

Combining Double Parton Distributions and Parton Showers

Baptiste Cabouat
Supervisor: Prof. Michael Seymour

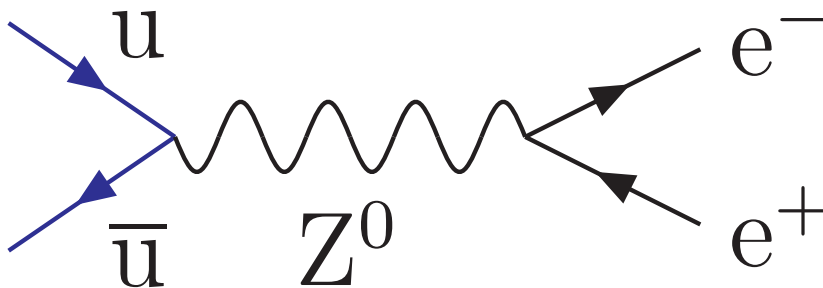
School of Physics and Astronomy, Schuster Building, University of Manchester
Manchester Christmas Meeting 2018

December 17th, 2018

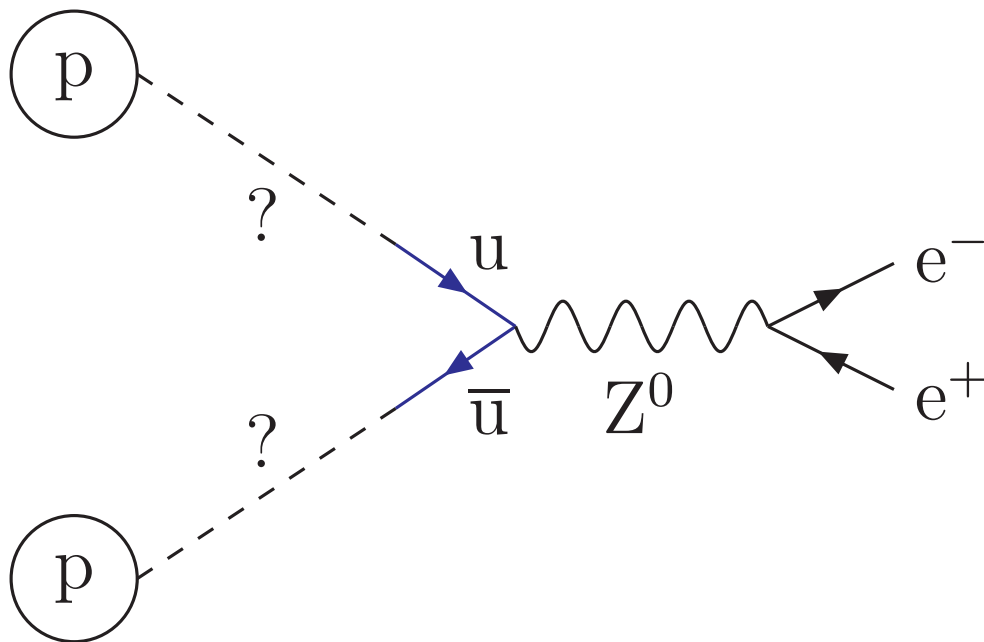


The University of Manchester

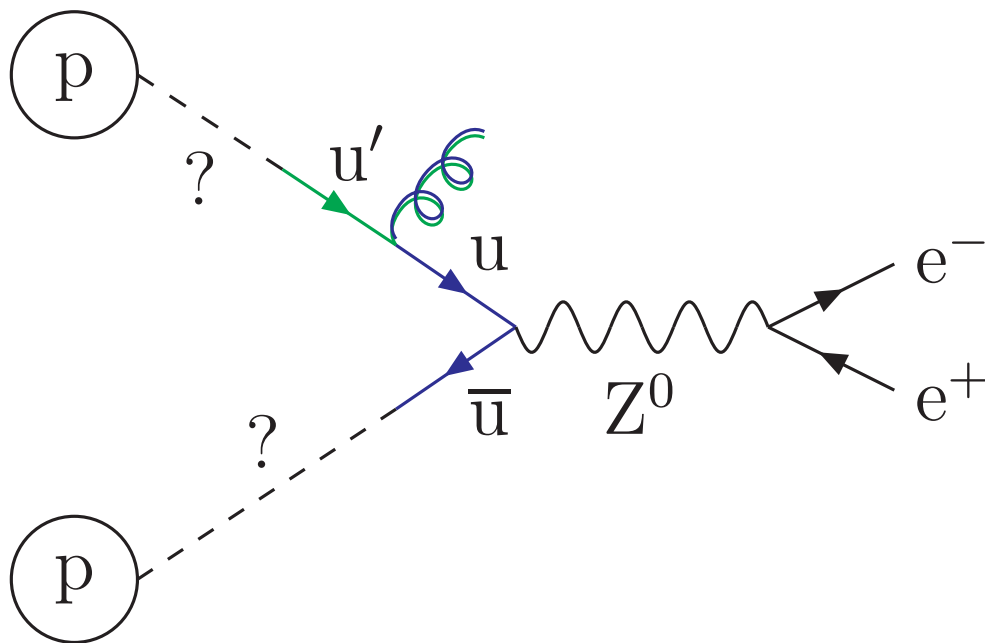
Simulating Z production at the LHC



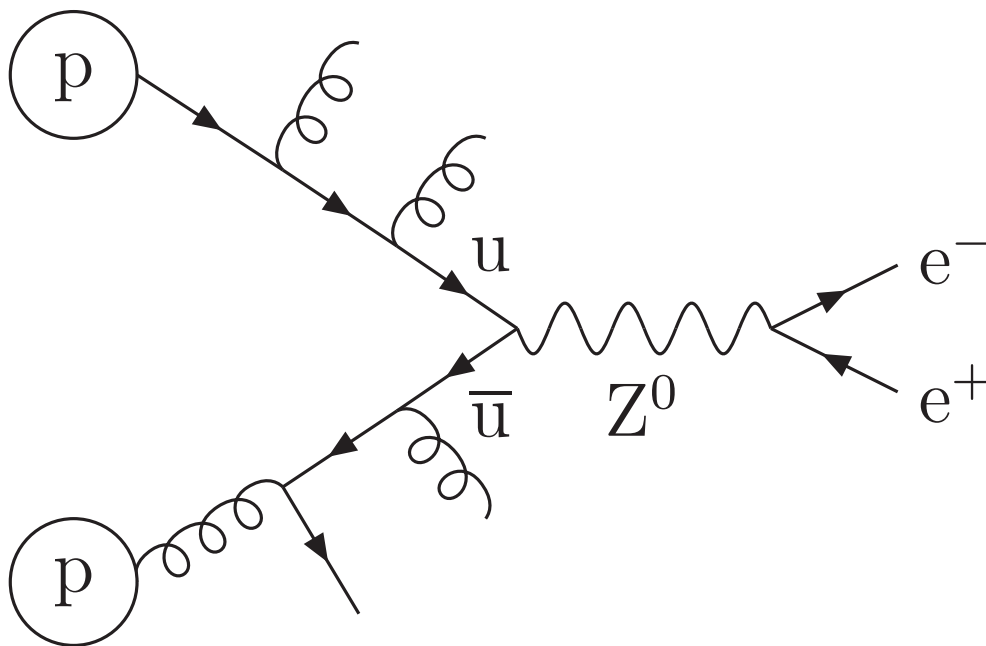
Simulating Z production at the LHC



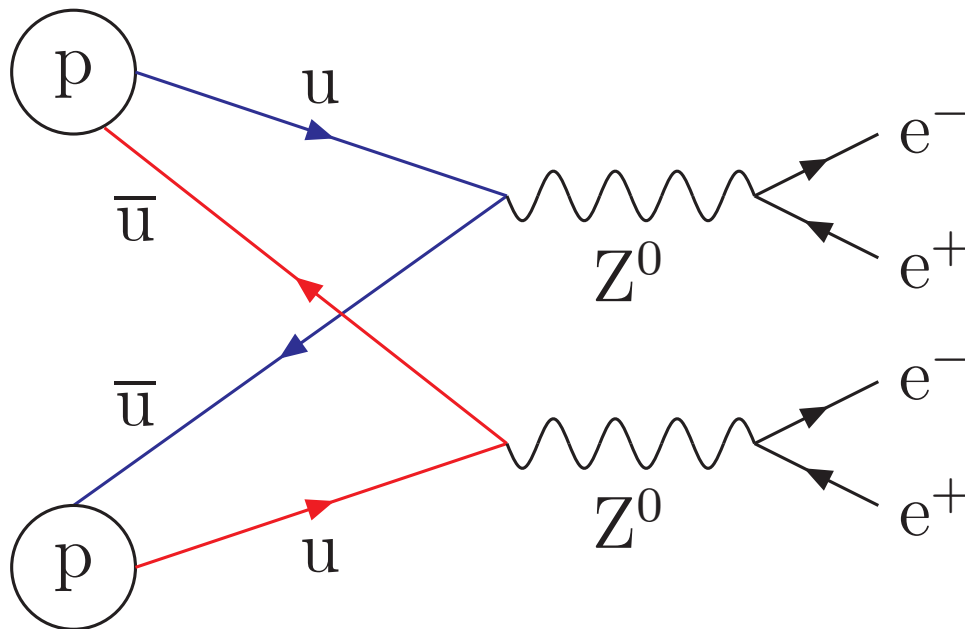
