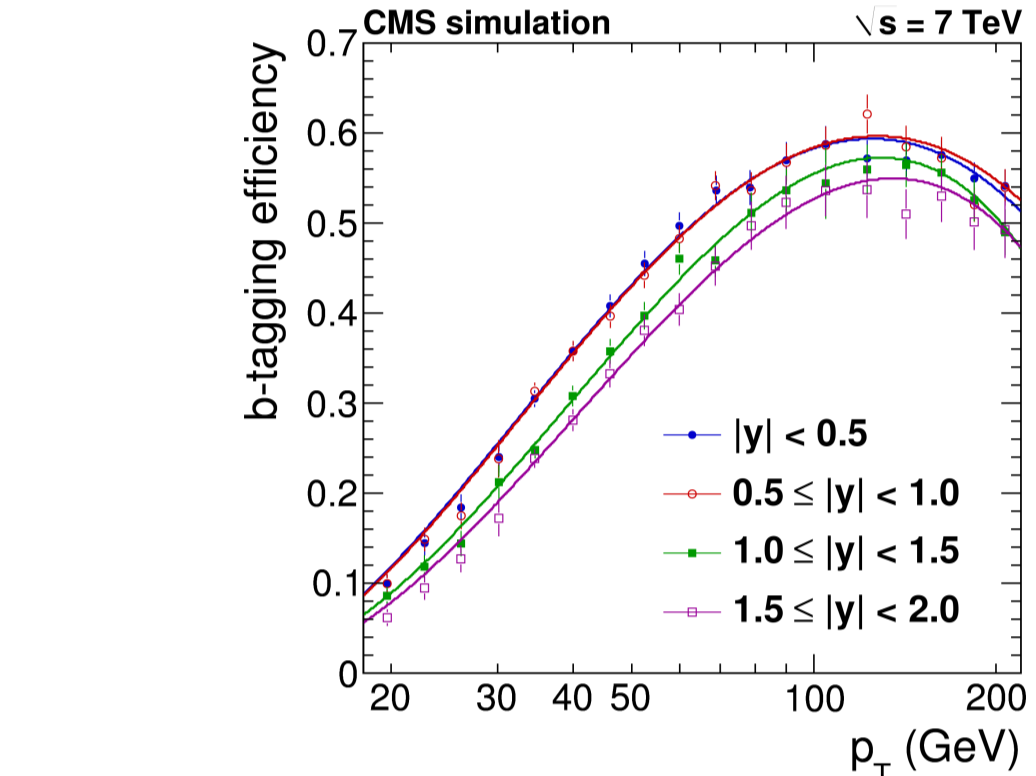
## integrated luminosity:

- overall delivered luminosity: 101.7/nb
- recorded luminosity (good runs): 72.9/nb
- luminosity used in analysis (trigger): 60.3/nb

