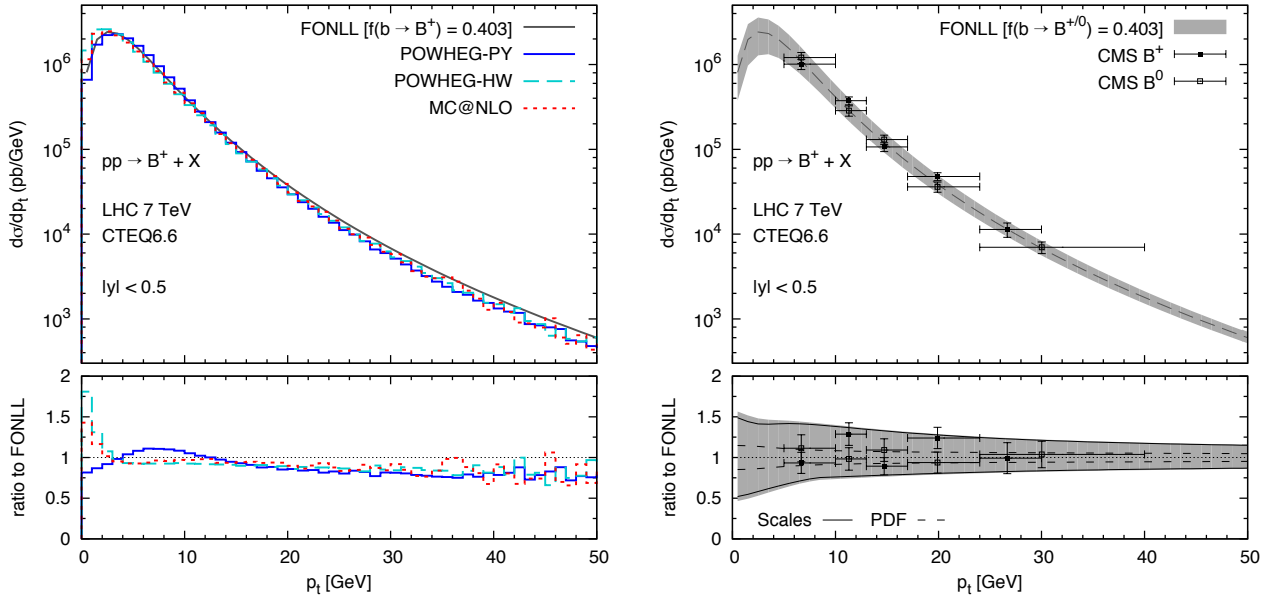

Figure 4: Transverse momentum distribution of B^+ mesons at central rapidity, $|y| < 0.5$. Left plot: comparison among the central predictions of our four benchmark calculations, FONLL, MC@NLO, and POWHEG with PYTHIA or HERWIG showers. Right plot: theoretical systematics for the FONLL calculation, and the comparison with data from CMS [54,55], rescaled to the $|y^B| < 0.5$ region. For the systematics we show the individual scale and PDF components, as well as the combined total.

to be compared with the FONLL predictions

$$\sigma^{\rm FONLL}(pp \to B^0,\ p_T^B > 5\ {\rm GeV},\ |y^B| < 2.2) = 25.5\ ^{+10.5}_{-7.1}\ \mu b \tag{17}$$

$$\sigma^{\rm FONLL}(pp \to B^+,\ p_T^B > 5\ {\rm GeV},\ |y^B| < 2.4) = 27.2\ ^{+11.2}_{-7.5}\ \mu b \tag{18}$$

$$\sigma^{\rm FONLL}(pp \to B_s^0,\ 8 < p_T^B < 50\ {\rm GeV},\ |y^B| < 2.4) \times {\rm BR}(B_s^0 \to J/\psi\,\phi) = 4.5\ ^{+1.7}_{-1.1} \pm 1.6\ nb\,. \tag{19}$$

The FONLL uncertainties in eqs. (17)–(19) are due to renormalisation and factorisation scales, heavy quark masses and PDF, as detailed in section 2.1.2. Of these three sources, the first is largely dominant. In the FONLL predictions the fragmentation fractions $f(b \to B^0) = f(b \to B^-) = 0.403$ and $f(b \to B_s^0) = 0.11$ [59] have been included. These values, leading to a ratio $f_s/f_d = 0.273$, are consistent with the recent direct measurement of this ratio by LHCb [60]: $f_s/f_d = 0.267^{+0.021}_{-0.020}$. Additionally, ${\rm BR}(B_s^0 \to J/\psi\,\phi) = (1.4 \pm 0.5) \times 10^{-3}$ [59] has been used, and the second uncertainty in the FONLL prediction of eq. (19) for B_s^0 production reflects the large uncertainty of this measured branching ratio.

A good agreement with the experimental measurements within the respective uncertainties can be observed, confirming the latest comparisons between theory and Tevatron data which showed no significant excess in bottom hadroproduction compared to theoretical predictions. The p_T spectra measured by CMS are compared to various predictions in Fig. 2 of ref. [55] and Fig. 2 of ref. [54]. The comparison of these data, rescaled to the rapidity region $|y| < 0.5$, with the FONLL predictions is shown in the right panel of Fig. 4.