

Update from Powheg-ew

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with M. Chiesa and C.L. Del Pio (Pavia Univ.)

Treatment of unstable particles in Powheg_ew

- present svn version contains two schemes for all input parameter schemes:
 - ▶ default, with self-energies and vertices multiplied by the Z -propagator with

$$\sim \frac{1}{s - M_Z^2 + i\Gamma_Z M_Z}$$

- ★ formally it violates gauge invariance
- Complex Mass Scheme (CMS) `complexmasses 1`

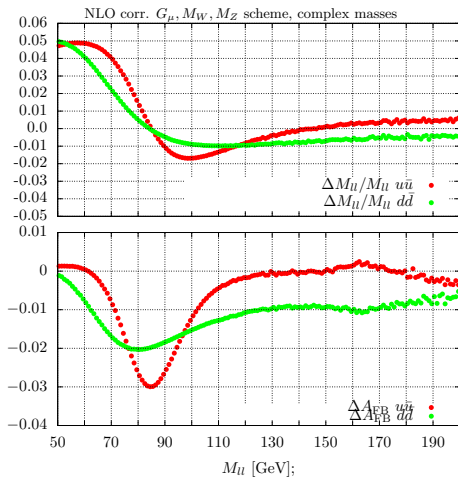
- Recent implementation of Pole and Factorization schemes

S. Dittmaier and M. Huber, arXiv:0911.2329

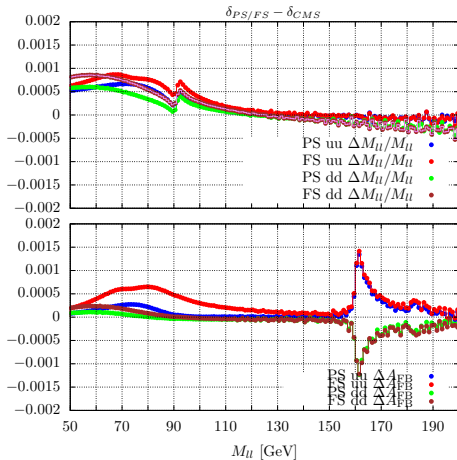
- ▶ `PS_scheme 1`
- ▶ `FS_scheme 1`

single $q\bar{q}$ flavour contributions

- NLO corrections, G_μ, M_W, M_Z scheme, complex mass scheme (CMS)



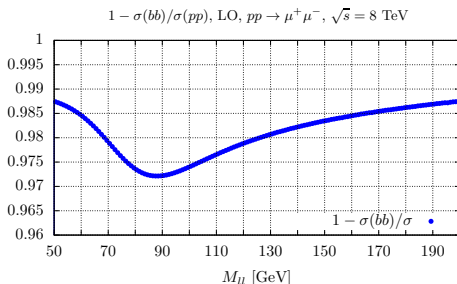
NLO corrections in PS/FS vs CMS schemes



→ fig. 6 of S. Dittmaier and M. Huber, arXiv:0911.2329

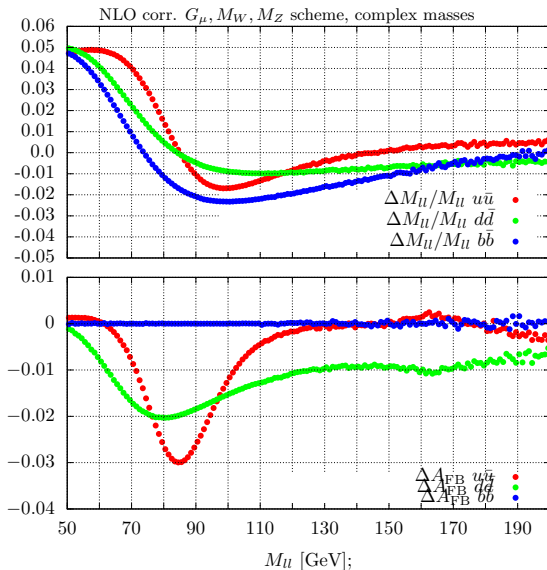
$b\bar{b}$ in initial state (5F scheme)

- weak corrections sensitive to finite top-quark mss effects (vertex and box diagrams)
- original version of Powheg_ew: $m_t = 0$ approximation $b\bar{b}$ channel matrix element as $d\bar{d}$

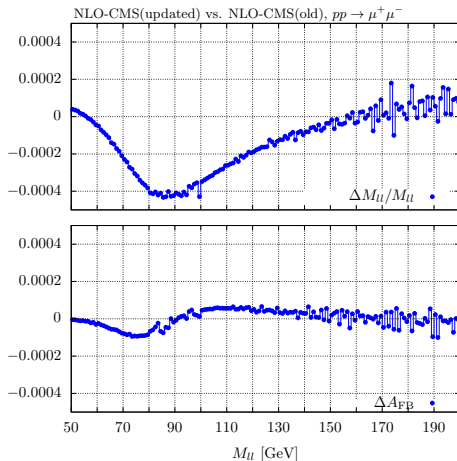


- updated matrix element to account for finite m_t corrections specific of $b\bar{b} \rightarrow \mu^+\mu^-$
- removed spurious finite light quark mass effects in two-point functions (except for $\Delta\alpha$) (negligible for cross sections)

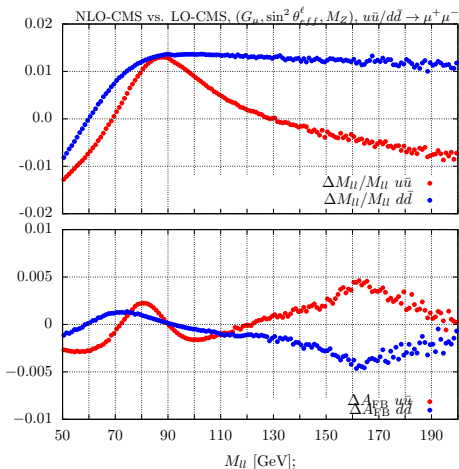
single $q\bar{q}$ flavour contributions (G_μ, M_W, M_Z , CMS)



Changes between updated and “old” version (with CMS)



single $q\bar{q}$ flavour contributions ($G_\mu, \sin^2 \theta_{eff}^\ell, M_Z, \text{CMS}$)



$p\bar{p} \rightarrow \mu^+\mu^-$ ($G_\mu, \sin^2 \theta_{eff}^\ell, M_Z$, CMS)

- $m_{\mu\mu} > 50$ GeV
- $m_{\mu\mu} > 50$ GeV, $p_\perp > 25$ GeV, $|\eta_\mu| < 2.5$

