

W,Z TH group: additional requests

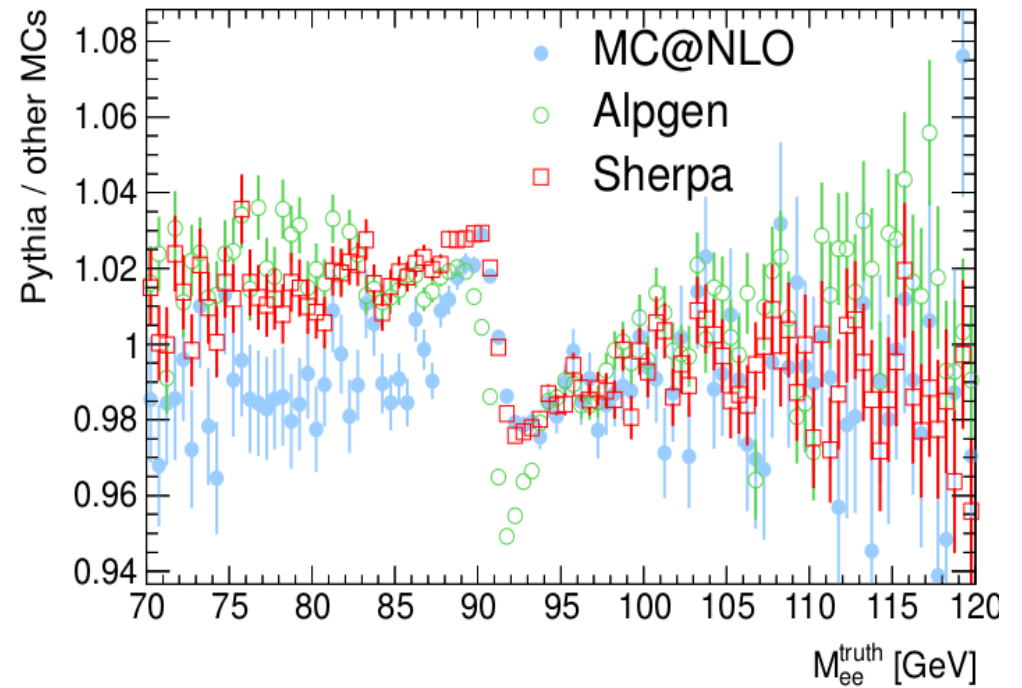
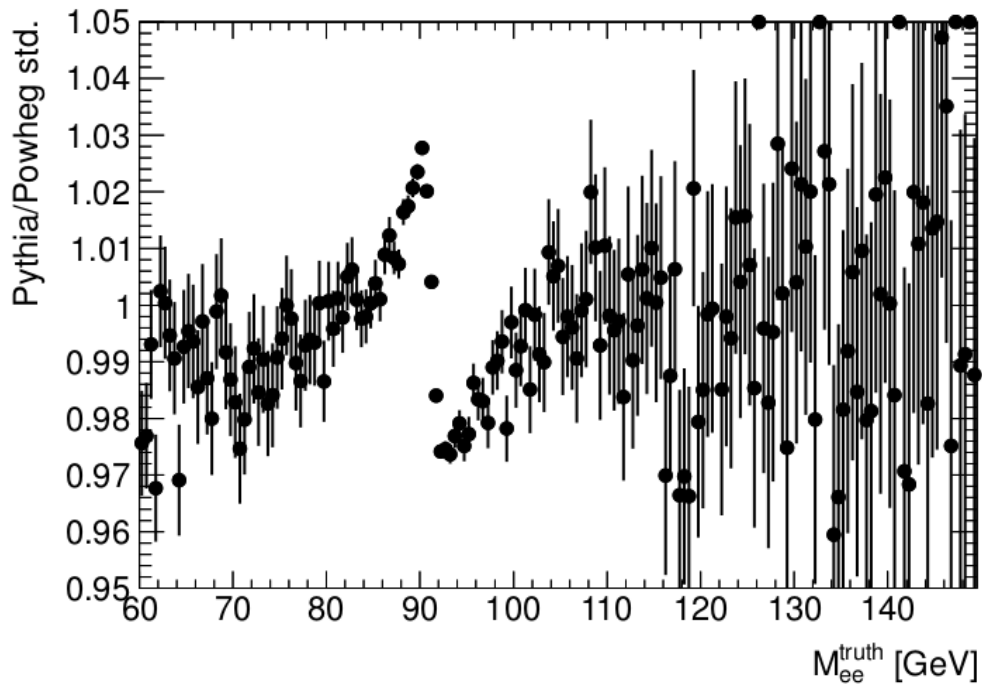
- **“IBA” for LO codes**

- ➔ Define an Improved Born Approximation to the full NLO result, for W and Z production : define masses, widths, (running) couplings appearing in LO expressions such as to approximate the full $O(\alpha)$ result as closely as possible
 - on the W,Z peaks, such expressions can be precise to $\sim 0.2\%$
- ➔ Qualify the approximation in various cases (low-mass, peak, high-mass, A_{FB} , ...)
- ➔ Why this is useful:
 - Provide recommendation to the MC authors to standardize the cross section expressions in LO generators (see next slide)
 - Extends the validity of our mainstream generators (Pythia, Powheg, Alpgen, Sherpa will be with us for several more years), including EW corrections to good approximation and providing an estimate of the remaining uncertainty