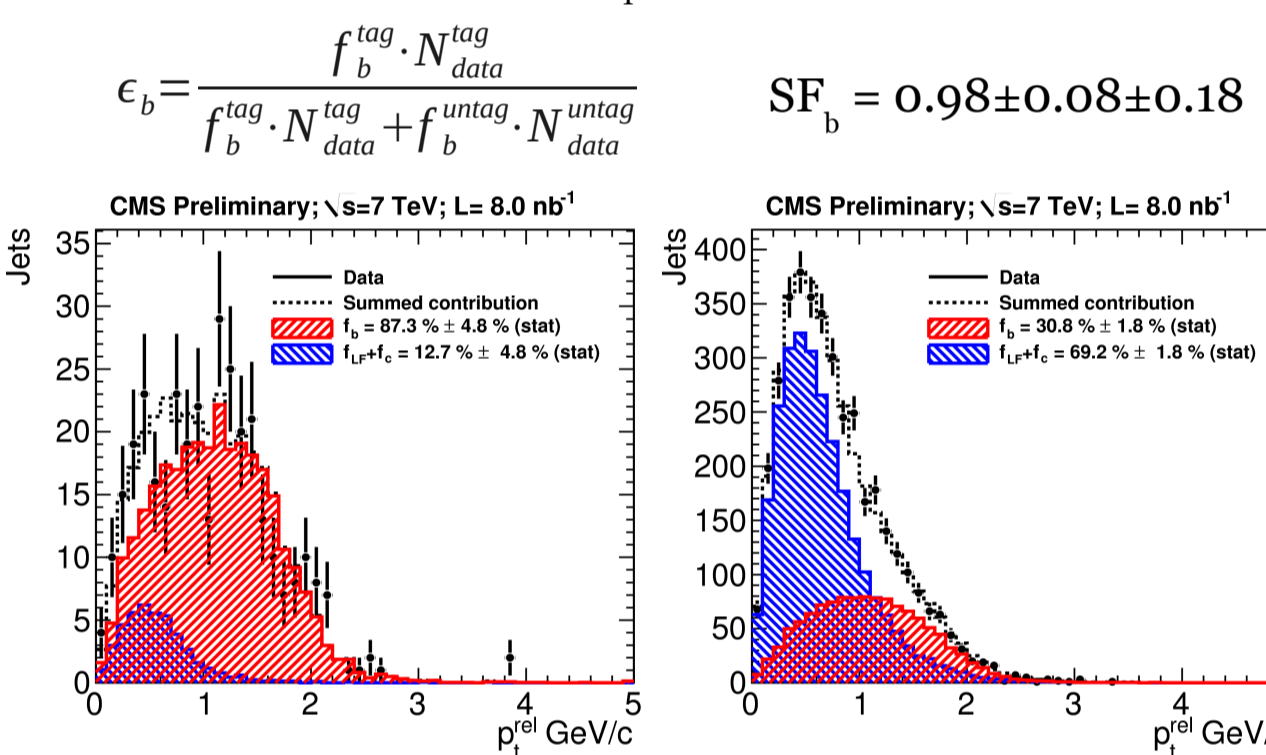


## b tag efficiency:

- efficiency estimation on MC sample



