Experimental summary (part I)

Hadron and heavy ion collisions

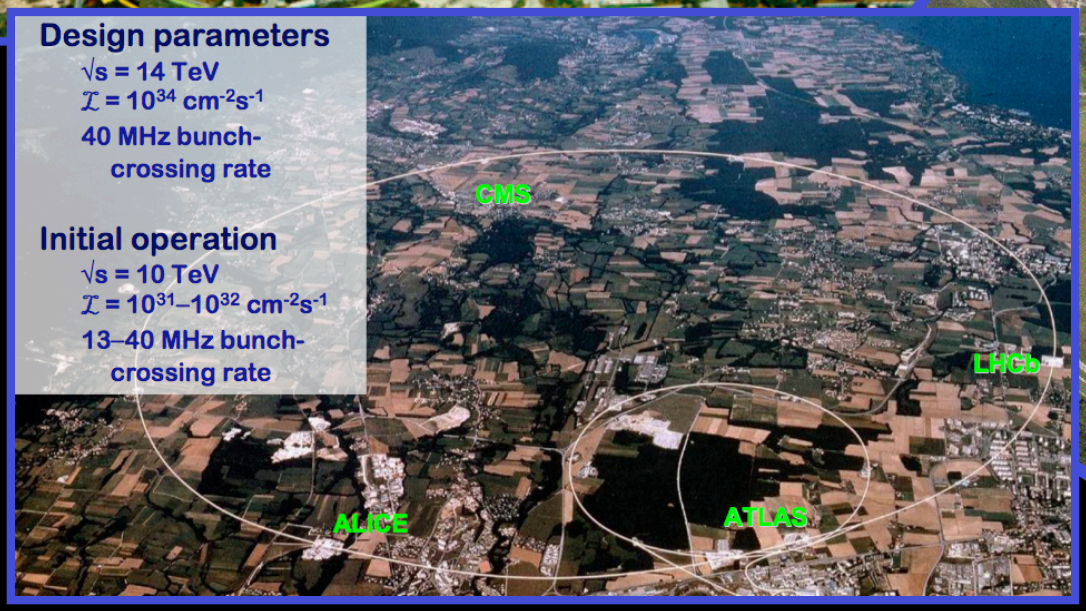
DIS2009 Madrid
April 30, 2009

Diego Tonelli

Fermilab

ALICE, ATLAS, CDF, CMS, DØ, LHCb, PHENIX, STAR

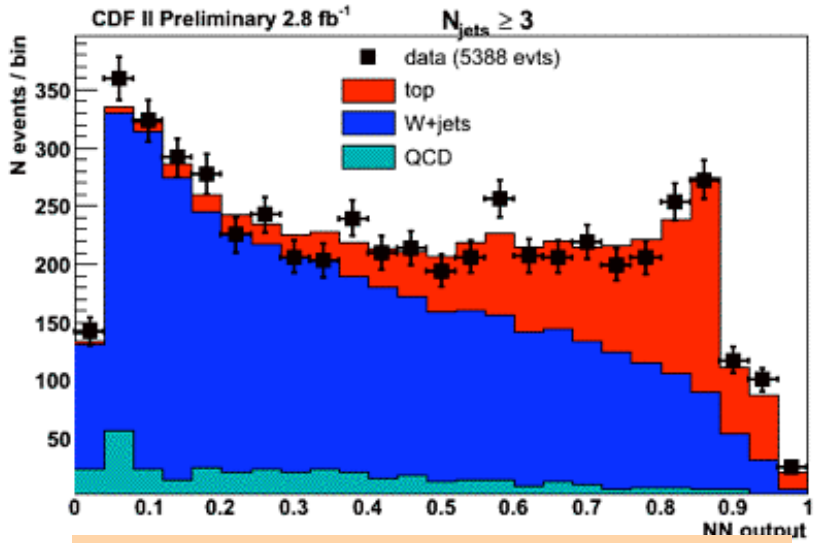
16 talks, ~240' + discussions



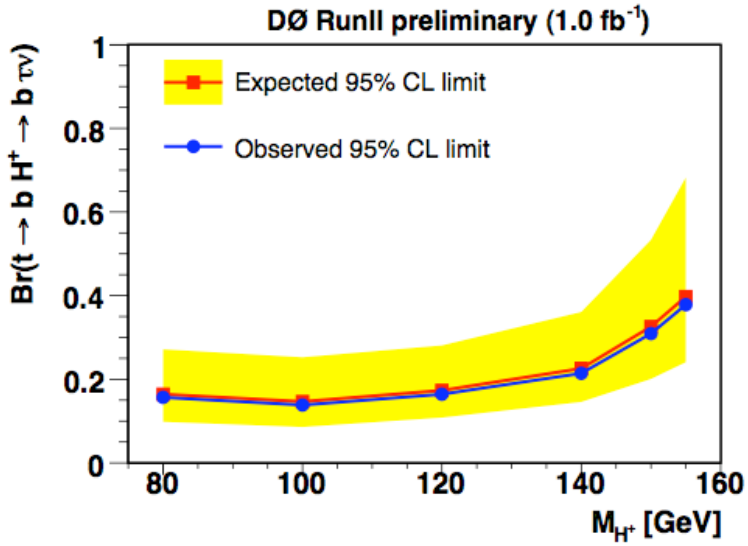
Top physics: entering the realm of precision

CDF/DØ

G. Gomez, J. Kvita



$\sigma = 6.9 \pm 0.4 \pm 0.4 \pm 0.1(th)$ pb



CDF combo: 7.0 ± 0.58 pb (above not yet included)

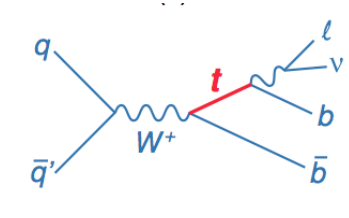
DØ combo: 8.18 (+ 0.98) (- 0.87) pb

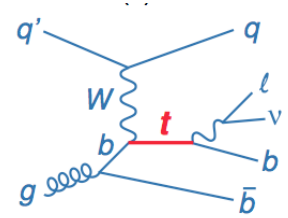
Constrains rate of top decay into charged Higgses.

