Integrating JetViP in NLOLIB

An Update

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Reminder

… what it is all about …

- NLOLIB: Framework housing several NLO calculations for various processes.
  - Disent and Mepjet: jet production in ep.
  - Racoon: electroweak physics in e^+e^-.
  - Based on / using HzTool.
  - Authors: T. Hadig and K. Rabbertz

- JetViP: NLO jet production in ep/e^+e^- with direct and resolved contributions.
  - Author B. Pötter left physics.
  - Some known shortcomings for resolved terms at higher Q^2.

- Task: Integrate JetViP into NLOLIB
  - Common PDFs, couplings → facilitate easy comparison of different programs.

So far ...

… not as much as I would like ;-(…

- Concentrated on ep part of JetViP.
- Since we want to use PDF as provided by NLOLIB
  ➔ have to disentangle all JetViP terms which all assume sums of different flavours.

- Work always checked by comparing results from NLOLIB with those from original JetViP.
  ➔ also comparison with Disent would be nice; not really done so far. One problem here – see later.

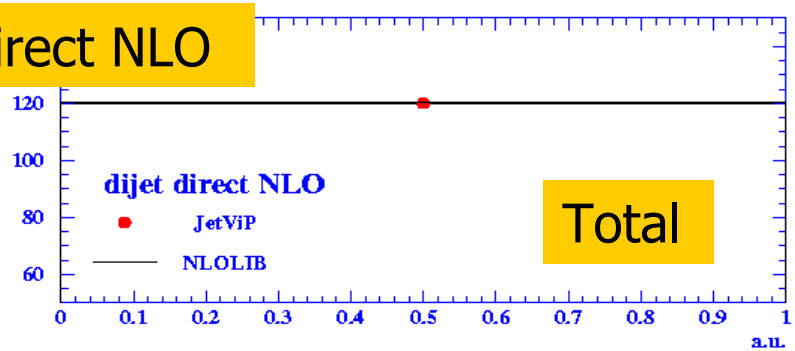
- Toy model: Some dijet cross-section at moderate Q^2:
  - $30 < Q^2 < 40$ GeV^2, $0.2 < y < 0.6$
  - Jets: $E_{T,Breit} > 5$ GeV, E_T-Sum > 8 GeV
  - Single tests of all contributions: direct, resolved, LO, NLO corrections, splitting terms.

- Using couplings from NLOLIB, but PDFs still from JetViP.
  - Also other small things remain to be done (NLOJET flag etc.)

