

# Some news from Les Houches

**LES HOUCHES - Centre de Physique**

**Workshop**

**PHYSICS at TeV COLLIDERS**

**Les Houches, June 11-29 2007**

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- Dirk ZERWAS

**AIM AND FORMAT**

*The aim of this Workshop is to bring together theorists and experimentalists working on the phenomenology of the upcoming TeV colliders. The emphasis will be on the physics at the LHC, particularly on progress in new techniques for the simulation of Standard Model processes and on the latest developments concerning new mechanisms of electroweak symmetry breaking and the associated New Physics. Issues ranging from jets and SM candles to Higgs and BSM will be discussed and tools covering these aspects will be critically reviewed and compared. Three Working Groups have been set up to cover these different aspects of physics at the LHC. The meeting in Les Houches is the central event of this year-long Workshop.*

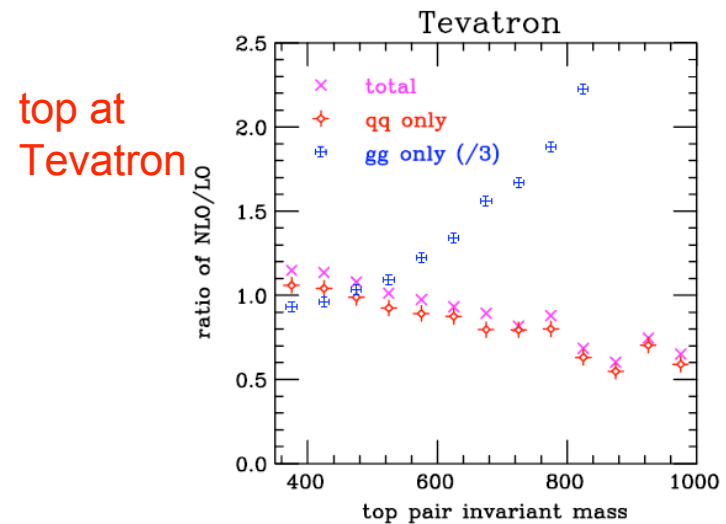
for more information, see: <http://lapp.in2p3.fr/conferences/LesHouches/Houches2007/>

Design: G. Cranmley / LAPTh

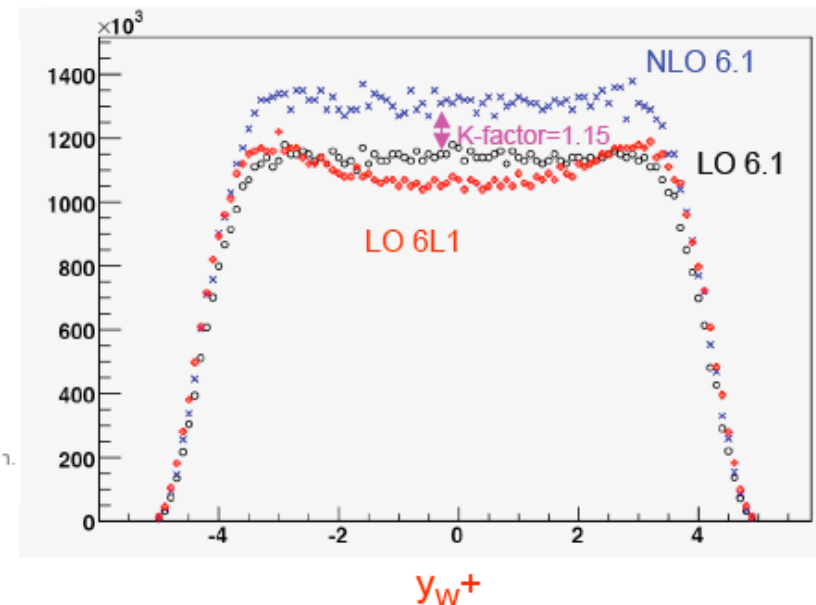
- J. Huston
  - ◆ Michigan State University

