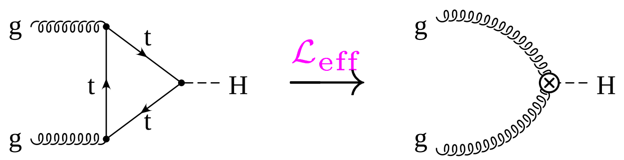
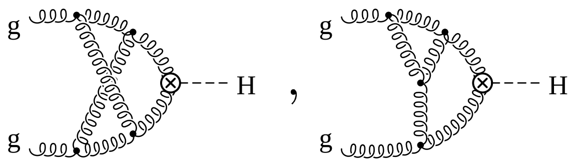
Robert Harlander (BNL):
Higgs production at the LHC to $\mathcal{O}(\alpha_s^4)$

hep-ph/0007289

- gluon-gluon fusion dominant
- $m_t \to \infty$ justified: use $\mathcal{L}_\text{eff}$



- $\mathcal{O}(\alpha_s^4)$ (virtual) $\Leftrightarrow$ two-loop:
  $p_1^2 = p_2^2 = 0, \; (p_1 + p_2)^2 = M_H^2$



- applying new algorithm for integration-by-parts identities, implemented in `MINCER`-like program using `FORM`

- run-time: few minutes

- Motivation
  - $gg \to H$ dominant for Higgs production at the LHC
  - theoretical uncertainty at NLO: $> 50\%$
- result for time-like/space-like form factor:

$$\left|\frac{\Gamma(M_H^2)}{\Gamma(-M_H^2)}\right|^2 = 1 + \underbrace{0.528}_{\text{NLO}} + \underbrace{0.172}_{\text{NNLO}}$$

- large corrections, but good convergency
- method and program extendible by using expansions
- next: real radiation of gluons (with W. Kilgore)
- see: hep-ph/0007289 (Phys. Lett. **B**, in print)