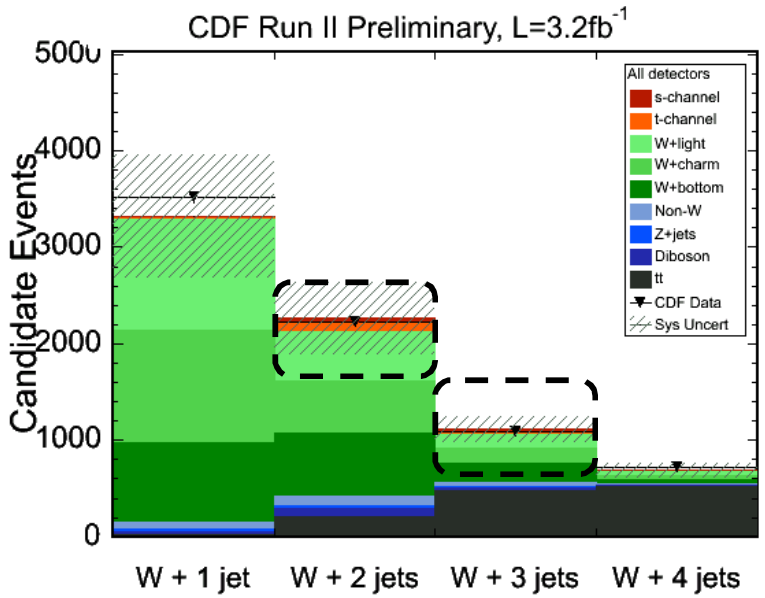
Search for singly-produced top quarks

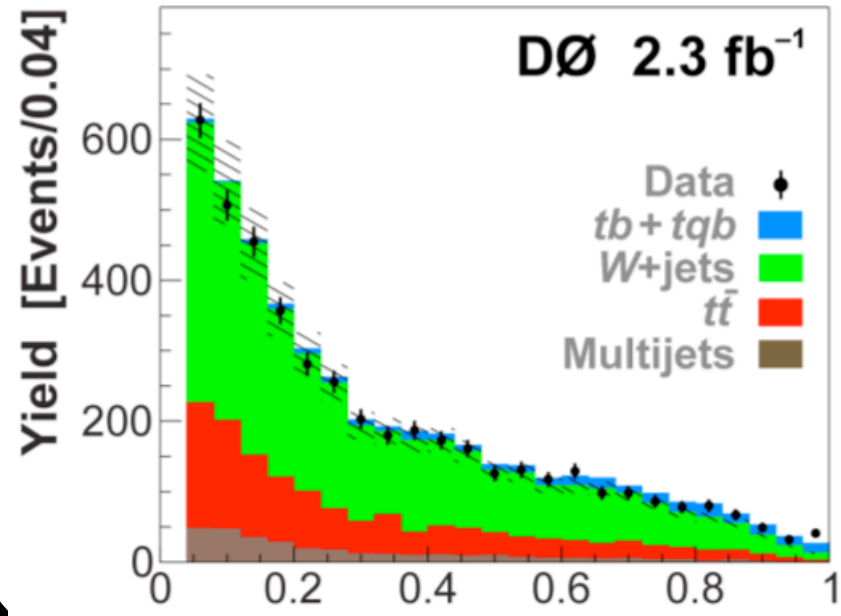
CDF/DØ

G. Gomez, J. Kvita







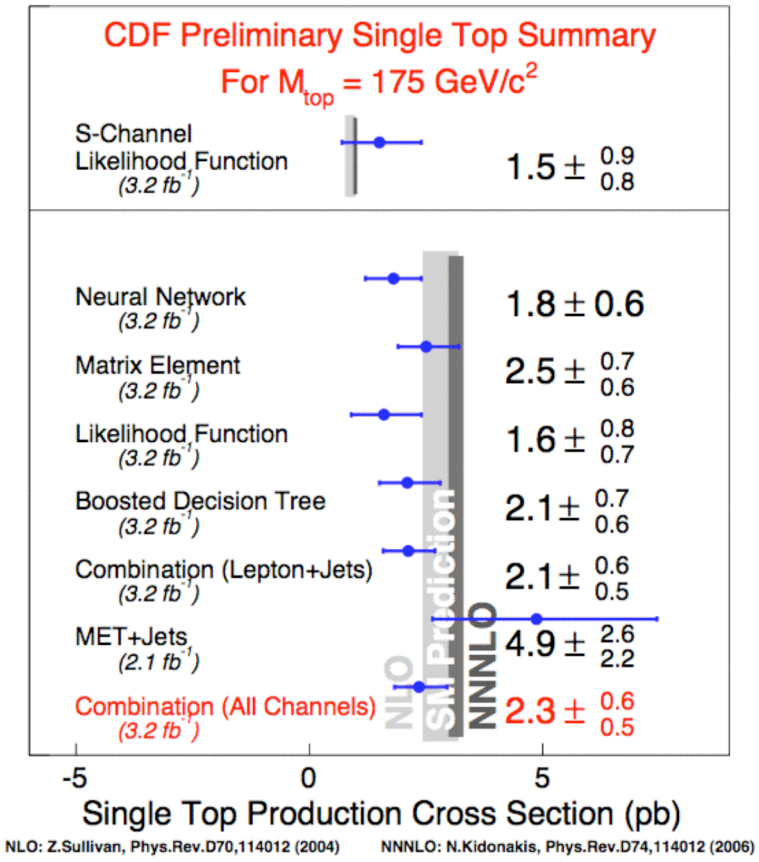


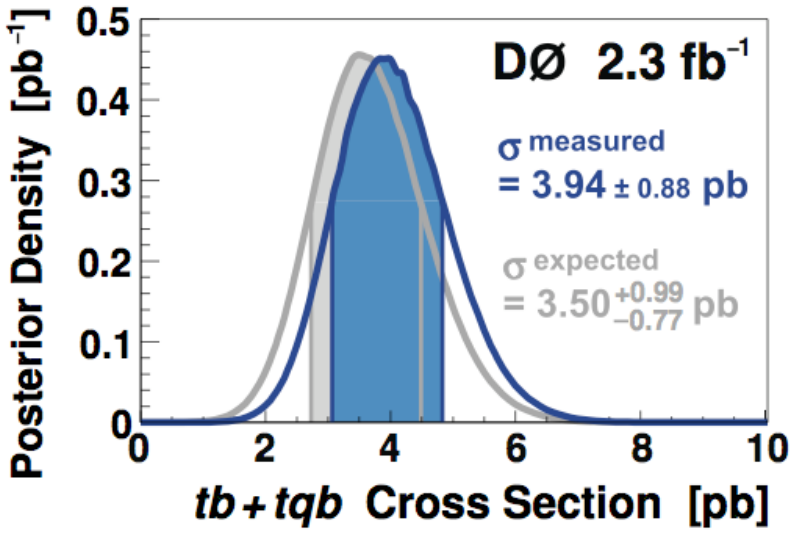
Machine-learning multivariate techniques greatly improve discrimination

