Drag Effect with *b*'s: Status Report

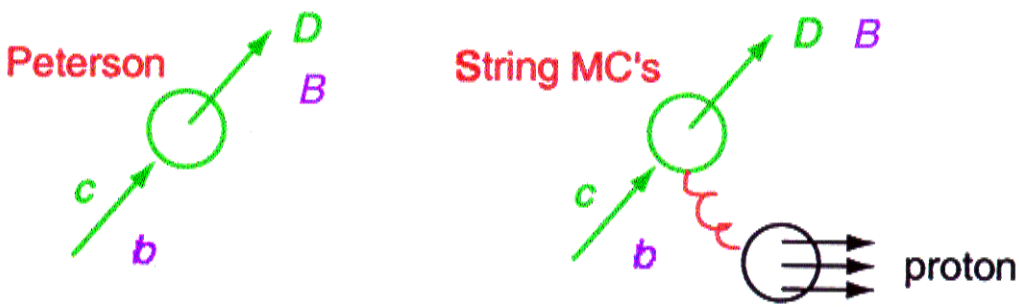
- **Outline**
  - MC studies and first look at feasibility

Run II B Physics Workshop
Prod/Frag/Sect. Working
~~Group Interim Meeting~~
~~8 November 1999~~
Fermilab
25 February 2000

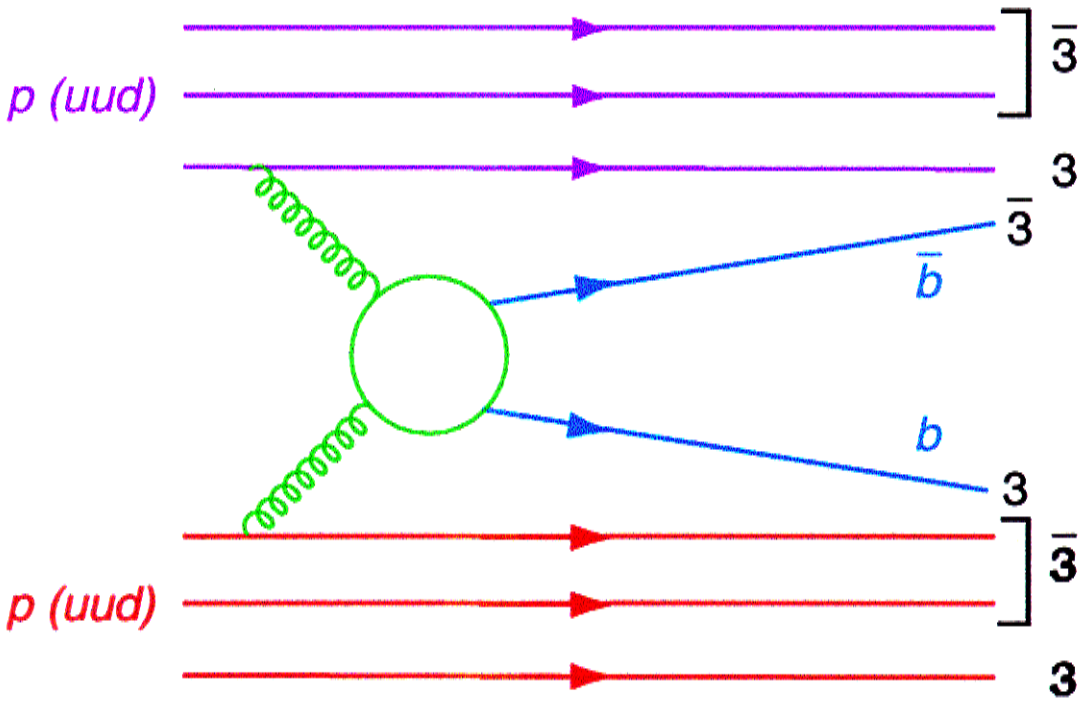
Rick Van Kooten,
Indiana University
DØ

Beam Drag Effect

- As presented by Brian Harris at last workshop meeting, observed excess of D^*mesons in relation to NLO QCD prediction $\Rightarrow \eta$ shifted toward proton remnant
- Only known explanation is "beam-drag" effect



- Not explained by
  - PDF set
  - Scale choice
  - mass of quark
  - frag. function and evolution
  - photon structure
- Won't help with the problem of excess of b production in central η, but possibly for far forward η (+shape change)
- PYTHIA (as opposed to ISAJET) should show effect in B production.
- Any F-B asymmetry? $B \leftrightarrow p$ $\bar{B} \leftrightarrow \bar{p}$ (i.e., quark remnant participation instead of just gluons)