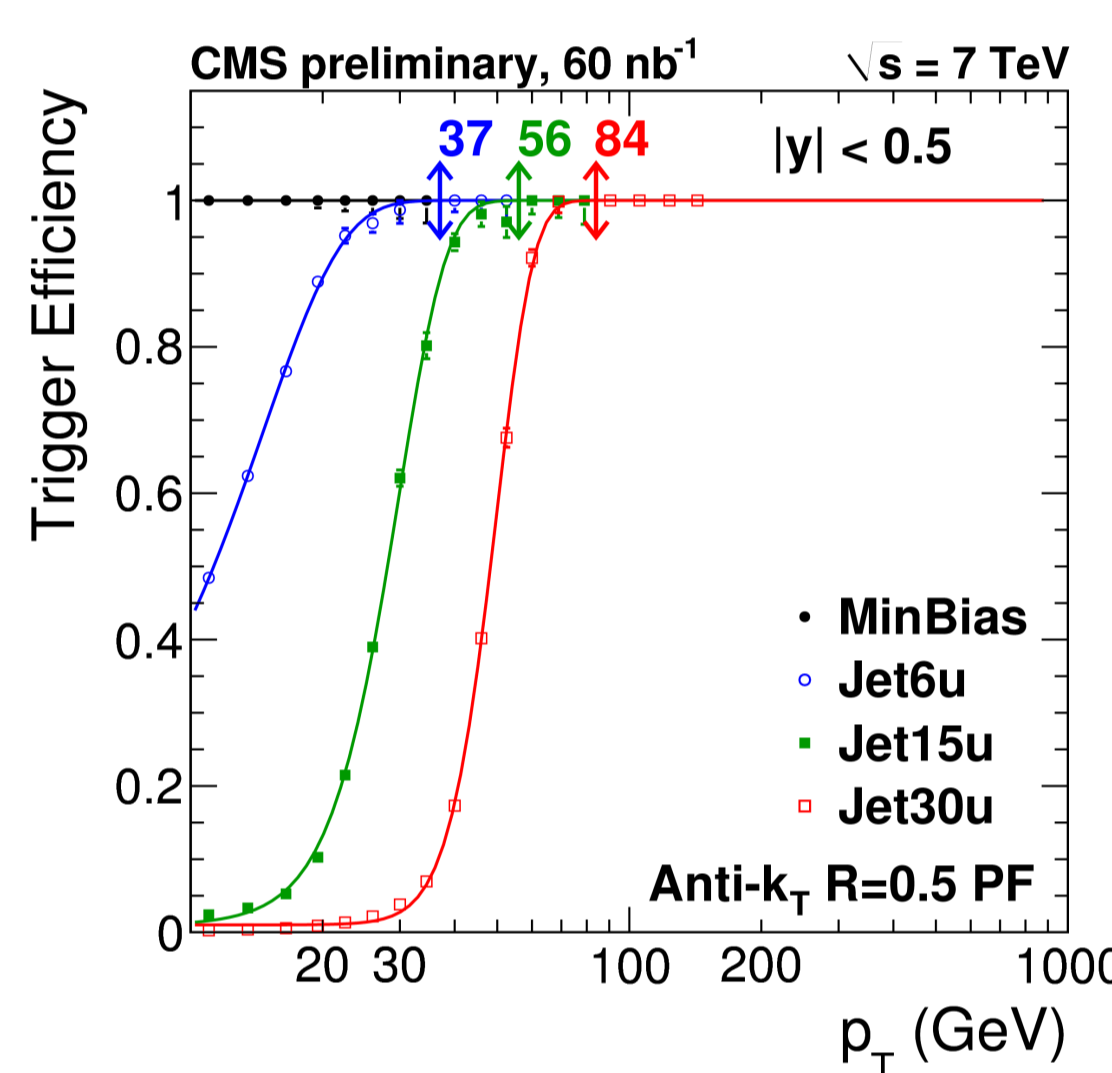
- data/MC scaling factor assumed to be 1 in agreement with estimated value of pT template method:



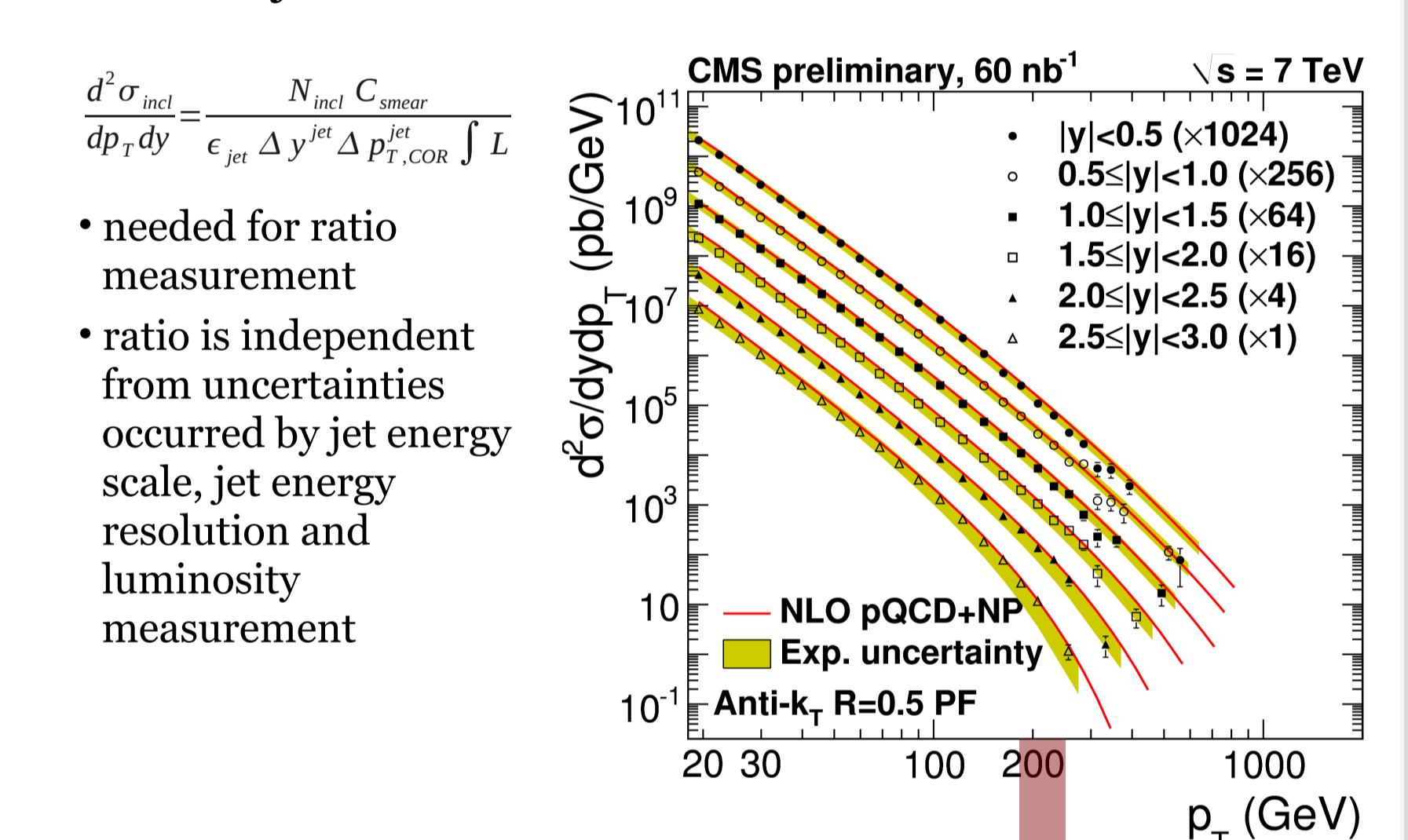
$$\frac{d^2 \sigma_{bjets}}{dp_T dy} = \frac{N_{tagged} f_b C_{smear,b}}{\epsilon_b \epsilon_{jet} \Delta y^{jet} \Delta p_{T,COR} \int L}$$