Observation of EW top-quark production

CDF/DØ

G. Gomez, J. Kvita





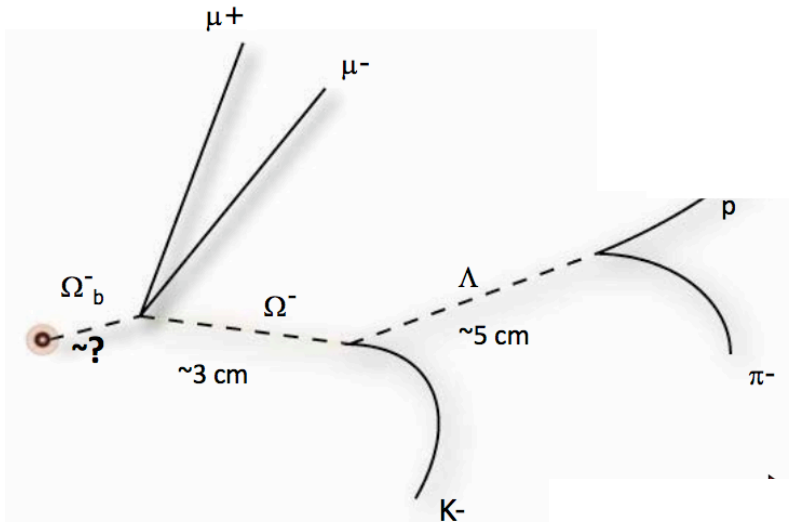
CDF: $|V_{tb}| = 0.91 \pm 0.13$

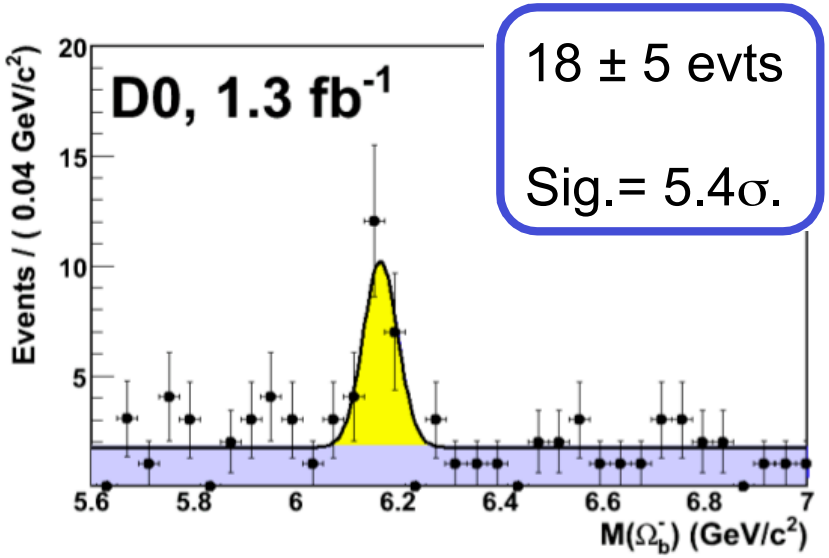
DØ: $|V_{tb}| = 1.07 \pm 0.12$

New hadrons discovered at the Tevatron

DØ

P. Ratoff





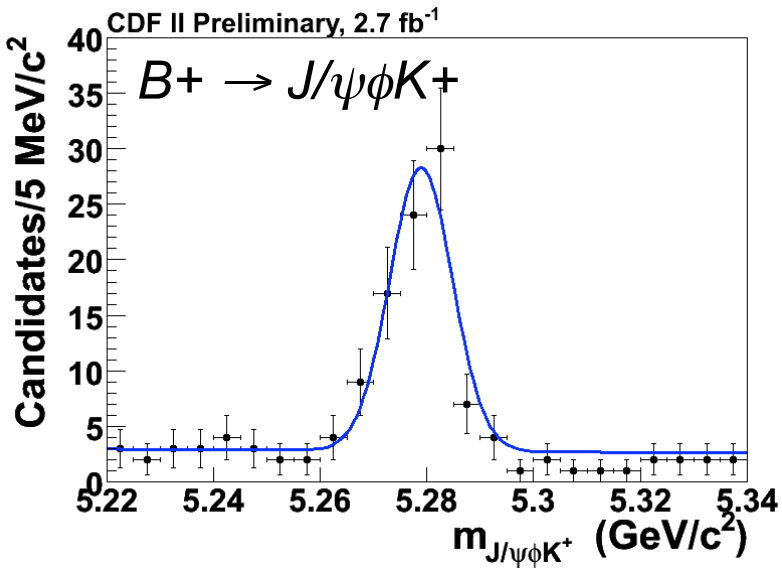
Some were expected….

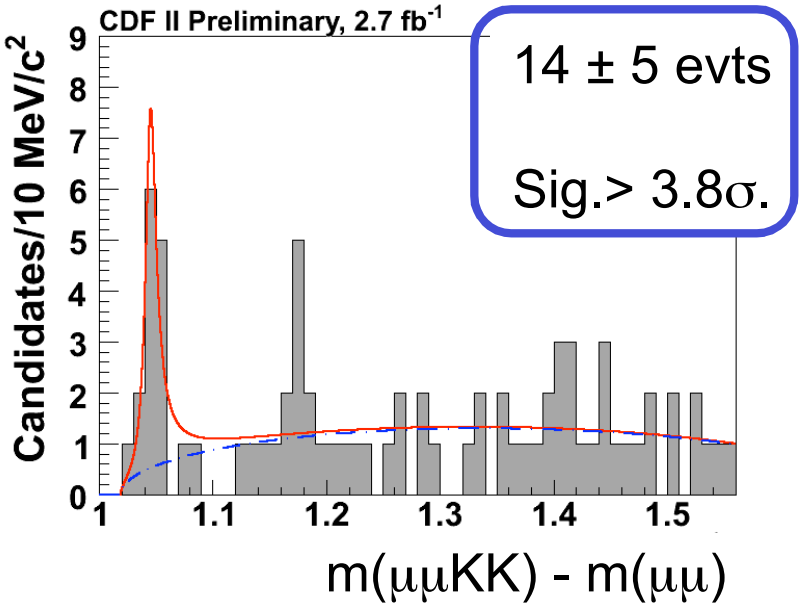
Ω_b mass 6165 ± 10 ± 13 MeV/c^2

New hadrons discovered at the Tevatron

CDF

K. Yi





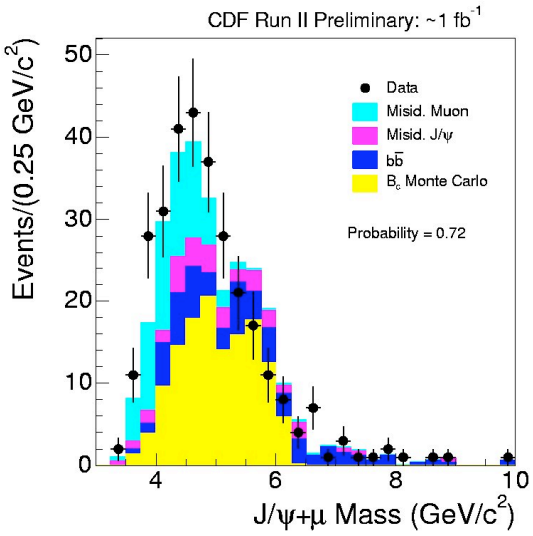
….some not….

