DPS Session: Theory Introduction

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Theory Developments

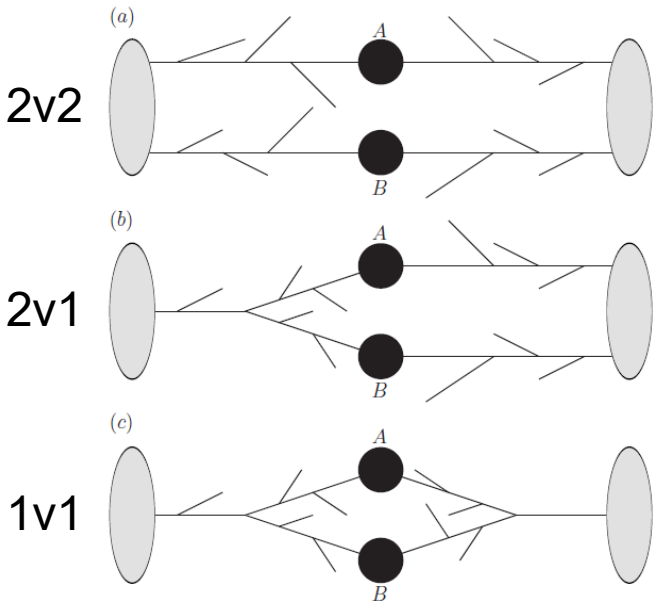
Factorisation issues: do soft gluon exchanges cause any problems with DPS factorisation?

Answer is no for so-called 'Glauber' soft modes ➡ J. Gaunt
Arrangement of 'central' soft modes into Wilson lines more complicated in DPS than SPS – remains to be worked out at all orders.

Issues related to perturbative splitting contributions to DPS, and double counting between SPS and DPS

A scheme to incorporate all three contributions and avoid double counting with SPS ➡ M. Diehl

Do the 2v1 contributions exist at all?
➡ D. Treleani



DPD modelling

Even with a factorisation formula + perturbative evolution equations, one still needs low scale input double parton distributions (DPDs) to make predictions. Not much information on this yet from experiments – many phenomenological studies use a product of single PDFs and some smooth transverse function.

$$D(x_1, x_2, \mathbf{y}) \rightarrow D(x_1) D(x_2) G(\mathbf{y})$$

Some efforts to go beyond this:

- Predictions of (valence quark) DPDs from a light front quark model
  ➡ M. Rinaldi
- Attempts to use sum rules to construct DPD inputs
  ➡ K. Golec-Biernat

Phenomenology

Various processes of interest to study DPS:

- Processes with heavy flavour (DPS and SPS total xsec comparable)
  - W/Z + heavy meson ➡ A. Snigirev ➡ V.Belyaev
  - $c\bar{c}c\bar{c}$ ➡ A. Szczurek
- W/Z + jets (clean process + process with large rate)
  ➡ B. Blok, R. Kumar
- Jets (much larger rate, DPS extraction tough)
  - 4 jet ➡ R. Maciula, M. Serino, B. Blok P. Gunnellini O. Gueta
  - Mueller-Navelet jets ➡ L. Szymanowski (small x session)
- Same sign WW (clean, rare) ➡ D. Ciangottini

For phenomenology, it is interesting to go beyond 'pocket formula' and try to estimate size of effects due to correlations (spin, colour, flavour, parton number, longitudinal & transverse momentum), phase space effects, and parton splitting effects – efforts ongoing, and some will be discussed here.