

# Small x discussion forum

- Goal of BFKL discussion

Different predictions for BFKL signatures at LHC exist. The goal of this discussion is to define a set of benchmark cross sections and distributions which will help to understand the different predictions. At the end we would like to propose a region of phase space, where BFKL effects can be tested at LHC.

- Small x physics can be one of the important Highlight of LHC physics at the moment.
    - have a clear vision of which observables can signal small x effects ?
    - how do we understand the high energy behavior of QCD:
      - similar to Higgs...
      - we know there must be small x rise and eventually saturation, but we do not know where .....
      - we need to come out with clear and consistent and convincing results .....
- ▶ this is the goal and focus of this discussion forum

# discussion started

- Discussion started in July
  - theory discussions on NLO calculation of Mueller-Navelet jets
  - plan for benchmark distributions and comparison with collinear NLO calculations
  - <https://twiki.cern.ch/twiki/bin/view/Main/BFKLDiscussion>

# Summary of last meeting

- Essential for the comparison of BFKL with NLO collinear calculations is a study of the stability of the NLO calculation as a function of the difference of the pt cuts for the 2 jets. Instabilities can occur if the pt-difference is too small or too big.
- A systematic check of NLO dijet calculations as a function of the pt-cut difference should be performed with POWHEG and a true NLO calculation for Delta phi as a function of Delta y. The same should be done with NLOJET++ (NLO for 3jets), because Delta phi < pi requires already  $O(\alpha_s^3)$ .
- To ensure stability in NLO one could check a cut on  $pt_1 + pt_2$ , combined with a requirement that  $pt_2 > x pt_1$  with  $x = \text{say } 1/2 \text{ or } 2/3 \dots ?$
- A comparison of Delta phi as function of Delta y with POWHEG, NLOJET++, HEJ and CASCADE will be done to have a common benchmark xsection and not too small but also not too large Delta y.
- A comparison of calculations of Samuel&Lech with the LO BFKL + E-mom effects of HEJ
- Where do we stand today ?

# Next steps

- **Proposal:**
  - extended discussion round on theory predictions and experimental results:
    - **ATLAS:**
      - forward jets
      - jet veto
    - **CMS:**
      - forward
      - forward-central jets
      - ratio of exclusive/inclusive jets versus  $\Delta\eta$
    - **LHCb/ALICE ?**
    - **Tevatron**
    - **HERA**
  - do we have a consistent picture of the measurements done at LHC:
    - do we see consistently disagreements / agreements ?
- Proposal for a one day workshop within LPCC for detailed discussion

# Today

- Today
  - new results on theory investigations
  - where do we stand with theory comparisons ?
  - new experimental results - and comparison with theory