## jet selection:

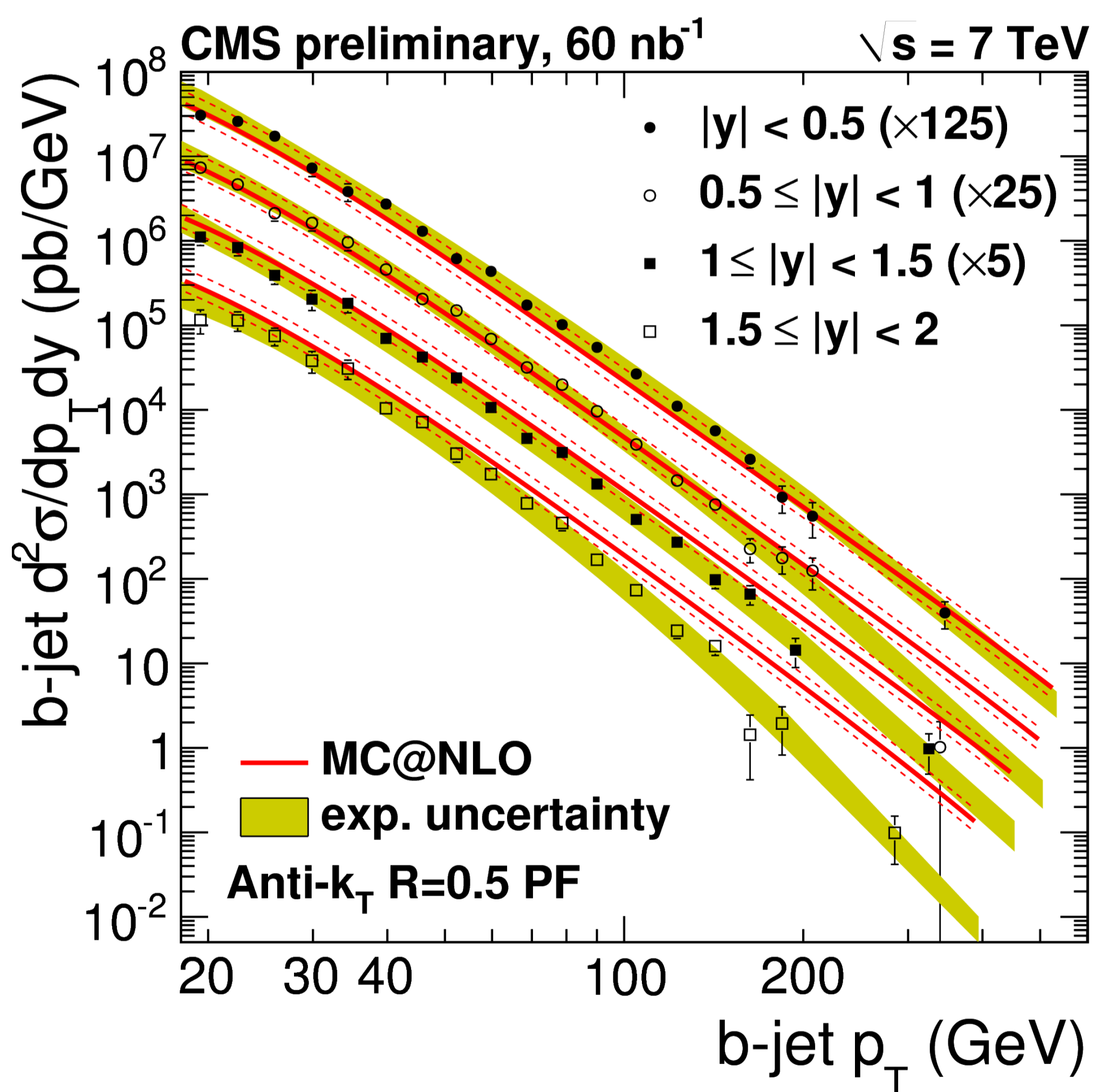
- particle flow jets based on anti k<sub>T</sub> (R=0.5)
  - p<sub>T</sub> spectrum: [18 GeV, 220 GeV]
  - y range: [0, 2.0]
- tight jet identification criteria (ε<sub>jet</sub> > 99%)
- primary vertex close to beam spot (< 0.15 cm)
- corrections for jet energies based on MC
- only one trigger per p<sub>T</sub> range
  - minimum bias trigger: [10 GeV, 37 GeV], prescale 211
  - level 1 jet trigger (L1Jet6U): [37 GeV, 56 GeV], prescale 30.6
  - high level jet trigger (Jet15U): [56 GeV, 84 GeV], prescale 7.73
  - high level jet trigger (Jet30U): [84 GeV, 220 GeV], prescale 1



