Лаборатория релятивистской ядерной физики

Физическая программа на ALICE

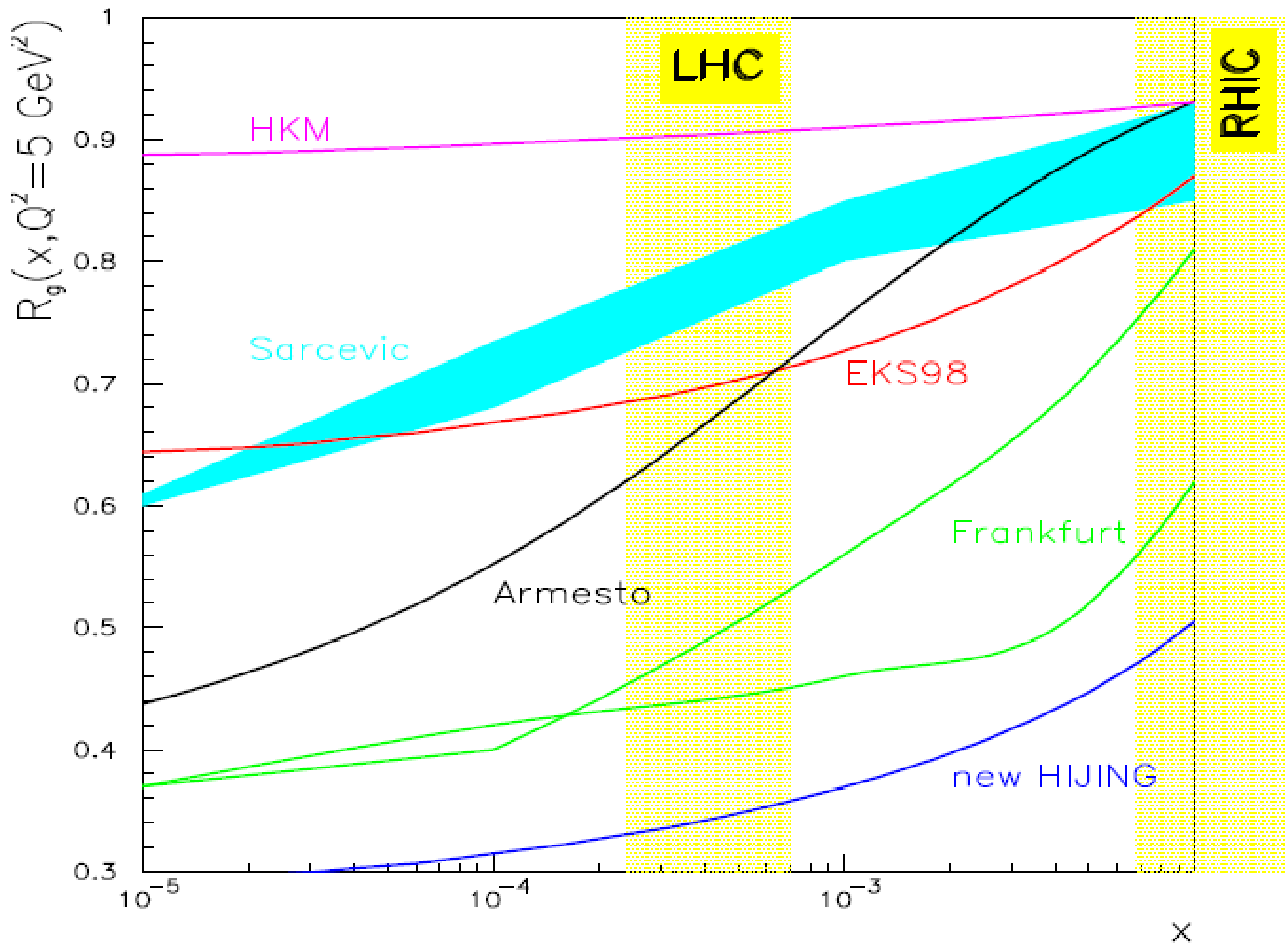
- **Структура $f_0(980)$ мезона**
- **Поляризация J/Ψ в pp и AA**
- **Поиск эффектов вне СМ: микроскопические черные дыры**
- **Ультрапериферические столкновения на LHC**