Going backwards in time



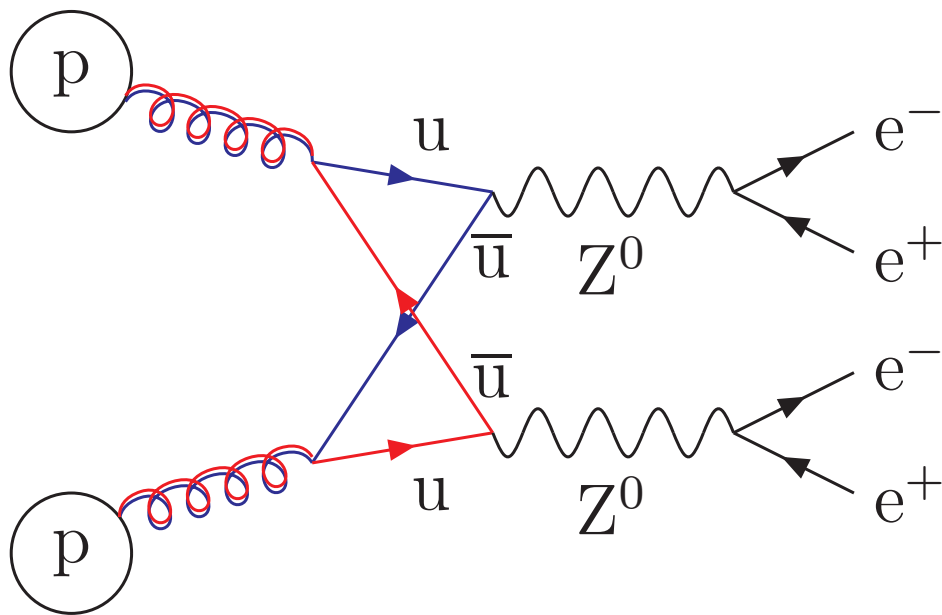
Parton showers



Double Z production



Double Z production with merging



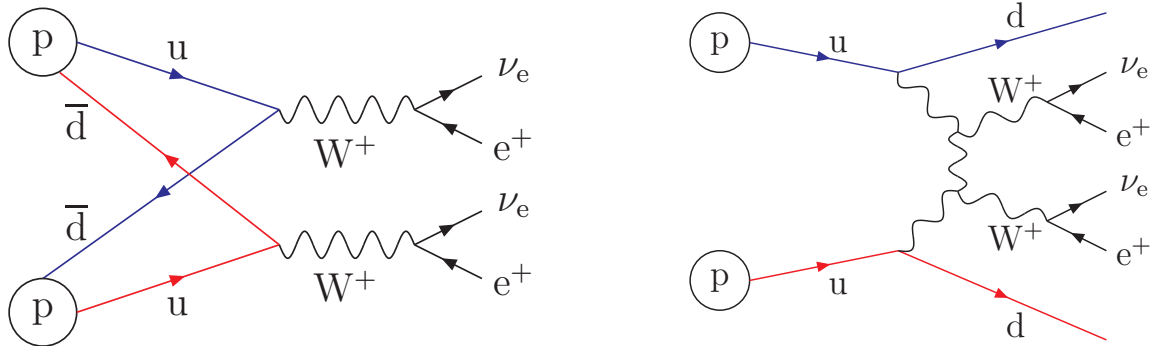
Why should we consider DPS?

$\sigma_{(A,B)}^{\text{DPS}} / \sigma_{A+B}^{\text{SPS}} \sim \Lambda^2 / Q^2$. But:

- In some very specific regions of phase-space [1111.0910]:

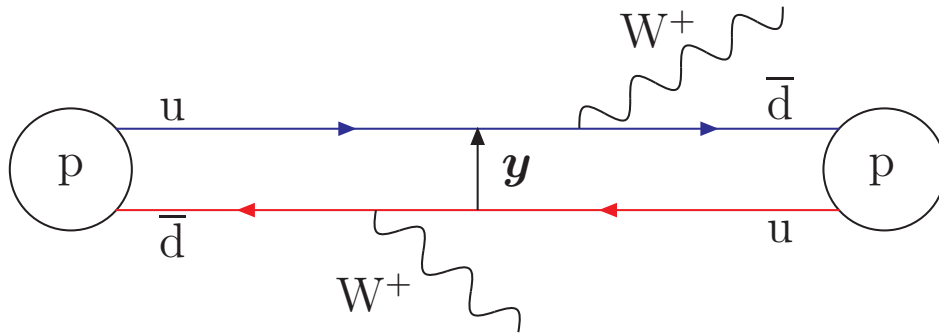
$$\frac{d\sigma_{(A,B)}^{\text{DPS}}}{d^2\mathbf{q}_A d^2\mathbf{q}_B} \sim \frac{d\sigma_{A+B}^{\text{SPS}}}{d^2\mathbf{q}_A d^2\mathbf{q}_B}$$

- SPS might be suppressed by a high multiplicity of couplings:



How do we do?

- In current event generators: single PDFs $f_i(x, Q^2)$ + DGLAP.
- Here, use the \mathbf{y} -dependent dPDFs $F_{ij}(x_1, x_2, \mathbf{y}, Q^2)$ developed by Gaunt, Diehl *et. al.* + dDGLAP [1702.06486].



Christmas wish list:

- Same-sign Ws: $2 \times u\bar{d} \rightarrow W^+ \rightarrow e^+\nu_e$
- QCD jets: $2 \times gg \rightarrow gg$.
- W + 2 jets: $u\bar{d} \rightarrow W^+ \rightarrow e^+\nu_e$ and $gg \rightarrow gg$.
- More experimental data for DPS.

Thanks for your attention and
Merry Christmas!