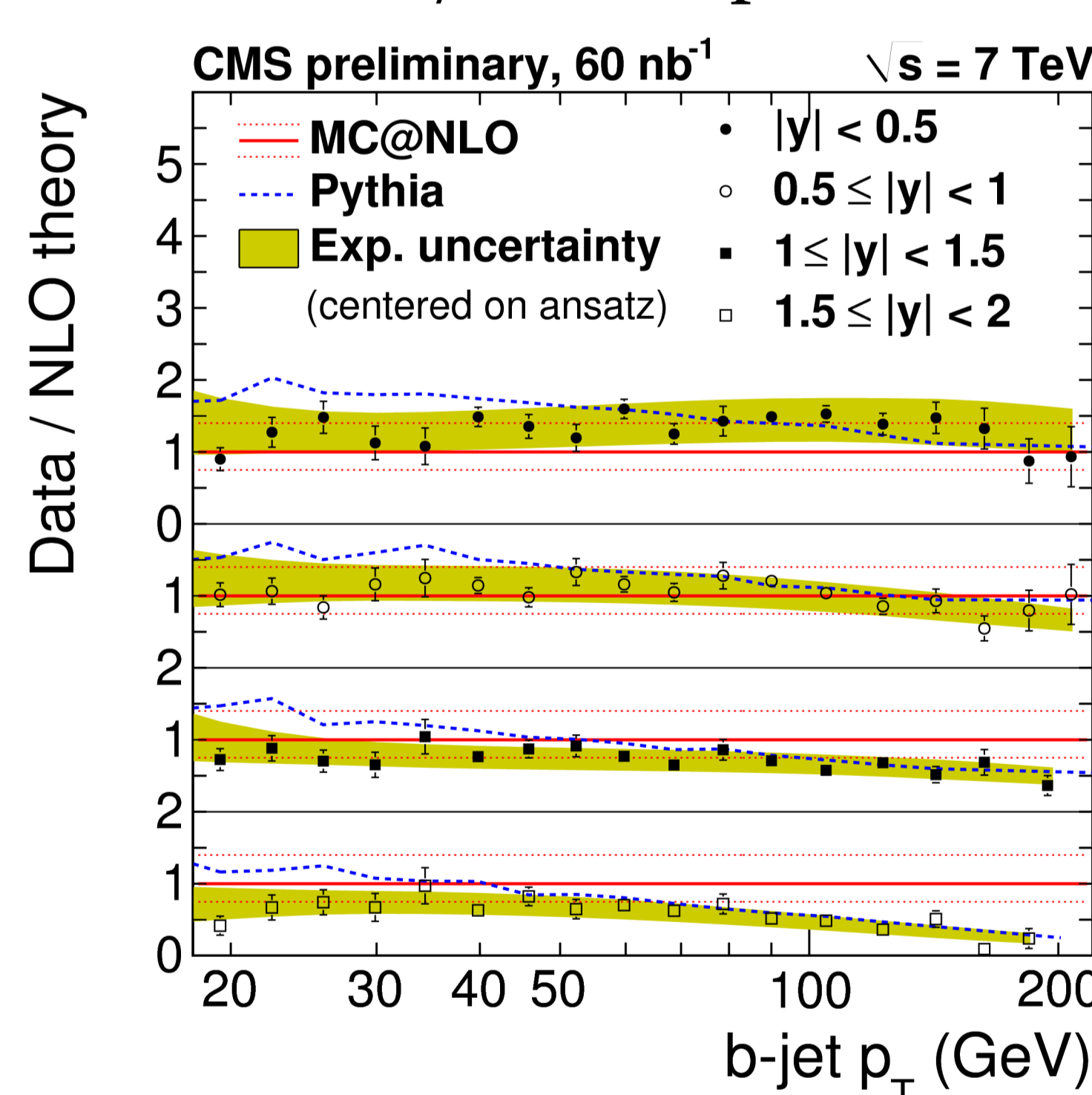
## inclusive jet cross section measurement:



## inclusive b-jet cross section:



## data/MC comparison:



Results:  
• good agreement between data and MC

- more precise than theoretical prediction

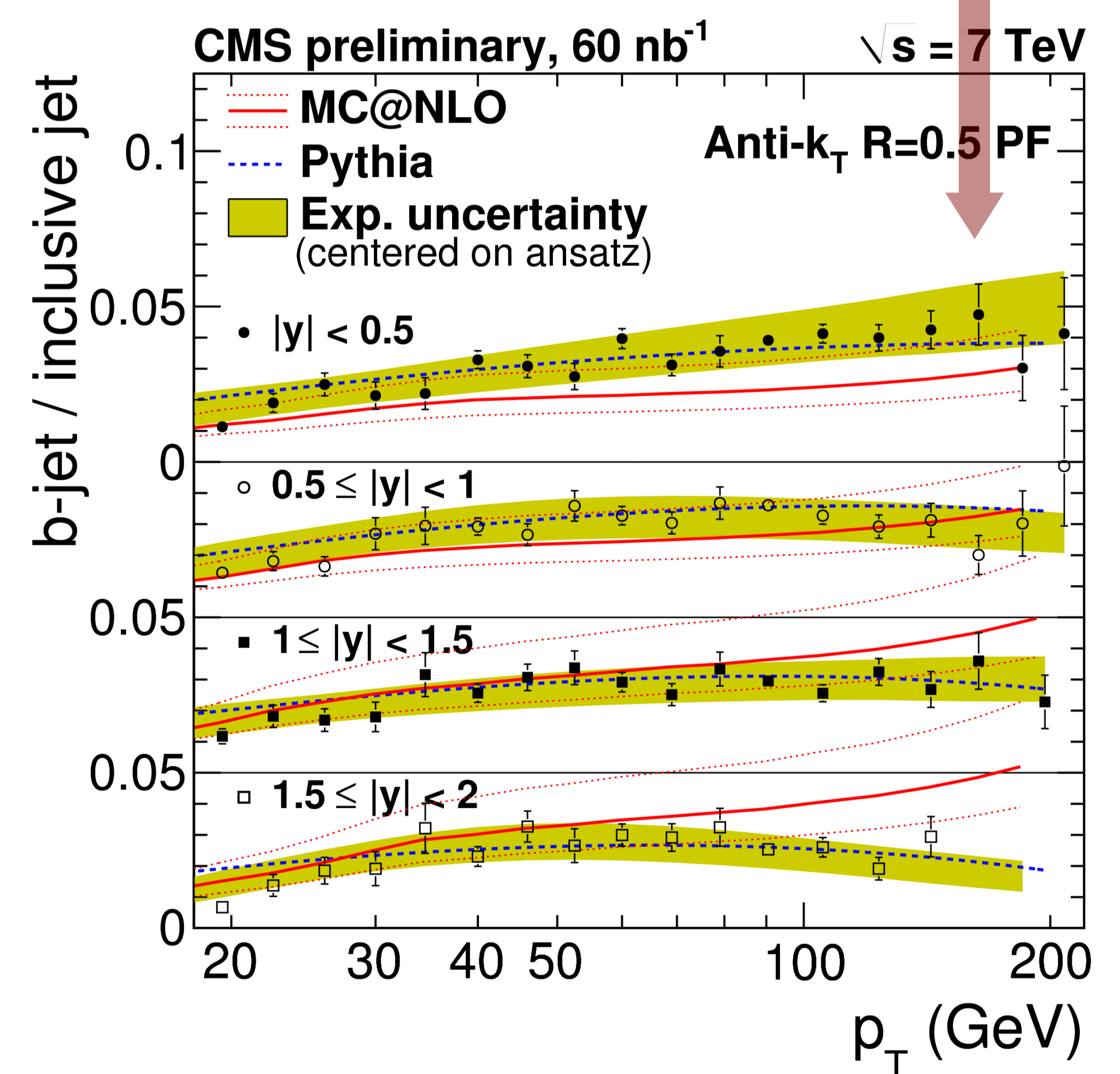
- dominant jet energy scale uncertainty partially cancels in the ratio measurement