1. Глюонные плотности в нуклонах и ядрах из фоторождения кваркониев

2. Динамика БФКЛ в фоторождении кваркониев

Сессия Ученого Совета ОФВЭ, 2009. М. Жалов

Gluon shadowing in Pb

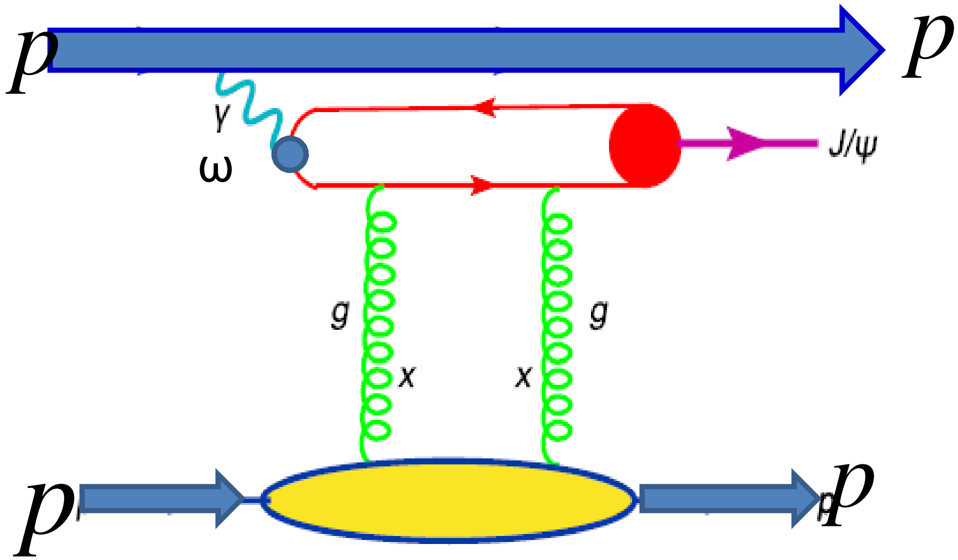


To fix the problem : PbPb->PbPb J/Ψ with ALICE at LHC – counting rate 10^{-2} events /sec

$$\frac{d\sigma_{AA\to AAJ/\psi}(y)}{dy} = \frac{dN_{\gamma/A}(y)}{dy}\cdot\frac{d\sigma_{\gamma p\to pJ/\psi}(t_{\min},y)}{dt}\left[\frac{G_A(x,Q^2_{eff})}{Ag_p(x,Q^2_{eff})}\right]^2 F_A^2(t_{\min})$$

Small x physics in UPC at LHC

in the first year pp run with 3.5 TeV protons



Loss $1/Z^2$

Gain

$\omega \approx \gamma_L k_t$

$L_{pp} > L_{pA}$

$$x = \frac{M_{J/\Psi}^2}{4\omega \gamma_L m_N}$$

$$y = \ln \frac{2\omega}{M_{J/\psi}}$$

$$\frac{d\sigma_{pp \to ppJ/\psi}(y)}{dt dy} = \frac{dN_{\gamma/p}(y)}{dy} \cdot \frac{d\sigma_{\gamma p \to pJ/\psi}(y,t)}{dt}$$

$$\frac{d\sigma_{\gamma p \to pJ/\Psi}(\omega)}{dt} = \frac{16\pi^3 \alpha_s^2 \Gamma_{ee}}{3\alpha M_{J/\Psi}^5} \left| x g_N\left(x, \frac{M_{J/\Psi}^2}{4}\right) \right|^2 \exp(B_\Psi t)$$

