Residual uncertainties of the inclusive ggf XSection

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N3LO XS in EFT

- Fixed order scale uncertainty has gone down from ~7% to ~ 2-3%

- This is NOT the only source of theory uncertainty!

- All residual uncertainties need to be revisited (~1% effects are not negligible any more)

Beyond N3LO

- Resummation contributions beyond N3LO are expected to be negligible, given the convergence of the fixed order perturbative series...

- But we need to check!

Quark mass effects

- t-b (or t-c) known exactly to NLO

- top mass effects known to NNLO as a $n_h/2m_t$ expansion: effect is small (<1%) with an uncertainty of the same size. Worth considering?

Quark mass effects: scheme dependence

- But at which scheme? On-shell vs MSbar?

- the (rescaled) EFT changes by ~0.8%

- the exact NLO contributions have a stronger scheme dependence

Quark mass effects: parametric uncertainties

- precisely which quark masses to use? Do quark mass uncertainties affect significantly the cross section?

- m_b variation : 0.01% (completely negligible)

- m_t variation: 0.7% (not completely negligible)

} MSbar

EW effects

- Known exactly at $O(a_s^2 \, a_{ew})$: ~1.5% (on total)

- parametric uncertainties on that probably negligible

- The $O(a_s^3 \, a_{ew})$ for light quarks (~80%) known as an expansion in m_h/m_v (i.e. below threshold)

- Complete factorization or modified wilson coefficient ~1.5%-> ~4.7-5% (on total)

- EW corrections to h+j also known (but <1% with a rather negligible uncertainty)

➡ See Sandro's talk for more details

PDF+a_s

- The largest uncertainty source by far

- Which PDFs should be used to estimate it?

- What value of a_s (and with which a_s uncertainty)?

ihixs

- We are making an exhaustive study of all known contributions, on top of N3LO.

- Aim to release the next version (including N3LO) by the end of summer.