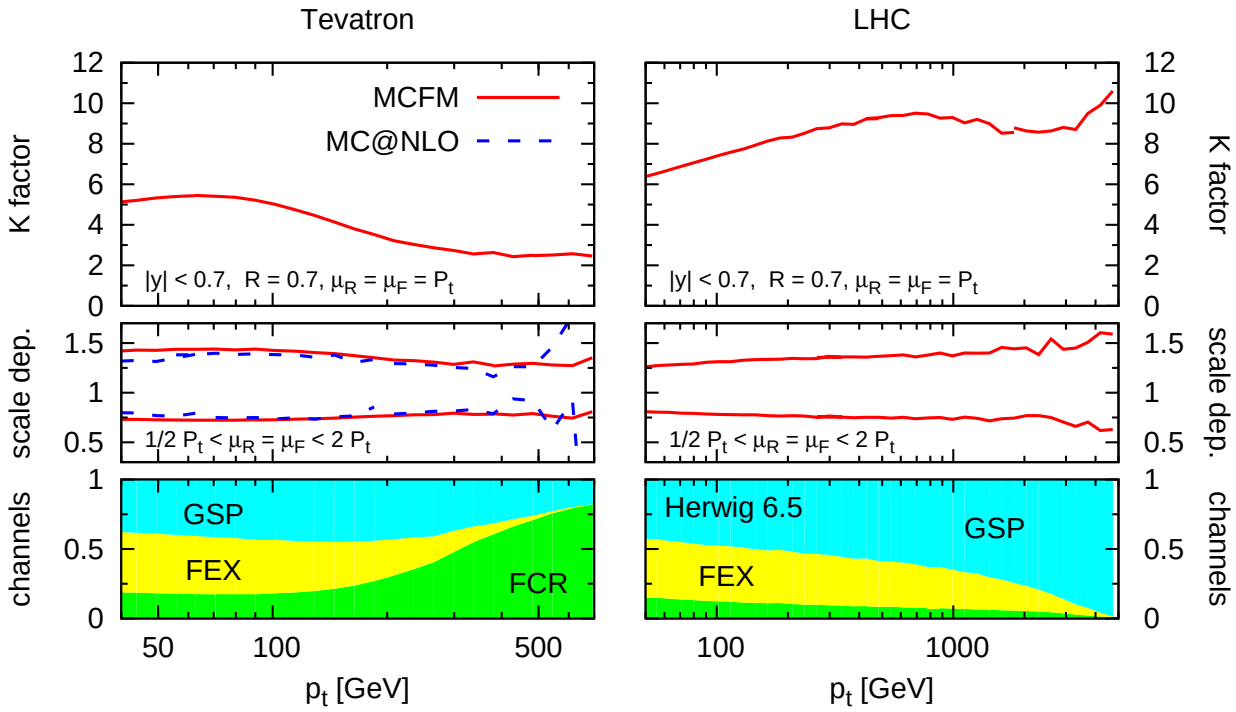

Figure 2: Top: K-factor for inclusive b-jet spectrum as computed with MCFM [10], clustering particles into jets using the k_t jet-algorithm [9] with R=0.7, and selecting jets in the central rapidity region ($|y| < 0.7$). Middle: scale dependence obtained by simultaneously varying the renormalisation and factorisation scales by a factor two around p_t, the transverse momentum of the hardest jet in the event. Bottom: breakdown of the Herwig [11] inclusive b-jet spectrum into the three major hard underlying channels cross sections (for simplicity the small $bb \to bb$ is not shown).

Tevatron Run II ($p\bar{p}$, $\sqrt{s} = 1.96$ TeV, left) and for the LHC (pp, $\sqrt{s} = 14$ TeV, right).[1] The fact that the K-factor is considerably larger than one indicates that the perturbative series is very poorly convergent, and implies that the NLO result cannot be an accurate approximation to the full result. It is for this reason that the scale dependence (middle panels) is large. One might think that a calculation with MC@NLO [12] should do better, since it includes both NLO and all-order resummed logarithmically enhanced terms. This turns out not to be the case, as can be seen from its persistently large scale dependence.[2] Essentially, while MC@NLO contains a good matching between the NLO b-production calculation and the b-quark fragmentation logarithms in Herwig, it does not match with

[1]Fig. 1 has been obtained using a midpoint type [6] cone algorithm, however given the recent discoveries [7, 8] of infrared safety issues in midpoint cone algorithms, we prefer to illustrate our arguments with an inclusive k_t-algorithm [9]. In practice, we expect most features of the figure to be insensitive to the choice of algorithm, for example also with an infrared safe cone-type algorithm such as SISCone [8].

[2]Poor numerical convergence prevented us from presenting the scale dependence for MC@NLO at the LHC. Note also that no K-factor has been shown for MC@NLO because the LO result is not unambiguously defined.