J/ψ in proton-antiproton UPC at TEVATRON -CDF

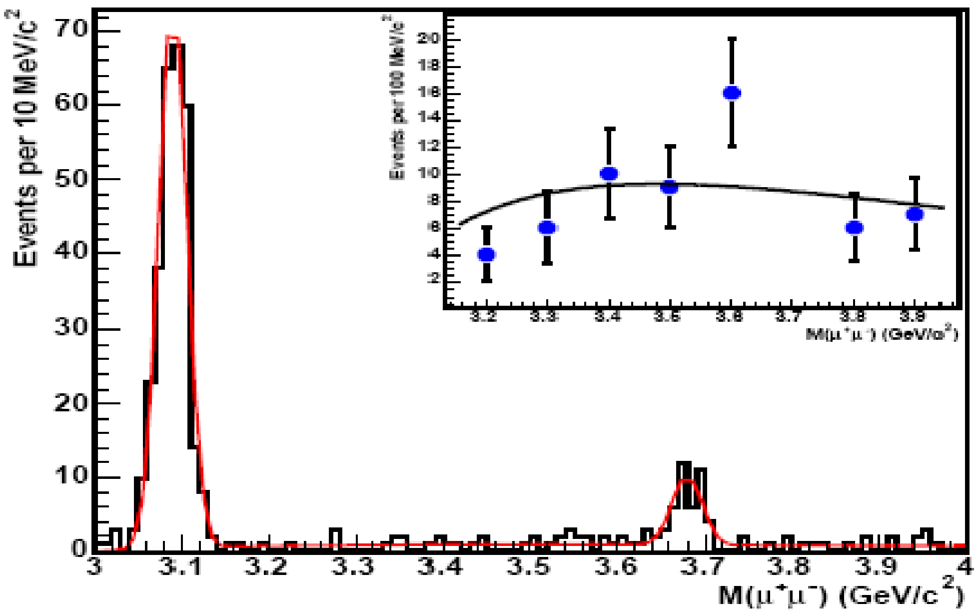
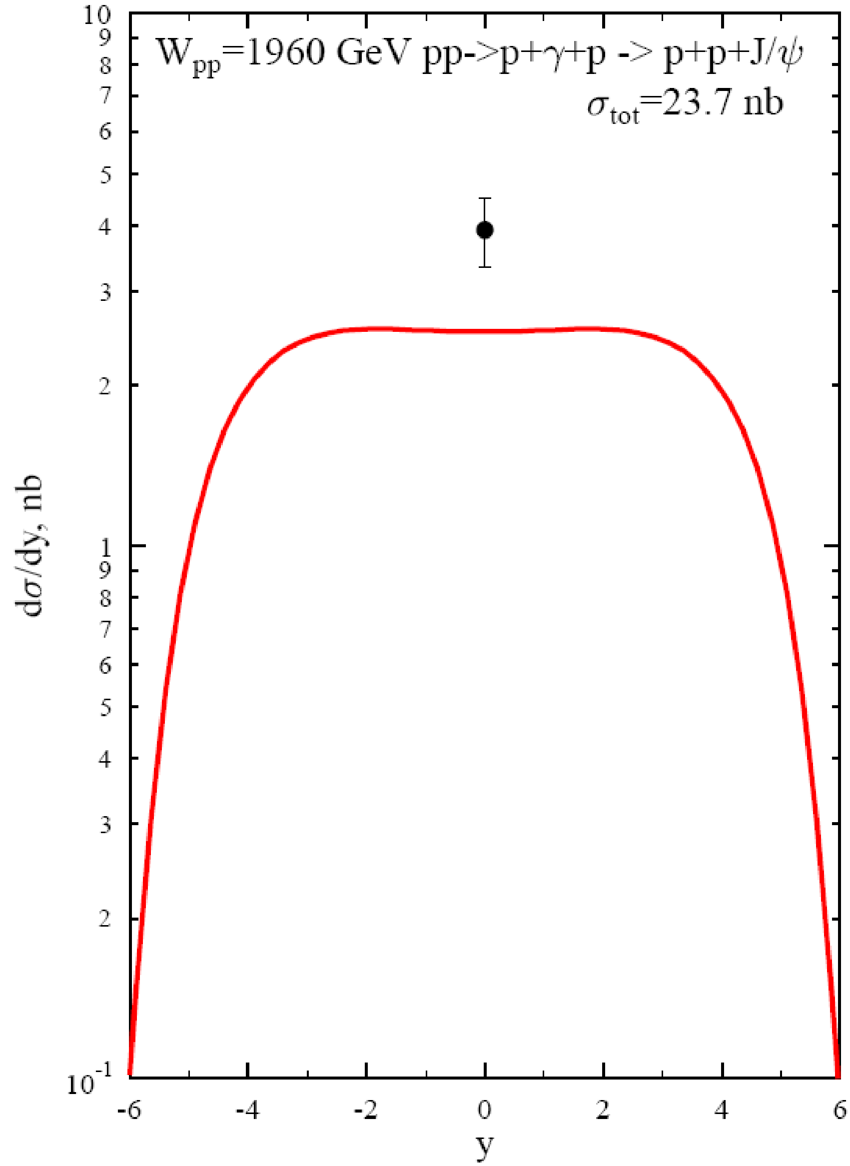
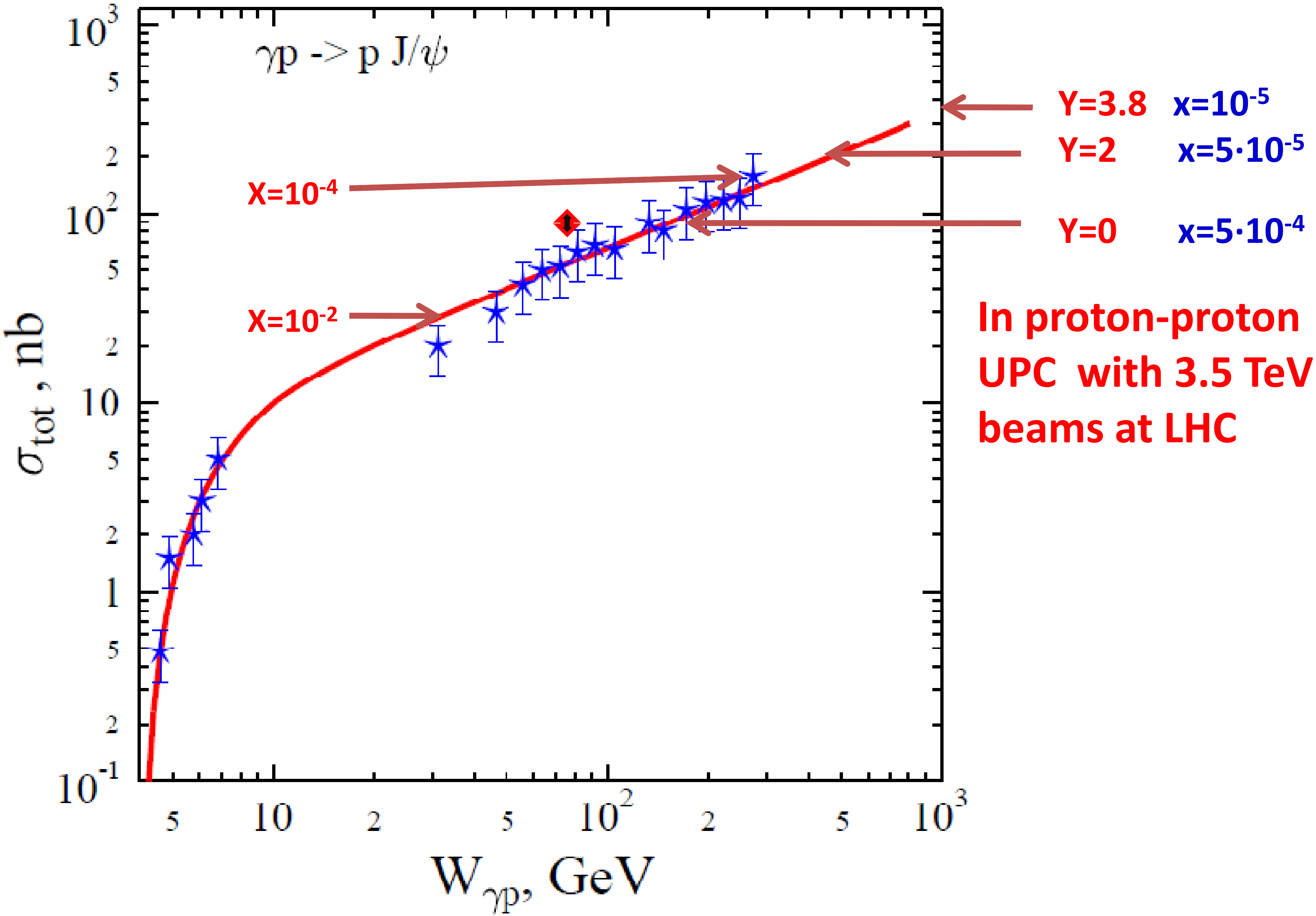