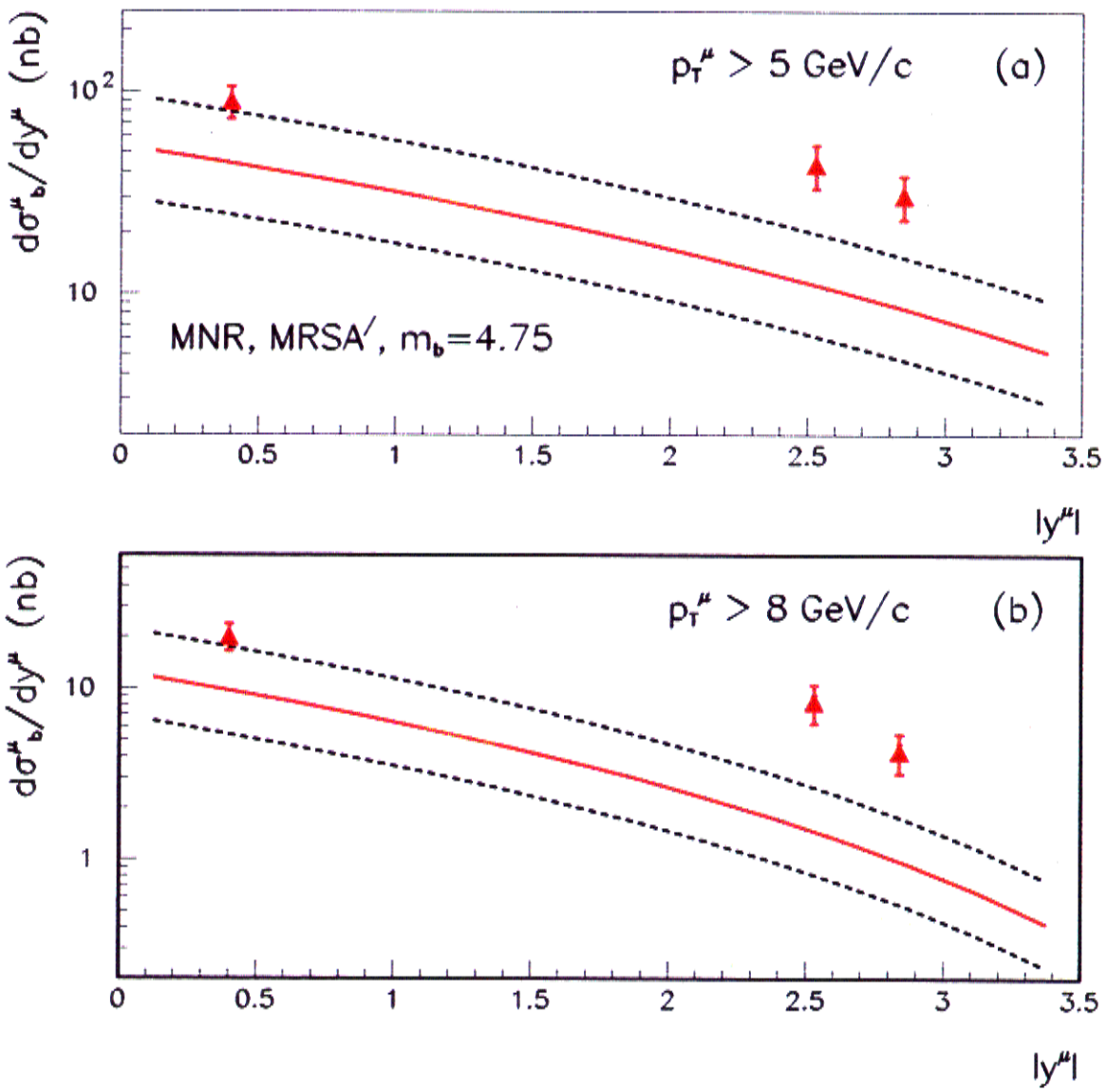
- Possible combination of the produced b and b with the quarks and anti-quarks of the proton/ anti-proton beam