Y(4140) mass:
4143 ± 2.9 ± 1.2 MeV/c^2

Production and properties of the Bc meson

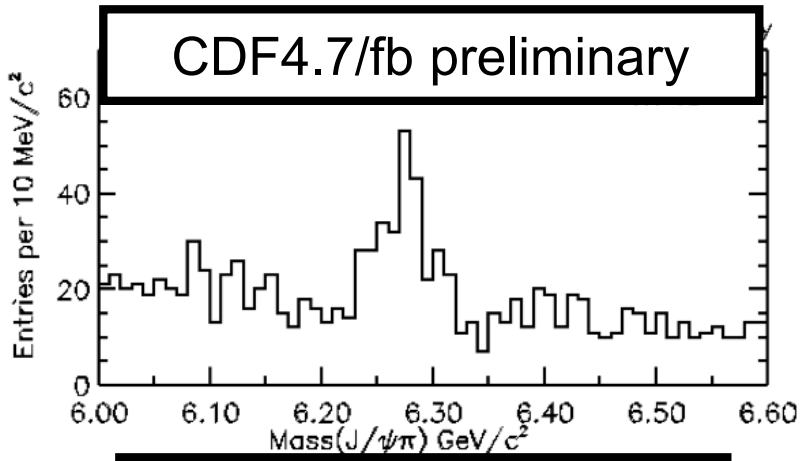
CDF/LHCb

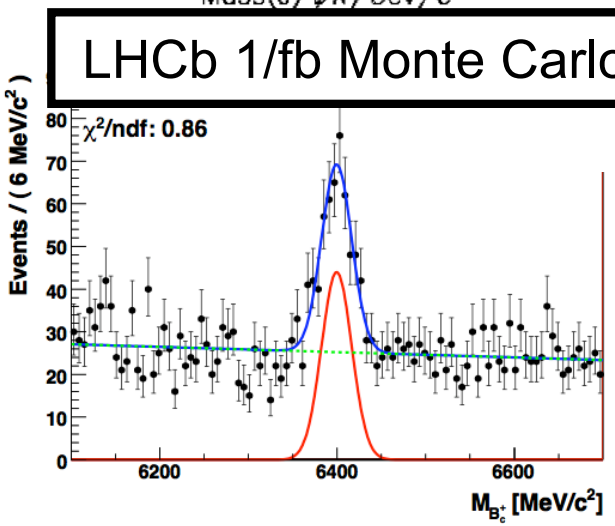
J. Pablo Fernandez, J. He



Production x-sect
times semimuonic BR
relative to $B+ \rightarrow J/\psi K+$

R = 0.295 +/- 0.063



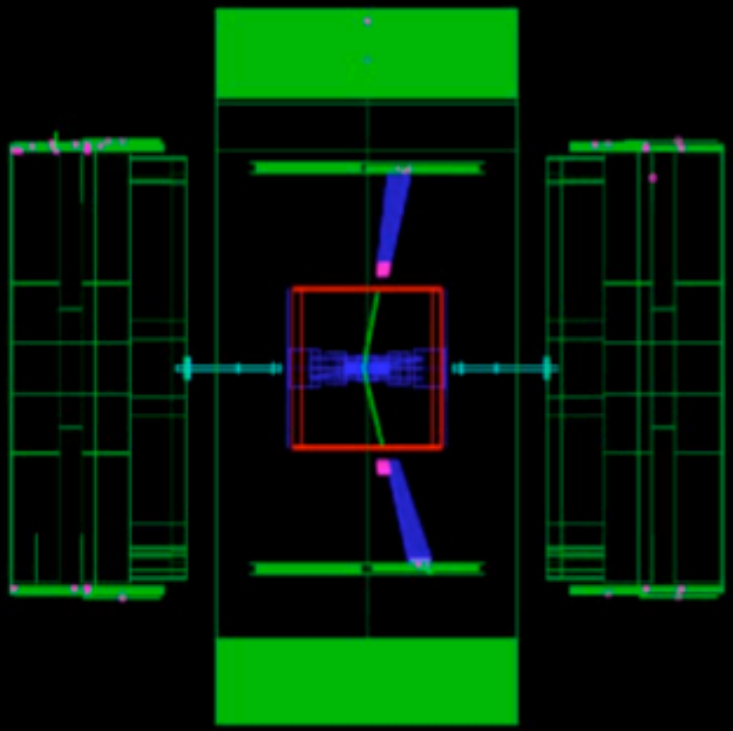


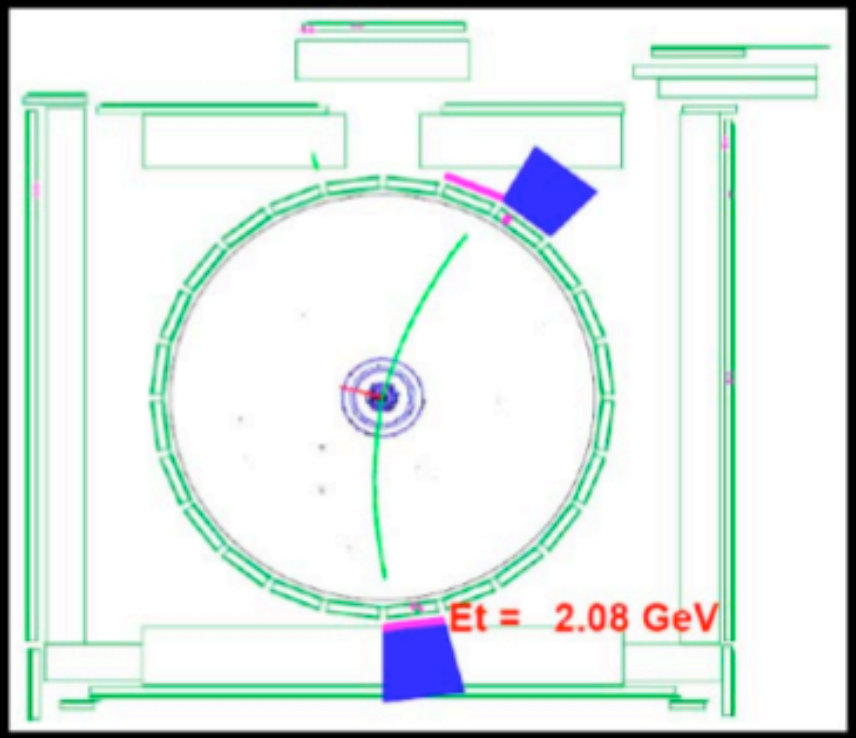
$c\bar{c}$ photo-production at CDF (?!..)