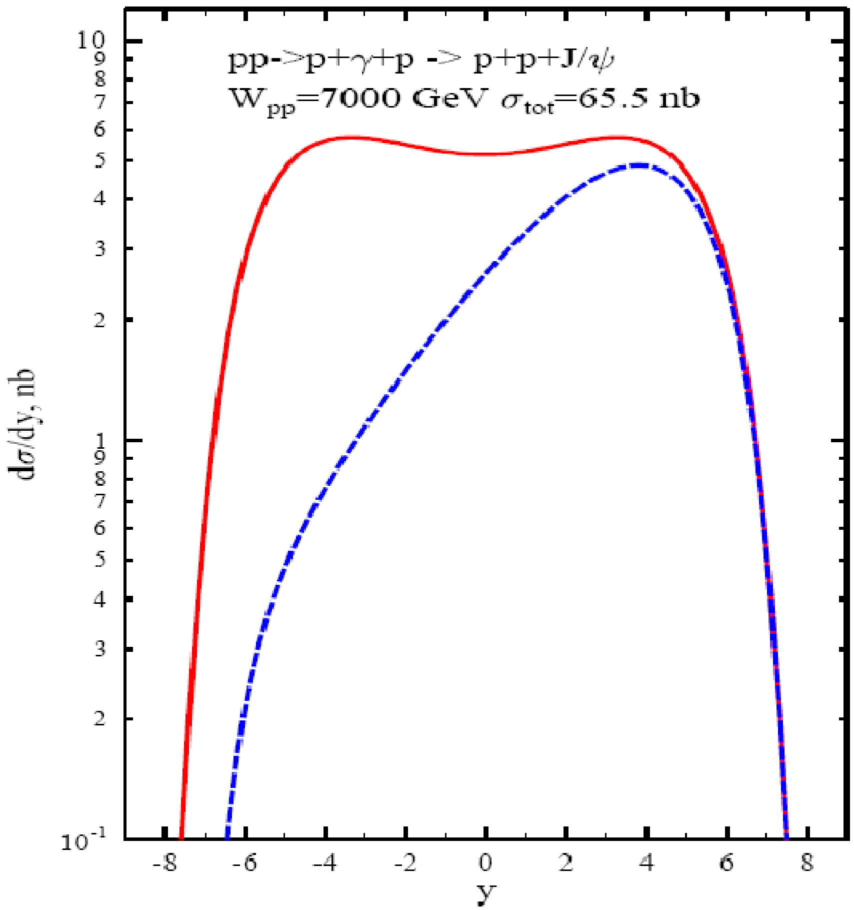
FIG. 2: Mass $M_{\mu\mu}$ distribution of 402 exclusive events, witl no EM shower, (histogram) together with a fit to two Gaus sians for the J/ψ and $\psi(2S)$, and a QED continuum. Al three shapes are predetermined, with only the normaliza tions floating. Inset: Data above the J/ψ and excludin $3.65 < M_{\mu\mu} < 3.75$ GeV/c^2 ($\psi(2S)$) with the fit to the QEI spectrum times acceptance (statistical uncertainties only).