# PDF's for Monte Carlos

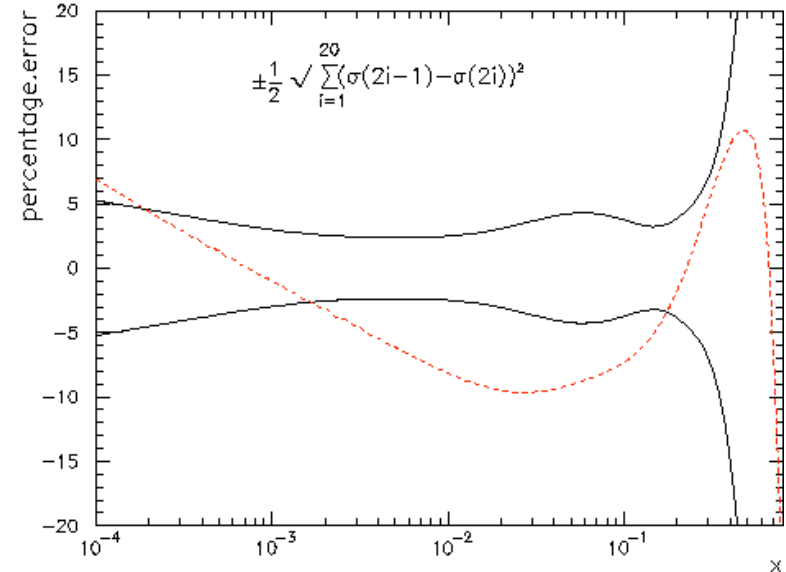
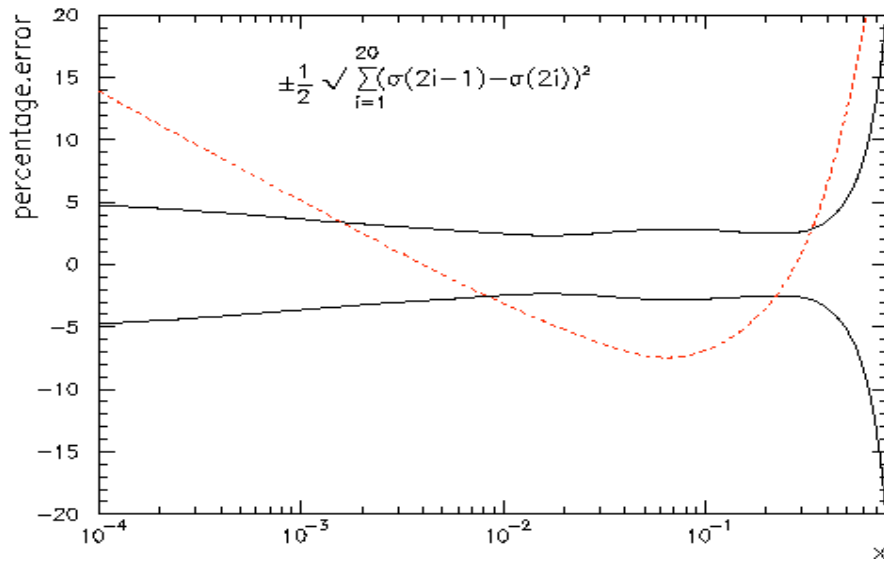
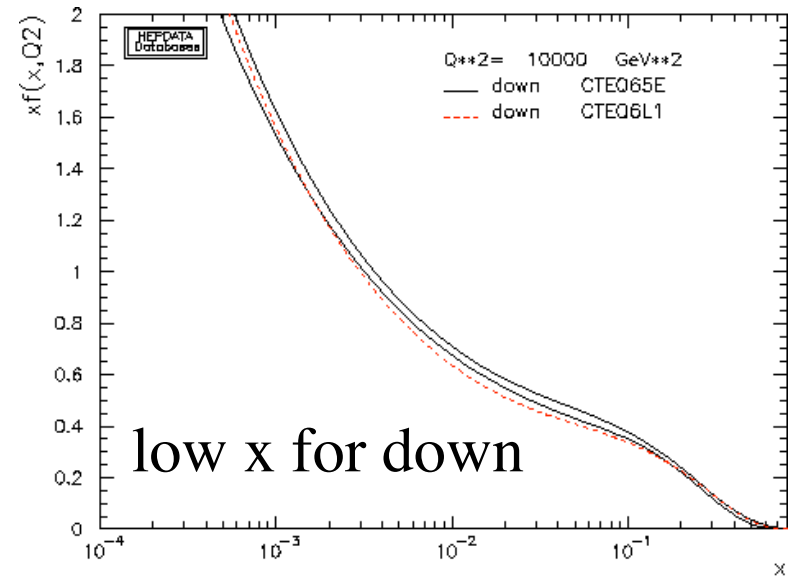
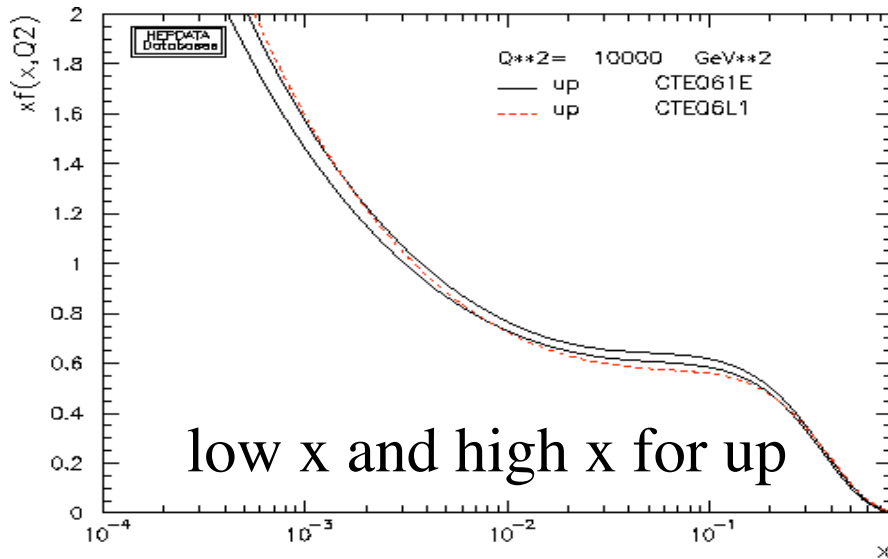
- Experimenters tend to use LO Monte Carlos for everything, including for processes for which NLO information is available
- And what's worse, when they do use NLO tools, they reference the MC@NLO webpage rather than the original paper
- LO pdf's can create cross sections/acceptances that differ in both shape and normalization from NLO due to influence of HERA data
- Can we use NLO pdf's in LO Monte Carlos?
- Can we modify LO pdf's for Monte Carlos to reduce differences?