CDF

J. Pinfold

Example exclusive $\mu^+\mu^-$ event:
Run 199559, Event 13120174



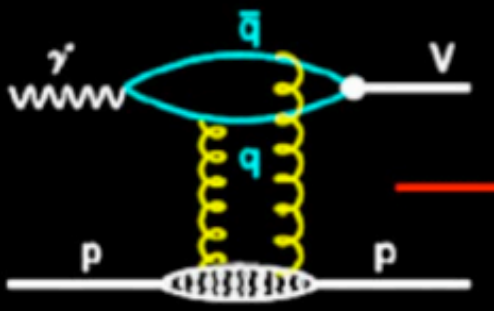


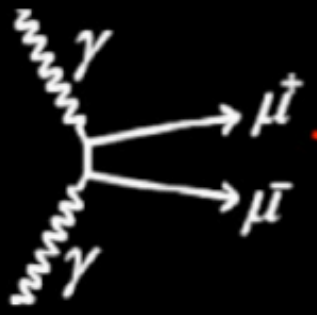
$c\bar{c}$ photo-production at CDF (?!..)

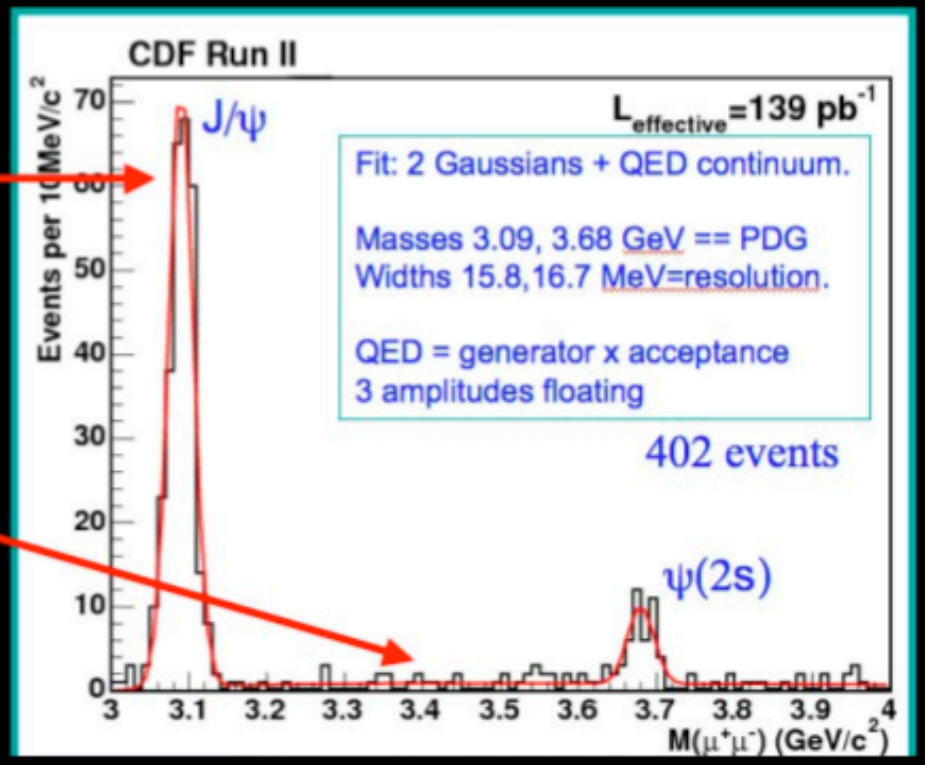
CDF

J. Pinfold

$$p + \bar{p} \rightarrow p + \mu^+\mu^- + \bar{p}$$







ccbar and continuum in agreement with theory/MCs. Also observed exclusive $\chi^0_{c.}$ Constrains x-sect for exclusive Higgs production at LHC