Exlusive charmonium photoproduction



In proton-proton UPC with 3.5 TeV beams at LHC



V.Rebyakova,M.Strikman, M.Zhalov
e-Print arXiv hep-ph/0911-5169

Advantage:

1. **Simple selection of J/ψ from high energy photons**
2. **Low background**
3. **Small contribution of other mechanisms -Odderon**

Difficulties:

1. **Small cross section**
2. **Feeding from χ_c can be separated experimentally and studied.**
3. **Trigger**

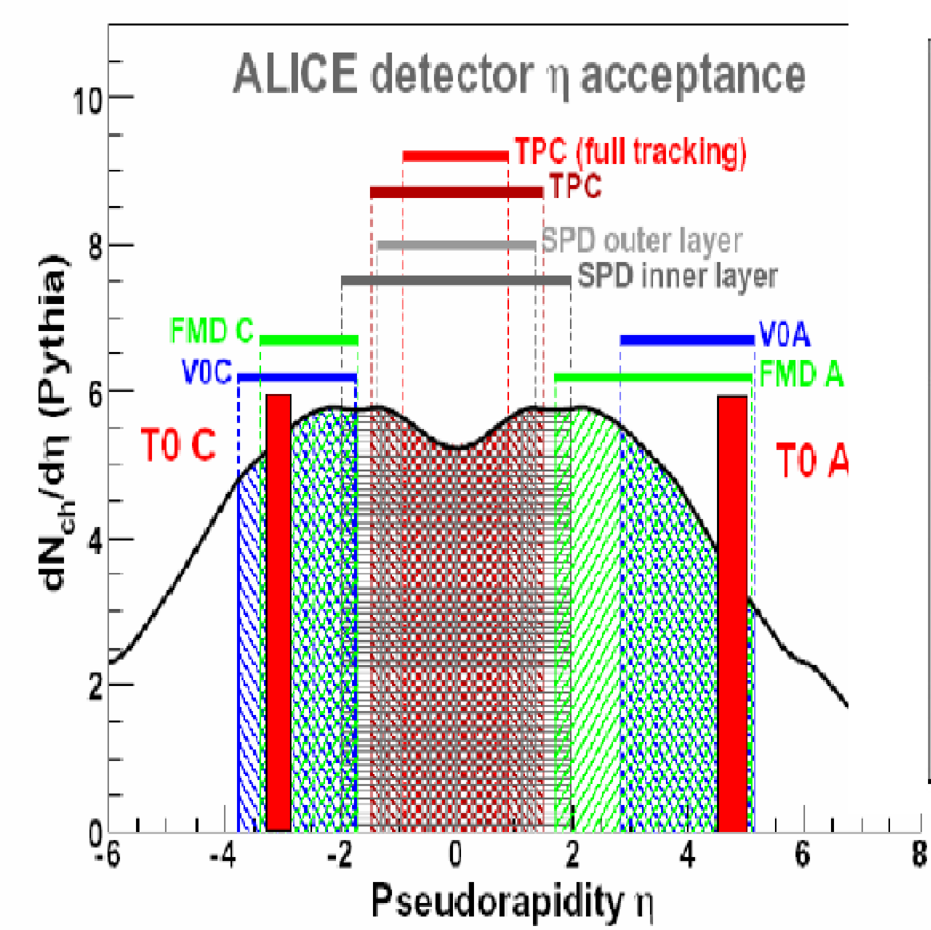
Counting rate: at Luminosity $L=10^{32}$ cm^{-2} s^{-1} (with accounting for Branching of J/ψ to dimuon channel $6 \cdot 10^{-2}$)