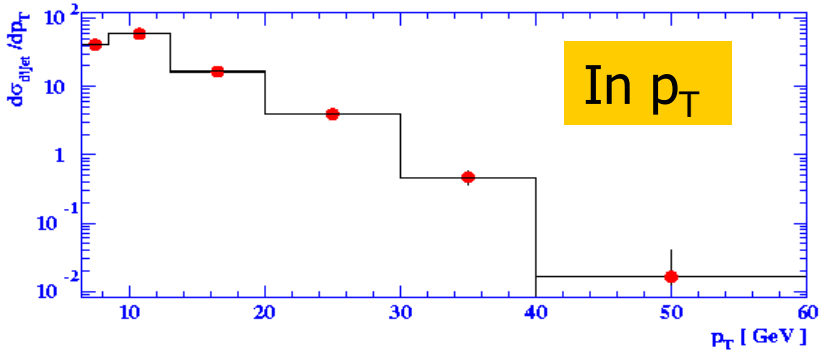
JetViP versus JetViP in NLOLIB

… and some problems

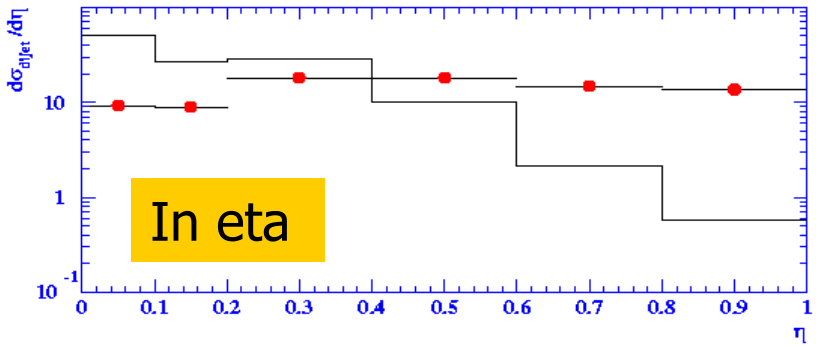
Direct NLO



Total

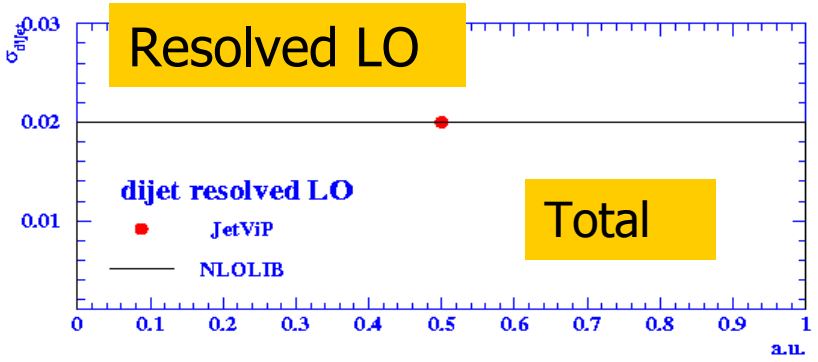


In p_T

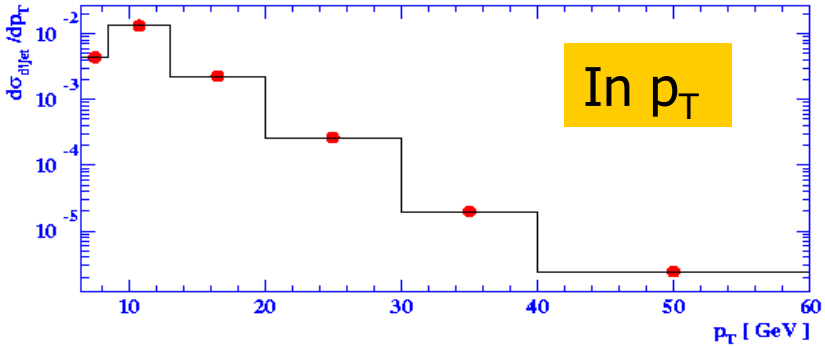


In eta

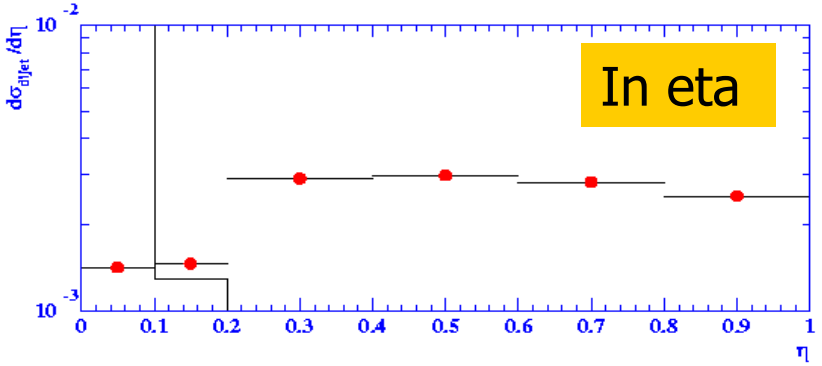
Resolved LO



Total



In p_T



In eta

Results

… and some problems

- Total cross-section: Very good agreement for all contributions (assuming sufficient statistics).
- Cross-section in p_T: Same as for total cross-section.
- Cross-section in eta: ????? Trivial bug?
- So far calculation in NLOLIB much slower than original JetViP:

  for cross-checks also standard JetViP result is generated in NLOLIB (however not usable in HzTool since all flavours convoluted).

ToDo

… too much!

- PDF from NLOLIB
- Repair eta distributions
- e^+e^- contributions.
- Small details (NLOJET flag etc.).
- Integration in progressing NLOLIB framework (my version is already quite out-dated, I guess).
- …

Summary

… what next ?

- Work off ToDo list
- Start thinking about pp program from Klasen
  - ➔ Structure similar to JetViP.
  - Tried to contact and get the program, but no answer so far.
- Any suggestions?