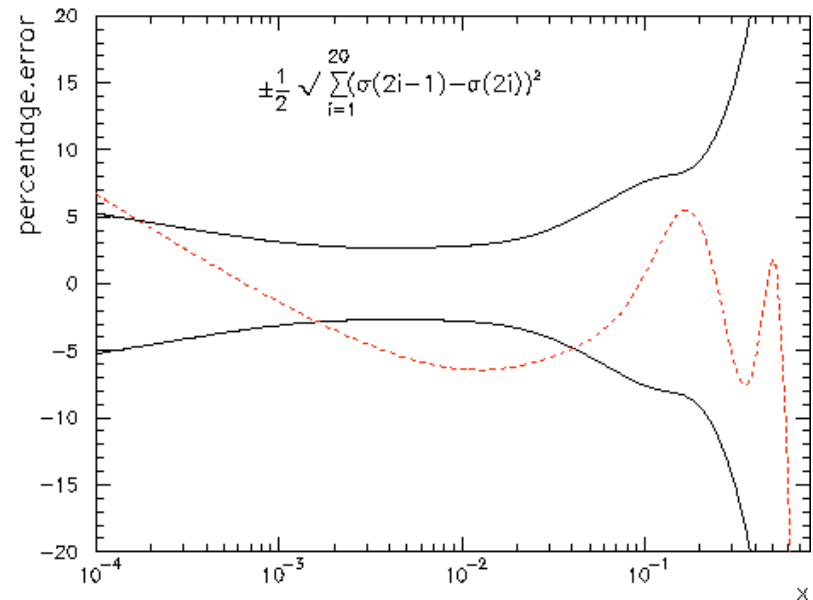
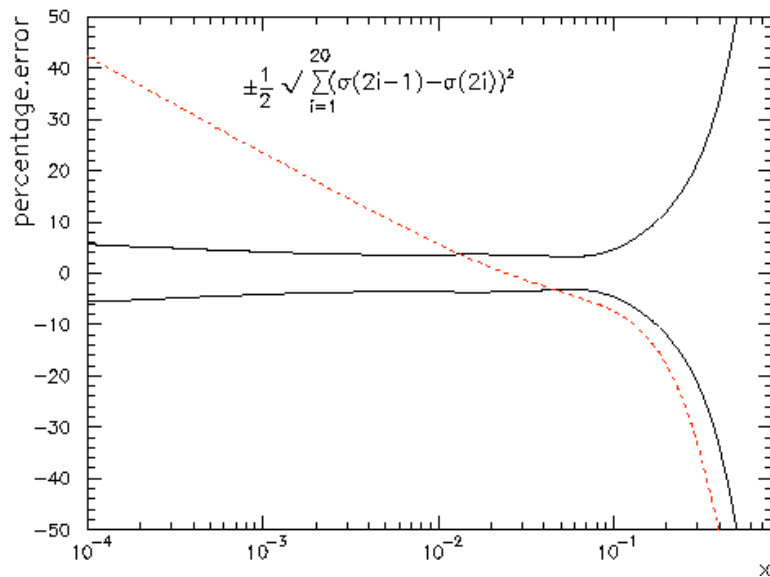
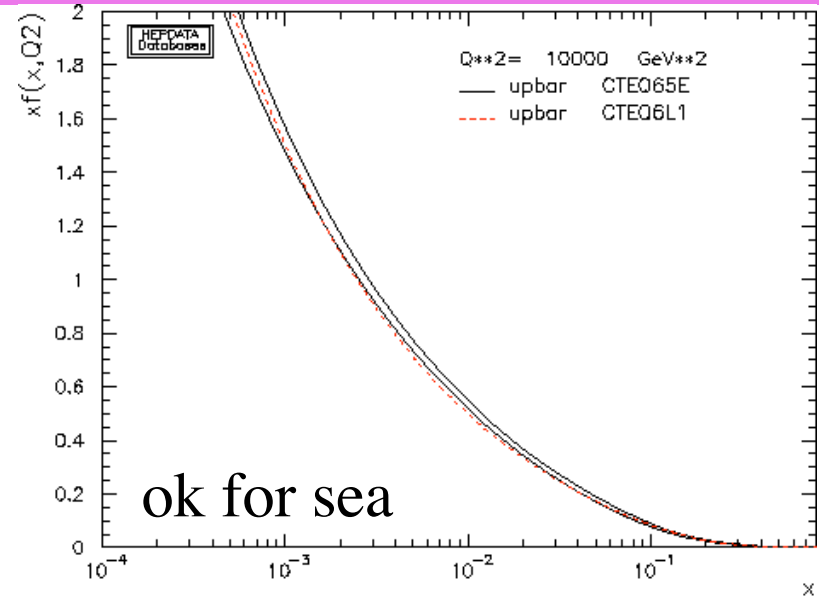
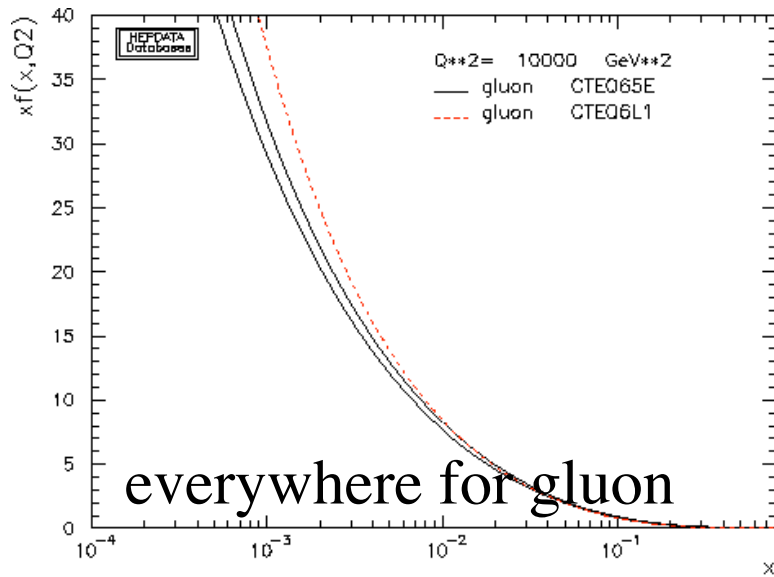
W<sup>+</sup> rapidity distribution at LHC