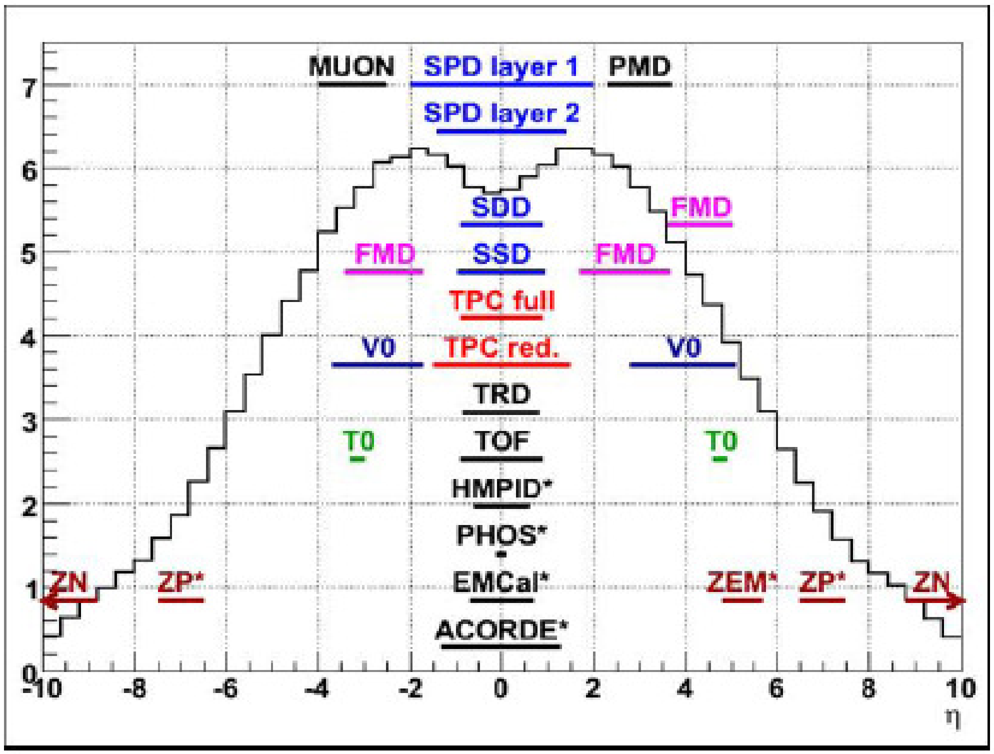
for 2<y<4 N≈$6 \cdot 10^{-2}$ $\mu^+ \mu^-$ s^{-1} ·Detector≈ $3 \cdot 10^{-3}$ $\mu^+ \mu^-$ s^{-1}

Hence, with special trigger for 24 hours we get the same number of events which were presented by CDF but at smaller x

How to measure

1. $\mu^+ \mu^-$ and nothing more – veto from ZDC and all other detectors
2. $\mu^+ \mu^-$ + veto from ZDC and other detectors in the J/Ψ hemisphere
3. $\mu^+ \mu^-$ + veto from ZDC in the J/Ψ hemisphere +low multiplicity





