

PDF Reweighting

ANNETTE

Parton Distribution Functions



The probability that a specific parton will have a certain momentum fraction of the proton's total momentum.

Weighting



Weighting is taking a baseline PDF, a reference point, and comparing other PDF distributions to it. We do this so that each PDF may carry its own weight. This weight structures the PDF histogram to make less biased events carry more weight compared to more biased events. This bias may result from lots of things, one of which is detector inefficiencies.

Reweighting

A



B

Reweighting is converting from one PDF to another PDF. You run events to generate PDF set A, then apply a reweighting algorithm to see what it would have looked like had you run events to generate PDF set B, however you never actually run events to generate PDF set B.

Why?

- So we can calculate PDF uncertainties.
- We want to combine PDF uncertainties with scale uncertainties to calculate the cross-sectional uncertainties.
- Cross-sectional uncertainties are the probability that one parton will interact with another parton upon the collision of two protons.
- We want this cross-sectional uncertainty because when we generate signal events for the dark matter candidate Z' using Monte Carlo simulation, we need to be able to say how much we believe these events will happen in actuality, when we collect data.