- leading uncertainty from b-tag efficiency

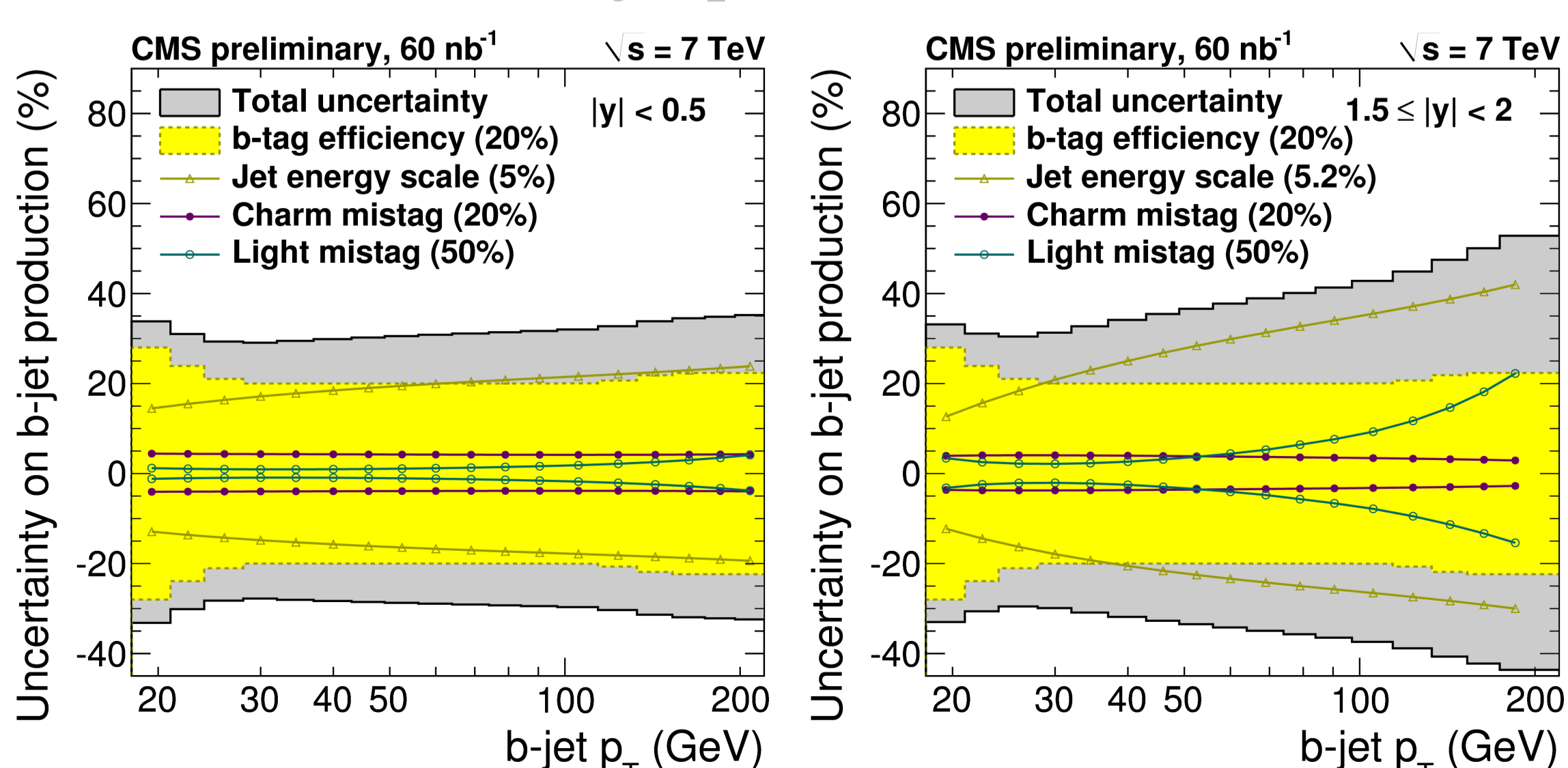
## References:

CMS-PAS-QCD-010-011  
CMS-PAS-BPH-010-009  
CMS-PAS-BTV-010-001

## b-jet cross section ratio:



## uncertainties on b-jet production (%):



## uncertainties on b-jet ratio (%):

