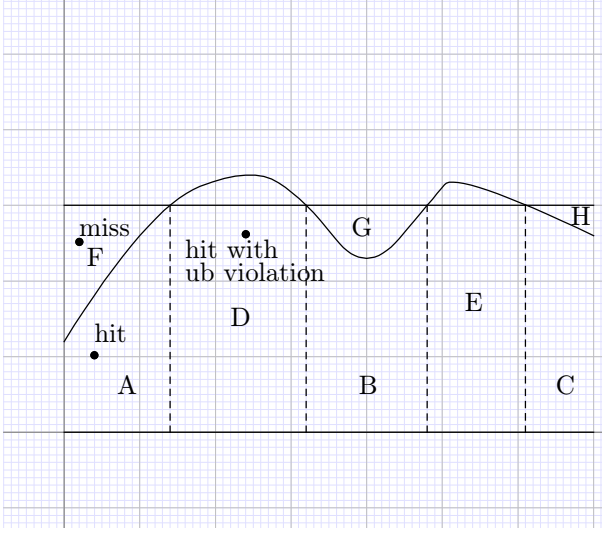


# 1 Corrections for upper bound violations

In a hit-and-miss generator, suppose that the upper bound is not working. The usual hit-and-miss procedure will then generate some events above the bound. These events will be generated as if the real distribution was truncated at the height of the upper bound. In order to remedy to this, the weight of ub violating event could be increased by a factor equal to the value of the function at that point divided by the upper bound. The algorithm becomes:

- Generate a random phase space point. If the value of the function is below the upper bound, accept/reject.
- If it is in a point where the bound is violated, accept the event but increase its weight by a factor equal to the ratio of the value of the function over the upper bound  $f/u$ .



This way , if  $N$  events are generate with a cross section  $W$ , histogramming all events will lead to a cross section

$$\frac{(N - N_{>})W + \sum_{N_{>}} W \frac{f_i}{u}}{N}.$$

This factor is reported in the counter file as 'Weight increment factor due to corrections for upper bound violation'.

In order to correct for this problem, one should divide the cross section by that factor.

## 2 Corrections for wrong estimate of the cross section.

If the estimate of the accumulated cross section (in absolute value!) is off, we get an error that will not be eliminated no matter how many events one generates. POWHEG provides an independent calculation of the absolute value of the cross section during event generation. This feature is independent upon the ubexcess\_correct one.

The python script FindReweightFromCounters.py gets these results out of the counters.

We have two possible corrections: we may correct for the UB violations, in which case we divide by the 'Weight increment ...' number given by the script; and we may correct for the ratio of the cross section computed on the fly over the stage 4 cross section, if the first one is more accurate.

The script also spits out a total correction factor. In reality, while there is no reason to apply the UB correction, it makes sense to also correct for the total cross section only if the error of the stage 4 cross section estimate is smaller than the cross section used for generation.