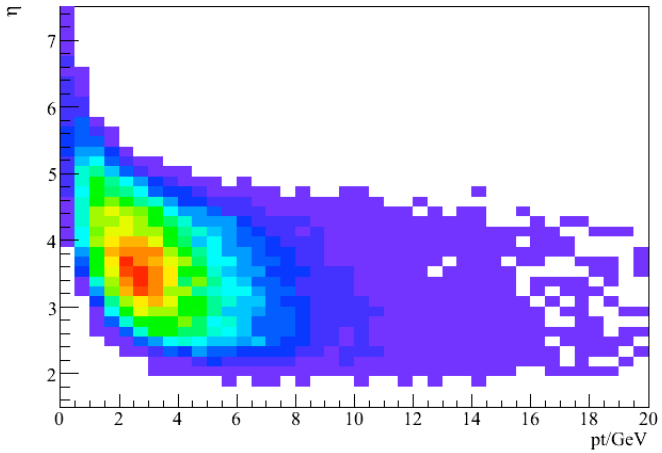
b-hadron and -onia production

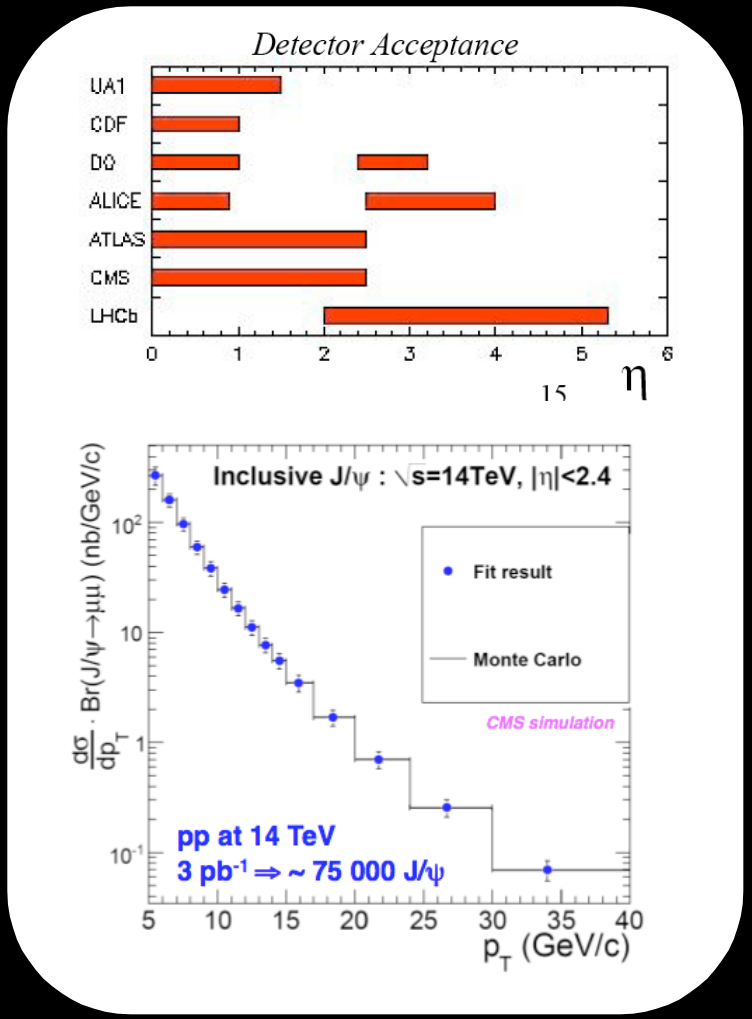
ATLAS/CMS/LHCb

C. Lourenço, M. Needham

Prompt -onia production. Some headaches in th-exp comparisons.

More experimental information needed (and provided in a consistent way)