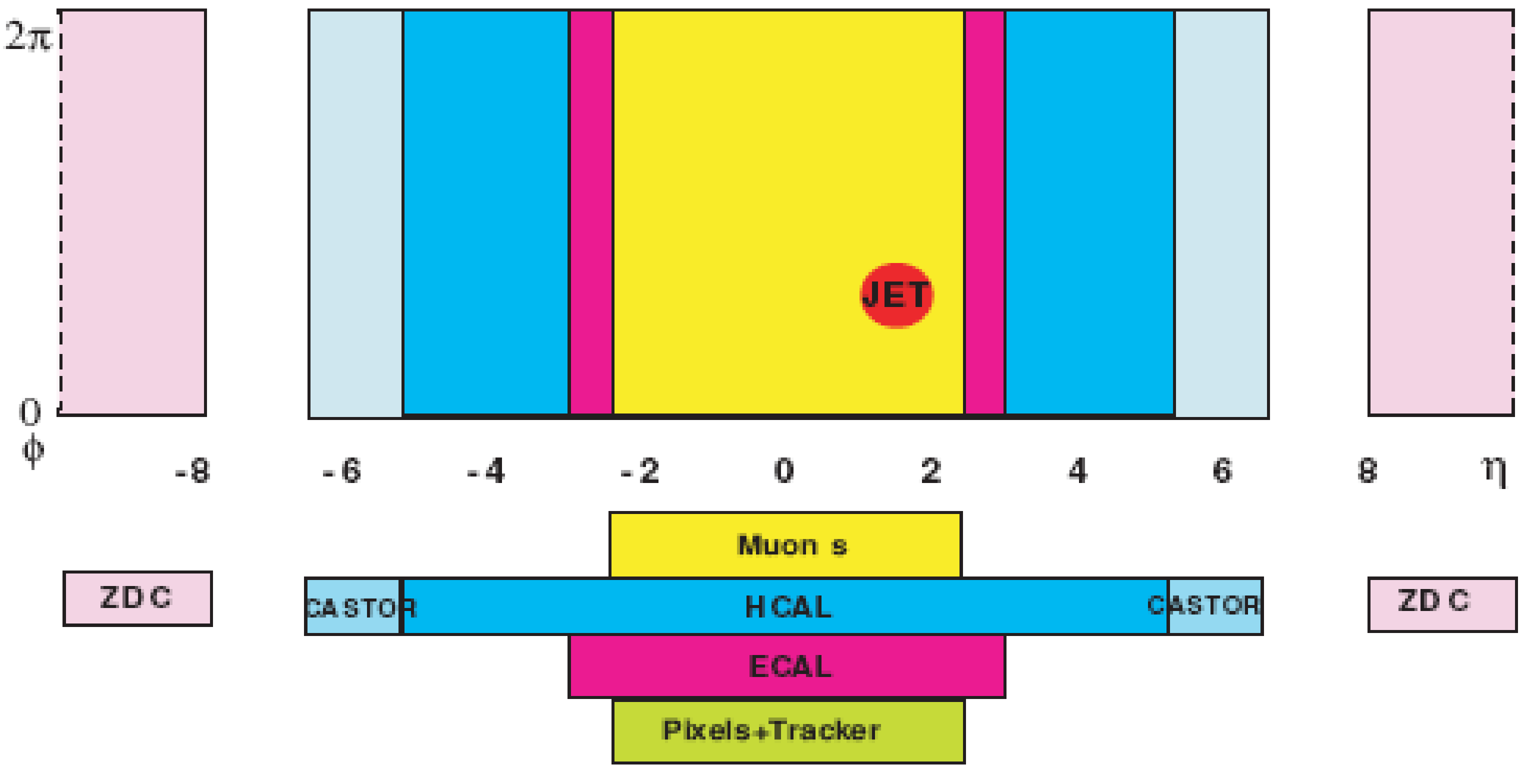


Figure 2. CMS coverage for tracking, calorimetry, and muon identification in pseudo-rapidity (η) and azimuth (ϕ). The size of a jet with cone $R = 0.5$ is also depicted for comparison.