# Where are the differences?



# Where are the differences?



# Two approaches

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## ● Modified LO pdf

- ◆ relax momentum sum rule
- ◆ fit LO pdf's to some benchmark processes that explore both low  $x$  and high  $x$  physics
  - ▲ W,Z production
  - ▲ bb
  - ▲ Low-mass Drell-Yan
  - ▲ VBF Higgs
  - ▲ gg->Higgs
- ◆ how much does MSR need to be relaxed? Does this cause any problems in the Monte Carlos? Does this cause any interesting reactions from theorists in the audience?

## ● Split pdf's

- ◆ NLO pdf's for matrix elements in Monte Carlo
- ◆ LO pdf's for UE + parton shower
- ◆ possible with Pythia8, Herwig++
- ◆ problems with matching, parton shower approaching both scales?

# First approach

- Modified LO pdf

- ◆ relax momentum sum rule
- ◆ fit LO pdf's to some benchmark processes that explore both low  $x$  and high  $x$  physics
  - ▲ W,Z production
  - ▲  $bb$
  - ▲ Low-mass Drell-Yan
  - ▲ VBF Higgs
  - ▲  $gg \rightarrow$  Higgs
- ◆ how much does MSR need to be relaxed? Does this cause any problems in the Monte Carlos? Does this cause any interesting reactions from theorists in the audience?

hep-ph/0706.2131 C. Gwenlan, A. Shertsnev, R. Thorne

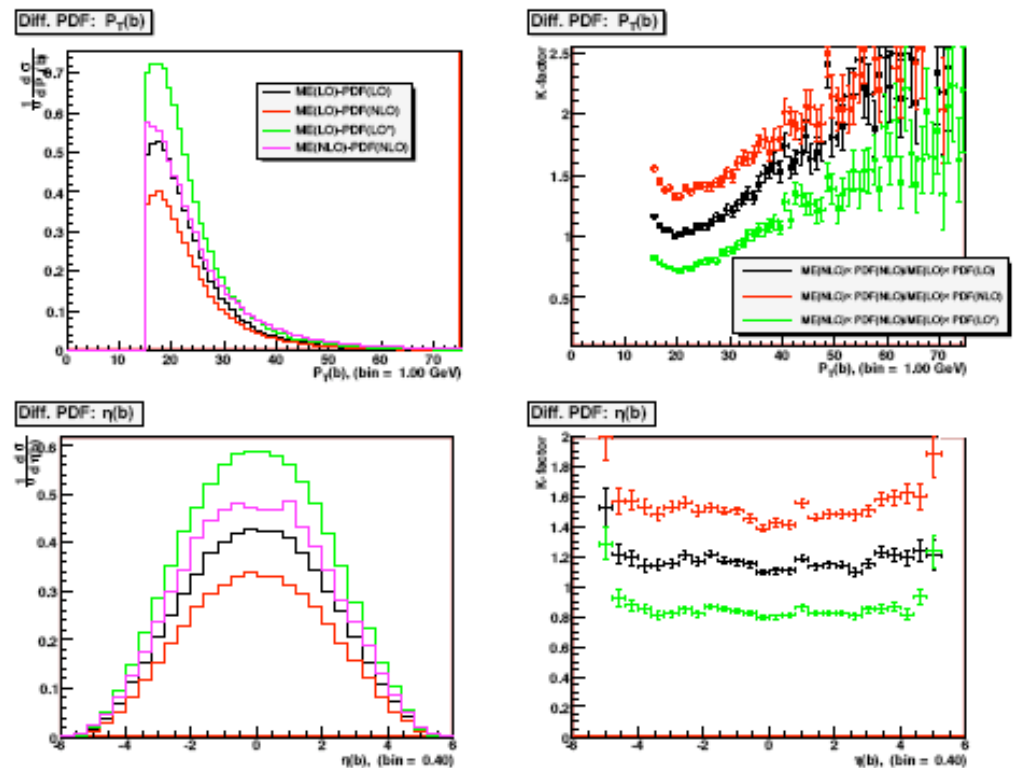


Figure 3: The  $b$  cross section at the LHC.

# Summary



- Both approaches will be tested and modified LO pdf's will be available within the next few months