- The bqq or $\bar{b}q$ can then be expected to have small transverse momentum

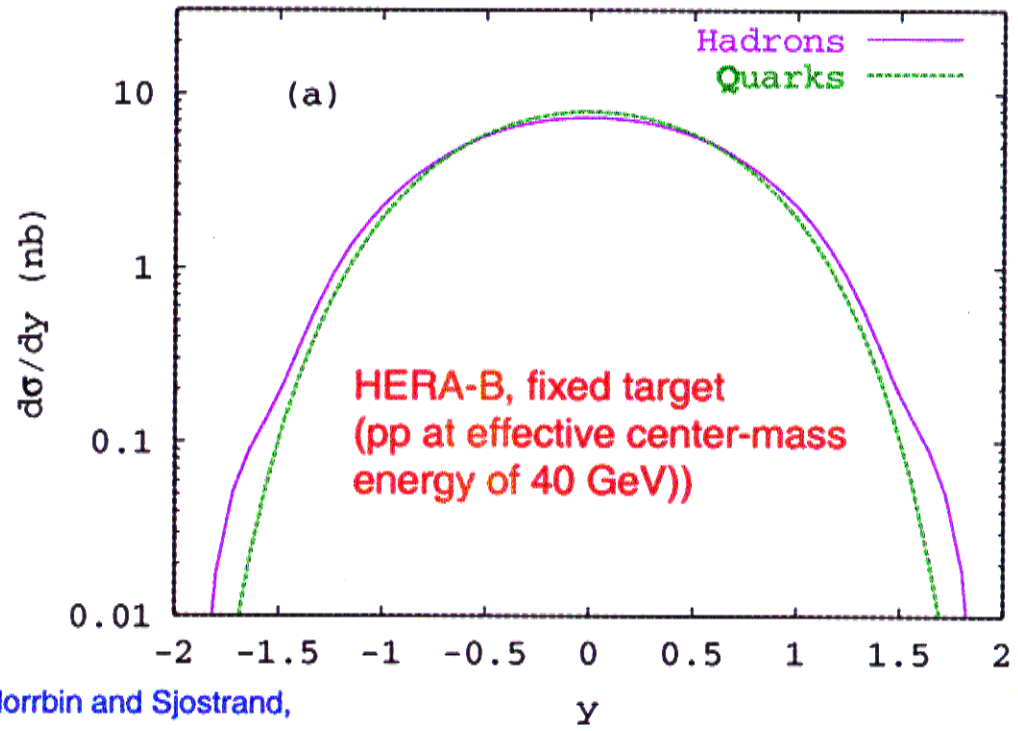
Monte Carlo

- Use PYTHIA, $b\,\bar{b}$ production at 2 TeV
- $p_{T,b} > 0.25$ GeV (otherwise runs *long* time)
- 4-vector, generator-level only, after hadronization
- Was able to turn effect "on" and "off" by switching to Feynman Independent Fragmentation (IF)
  - Lack of colour string between jets, confirmed using 3-jet e^+e^- events and energy flow between *q-g*
- Will try ISAJET later for lack of effect

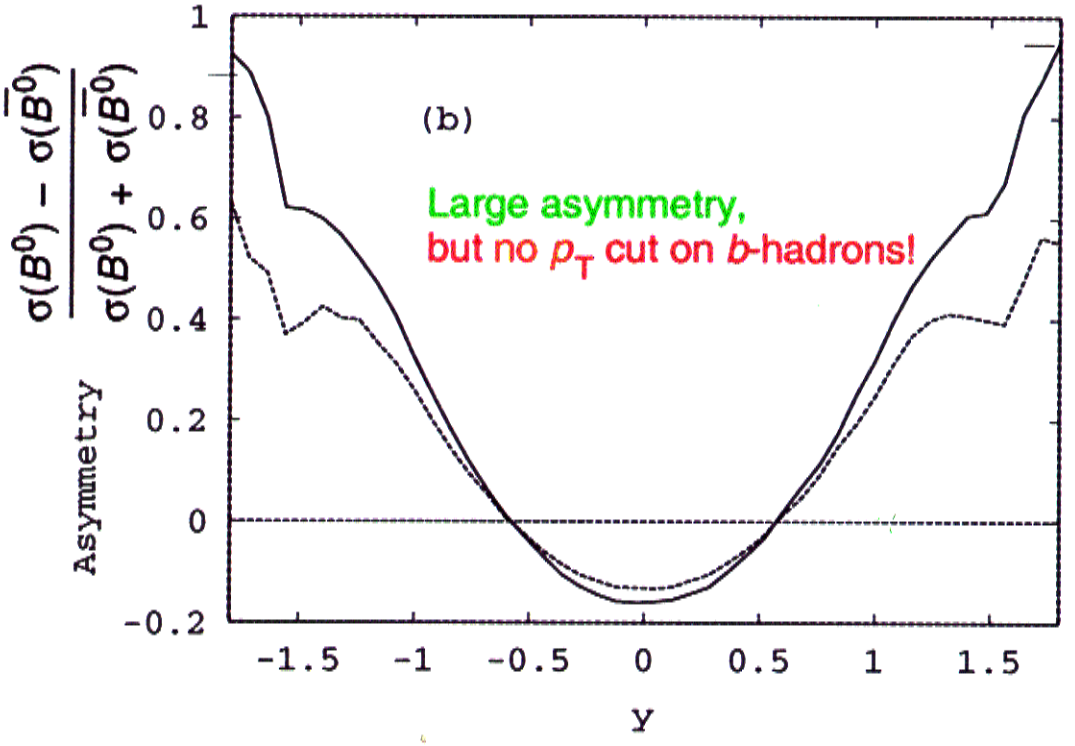
DØ Production Results vesus Rapidity



- p_T cut necessary
- DØ Run II reach in η will be more limited
- "Drag" effect a very low-p_T phenomena (and far-forward)



Norrbin and Sjostrand,
May 99, LU TP 99-08



To Do

- How far can p_T be pushed down in triggering? (vertex, lepton triggers)
- Look at extended regions in η (can BTeV play a role here?)
- Form asymmetry (including detector effects! not just 4-vectors) as function of rapidity, transverse momentum.

  ⇒ numerical assessment of Run II reach as function of integrated luminosity

had new results,
but they are
incorrect (picked up
wrong files)