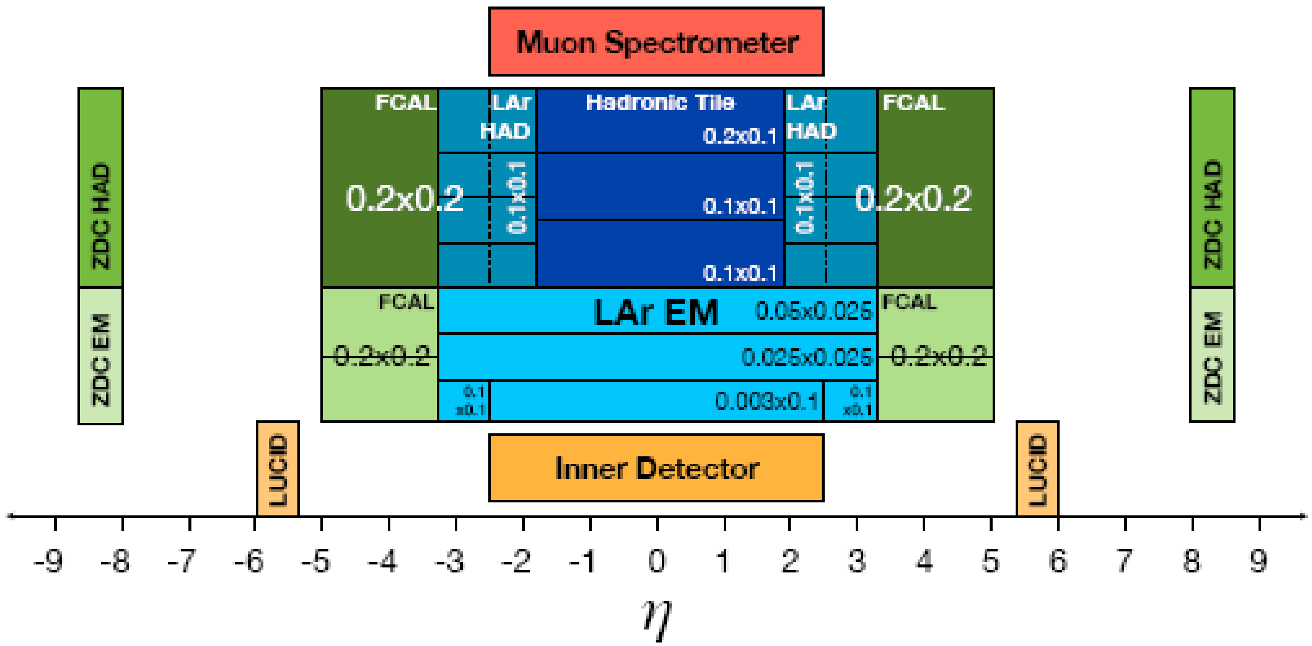
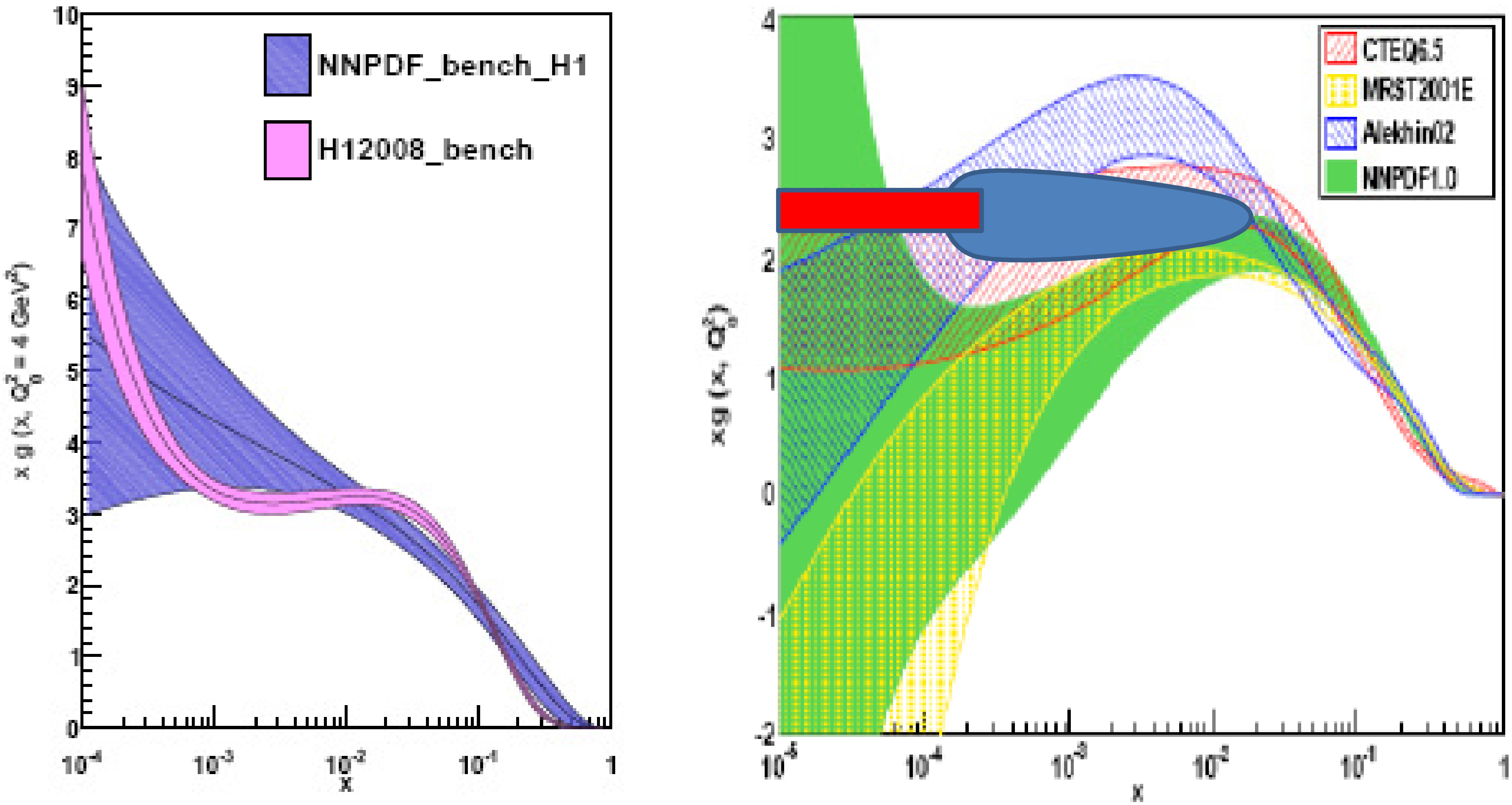


Figure 1. The η view of the different subdetectors of the ATLAS, all subdetectors cover the full 2π in azimuth. Tracking and muon detection extends to $|\eta| <2.5$. Both the electromagnetic and hadronic calorimeters cover $|\eta| < 5$ and are longitudinally segmented with the typical $\Delta\eta$x$\Delta\phi$ segmentation indicated.



NNPDF_bench_H1
H12008_bench
x g (x, Q_0^2 = 4 GeV^2)
x
CTEQ6.5
MRST2001E
Alekhin02
NNPDF1.0
x g (x, Q_0^2)
x