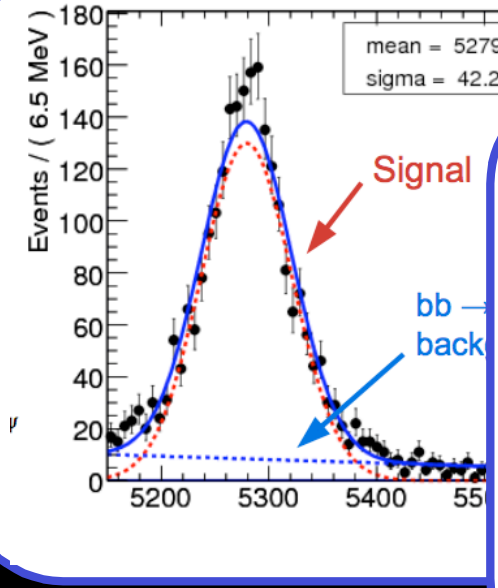


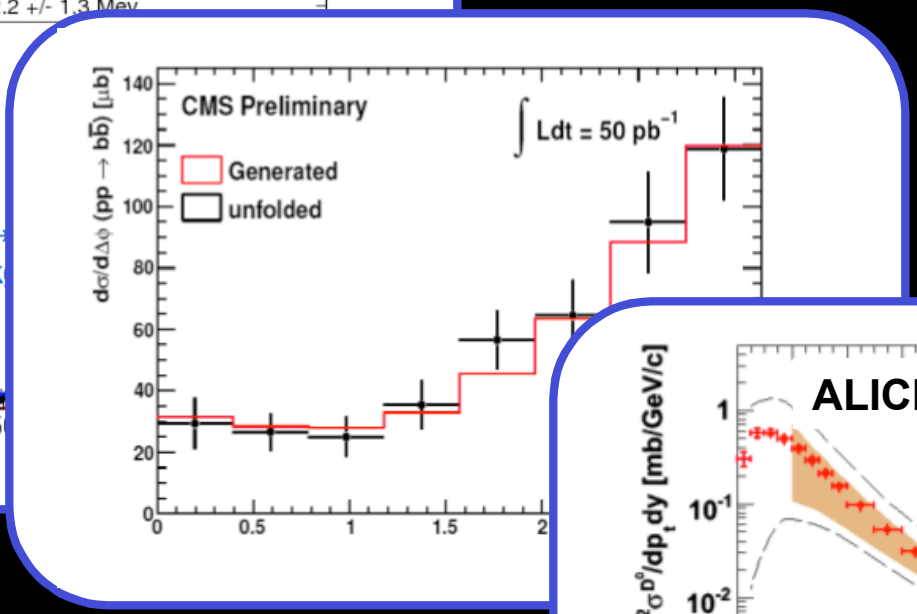


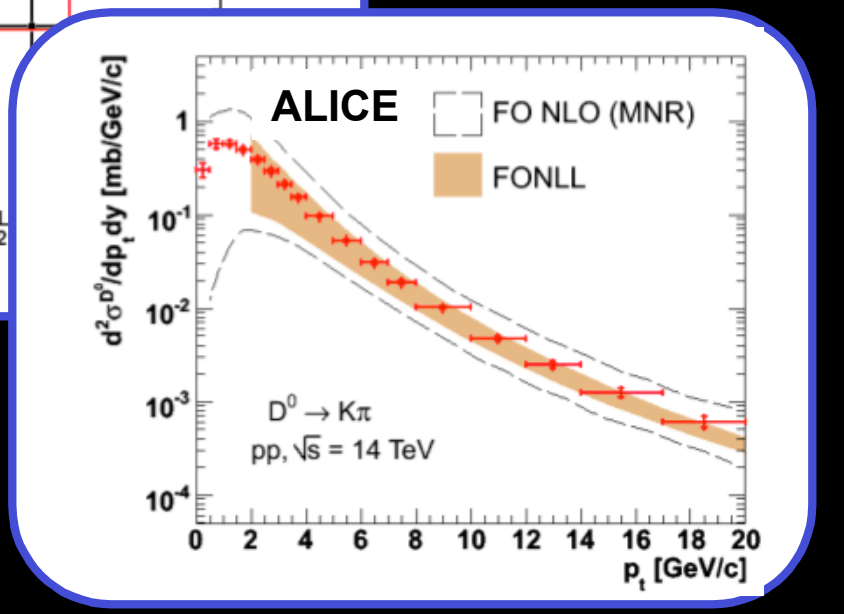
HF production and properties

ATLAS/CMS/ALICE

T. Stahl, J. Andrea, K. Toms, G. Bruno

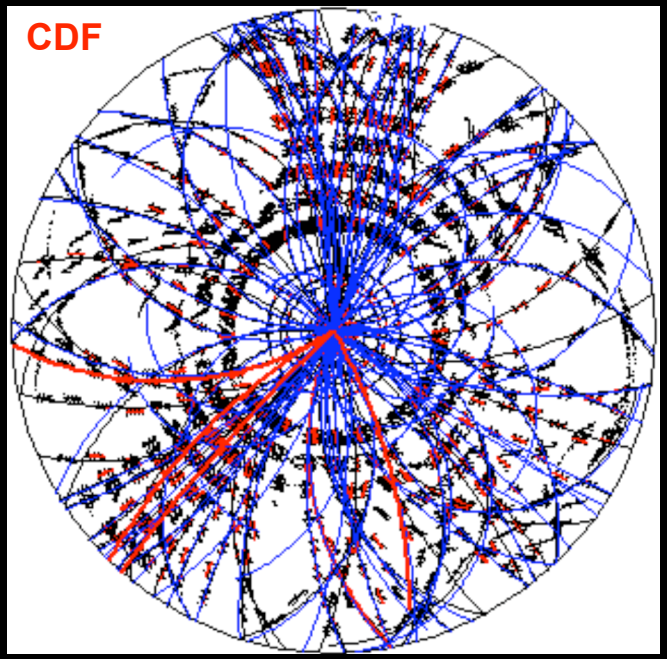


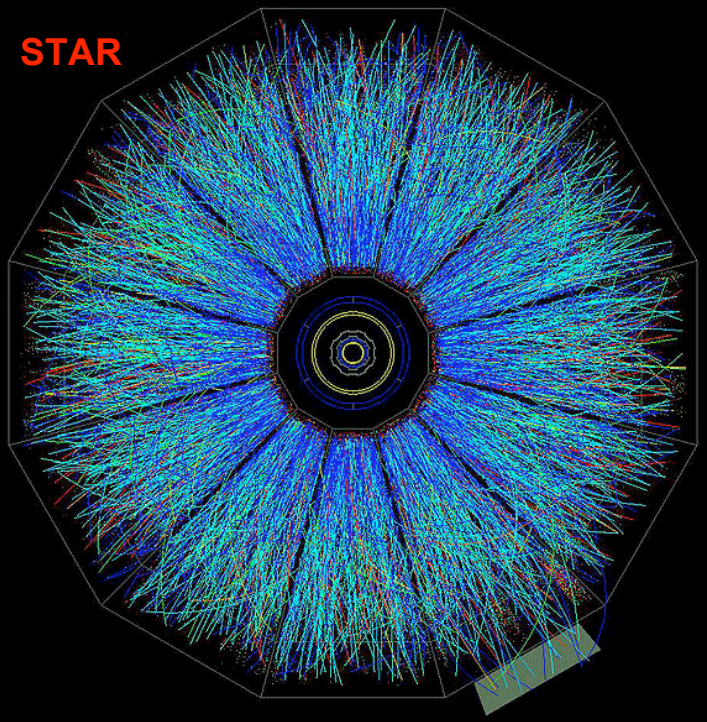




Plans/projections for initial measurements. Either inclusive or very known exclusive final states.

Heavy Ion collisions



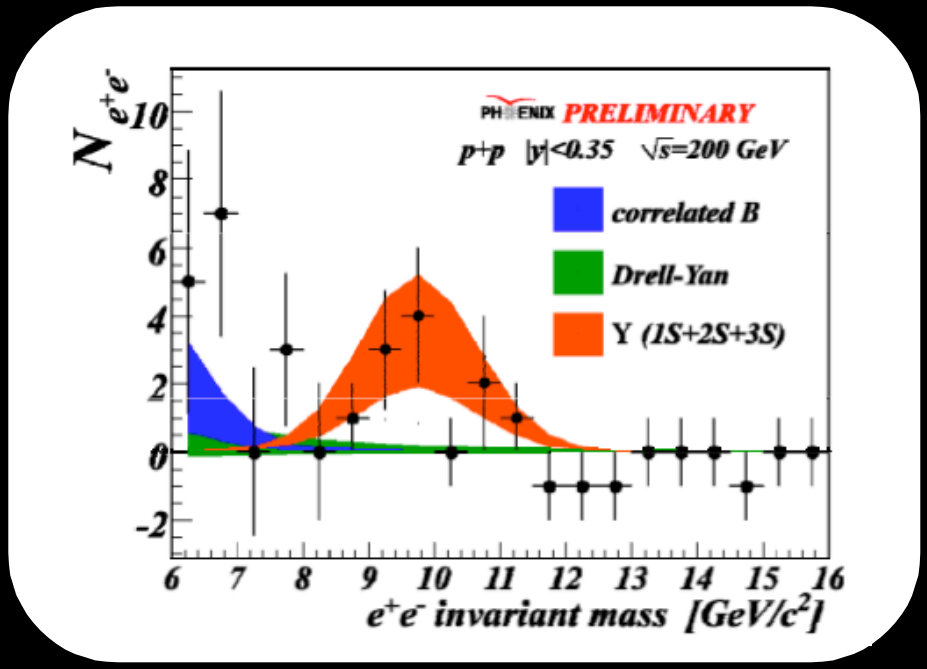


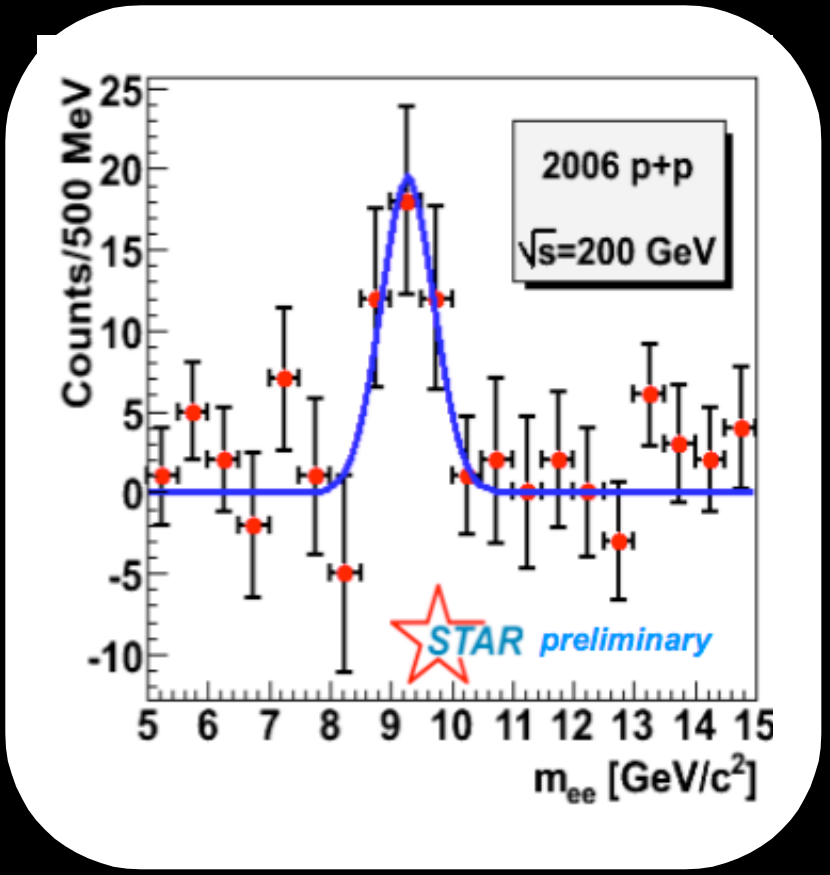
And I thought that HF physics at the Tevatron was challenging….