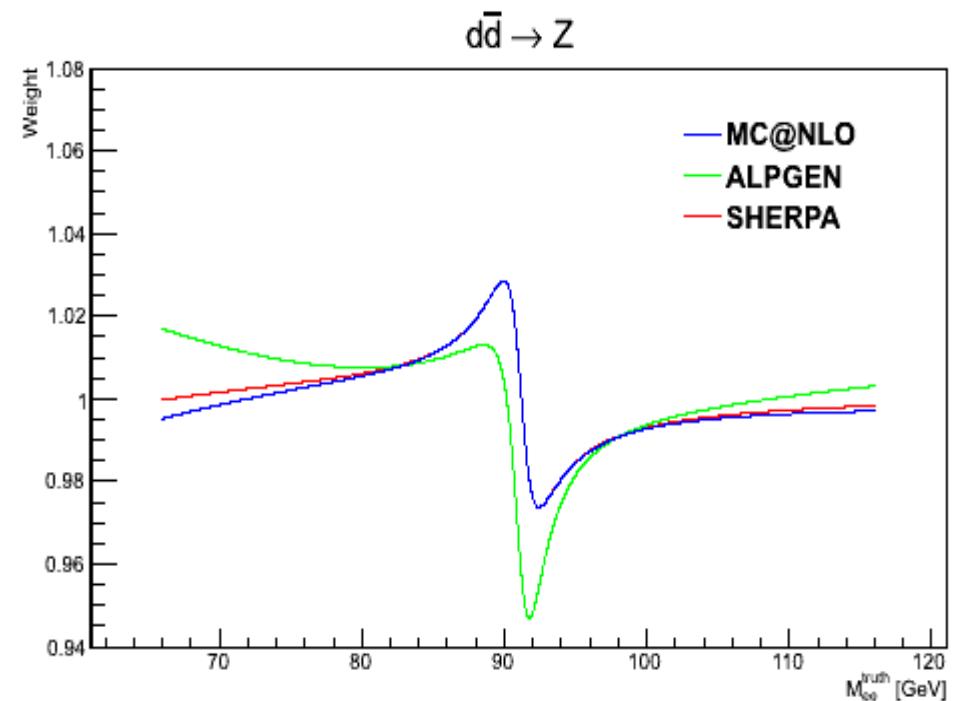
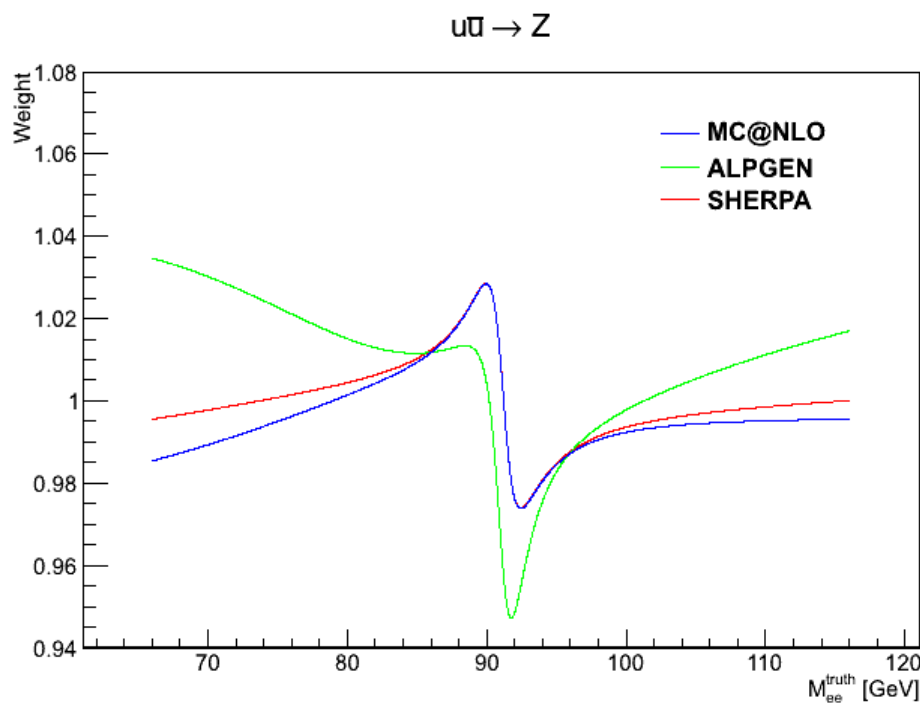
- Why a common IBA is important : comparison of EW settings in generators
- Colours assigned assuming we want to align cross sections & distributions to PDG/LEP1:

	alphaEM	Gmu	Mz	Γ_z	Mw	Γ_w	BW form
Pythia	Running	Running	91.1876	2.4812	80.399	2.072	Running-width
Powheg	1/127.9	1.166 10^{-5}	91.1876	2.4952	80.399	2.085	Fixed-width
Alpgen	1/132.3	1.166 10^{-5}	91.1880	2.4409	80.419	2.047	Fixed-width
Sherpa	1/128.8	1.166 10^{-5}	91.1876	2.4952	80.399	2.085	Fixed-width
MC@NL O	1/137.0	1.166 10^{-5}	91.1876	2.4952	80.399	2.085	Fixed-width

- Comparing lineshapes in our different samples (from Jan)



- Code reweighting the various predictions to a common “IBA”, defined for the moment like this (simplistic, to be improved following your recommendations):
 - ➔ PDG values for masses and widths, running width propagator for consistency
 - ➔ Gmu for W, Z couplings; Running alpha(QED) for photon
- Plots below : ratios are Generator / IBA (following previous slide quite closely)



- Technical checks of the calculation, reweighting Powheg to Pythia, or each of them to “IBA” : see slides by Jan Kretzschmar, attached to the email
- Summary
 - ➔ Produced reweighting code with two objectives
 - getting the QCD generators in agreement
 - Possibly reweight them to an IBA, approximating EW corrections reasonably this was simpler than looking into Pythia etc directly.
 - ➔ Does not include $\Delta\rho$ correction, also not running of $\sin^2\theta$