

# Seed questions

1. Can you explain why the mass of the  $W$  can't be directly measured by looking at the full leptonic final state in charge-current Drell-Yan?

- what are the observables typically used to measure the  $W$  mass?
- How are they related to the  $W$  mass?

2. Can you derive the following relation? (see slide 15 of my second lecture)

$$\frac{\sigma_{pd}}{\sigma_{pp}} \simeq 1 + \frac{\bar{d}(x)}{\bar{u}(x)}$$

3. Would you be able to sketch why, for large invariant masses, the  $\gamma\gamma$  contribution to the Drell-Yan cross section decreases more slowly with  $m_{\ell\ell}$  than that  $q\bar{q}$  one? Hint: try to derive an approximate solution to the DGLAP equation valid at large  $x$ ? (See also Ingo's lecture).

4. Can you explain what is actually meant with the notation  $N^l$ LL? To answer consider single-log resummation like the DGLAP evolution.

5. In the lecture we have seen how the *additive* matching between resummed and fixed-order calculations is implemented? Can you think of any other matching prescriptions? Hint: the additive matching can be schematically written as:  $\text{FO} + W - [W]_{\text{exp.}}$ . What does *multiplicative* matching suggest you?