The era of beauty is opening at RHIC

PHENIX/STAR

R. Granier de Cassagnac, J. Bielcik





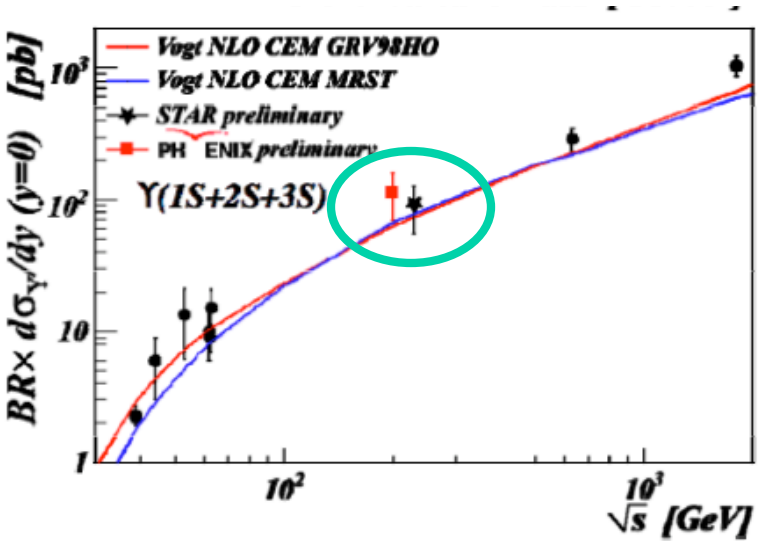
Beauty contributions

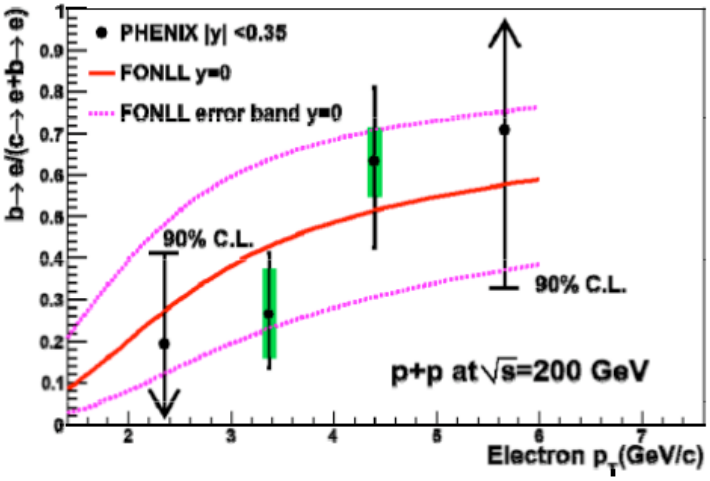
PHENIX/STAR

R. Granier de Cassagnac, J. Bielcik

HF: key tool to probe/understand the properties of the hot-dense medium.

Y follows world trend. Not modified in d+Au, but suppressed in Au+Au





Large beauty contribution to single-e spectrum.

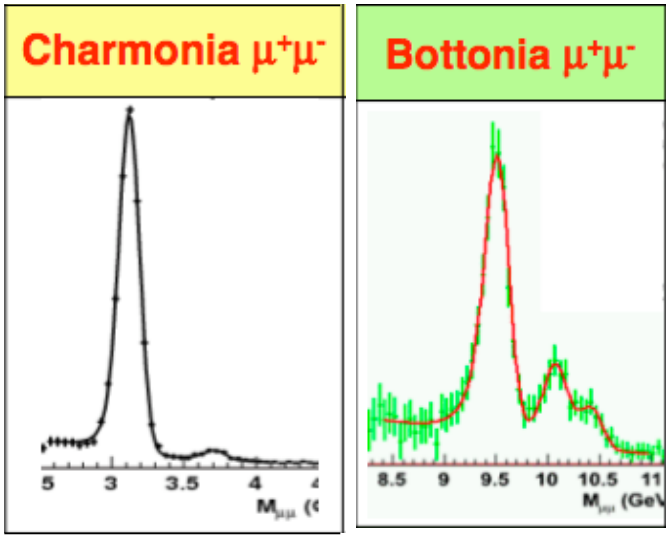
Consistent with theory.

Heavy Ions: the next generation

ALICE/CMS

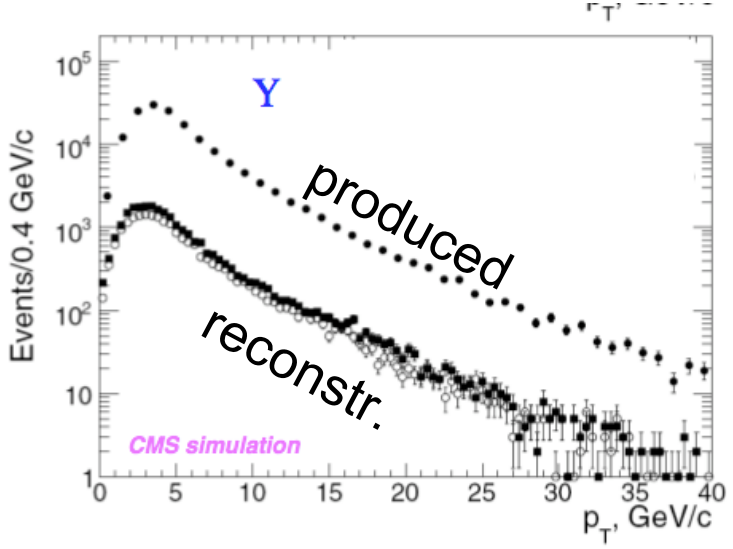
G. Bruno, C. Lourenço

ALICE ~ 1 month



~150 ~30

CMS- PbPb ~1 month



Part I conclusions (my take)

HF physics in hadron collisions entered its maturation stage. Tevatron keeps providing a plethora of new, key results, with > 1/2 of Run II samples still to be analyzed.

Paves the way for LHC, which will join the party very soon.

There will probably be competition at some point, but complementarity will be the name of the game in the near-medium future (which is a good thing). This further extends to heavy ion physics, where HF era just started.

"When the going gets tough, the tough get going"

Heavy Flavor at hadron colliders

Thanks to all speakers and participants, Juan and the organization, Ahmed, Leonid, and all people involved in producing these beautiful measurements.