

Franz Herzog

Research Activities & Interests:

- Higher Order perturbative methods for QCD
- Higgs Phenomenology

Les Houches CERN Retreat 2013

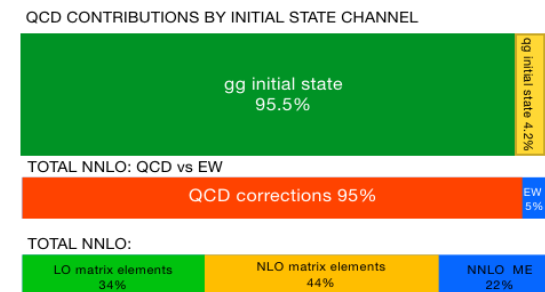
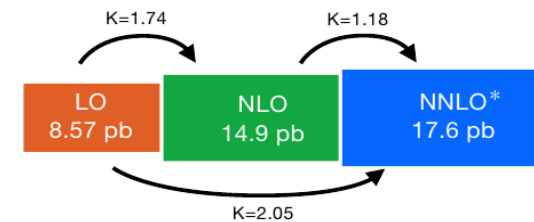
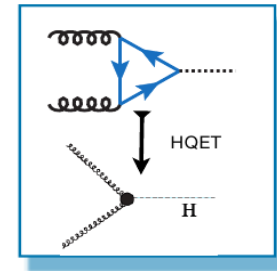
Public tools for precise predictions for Higgs boson production:

IHiXS (total rates)

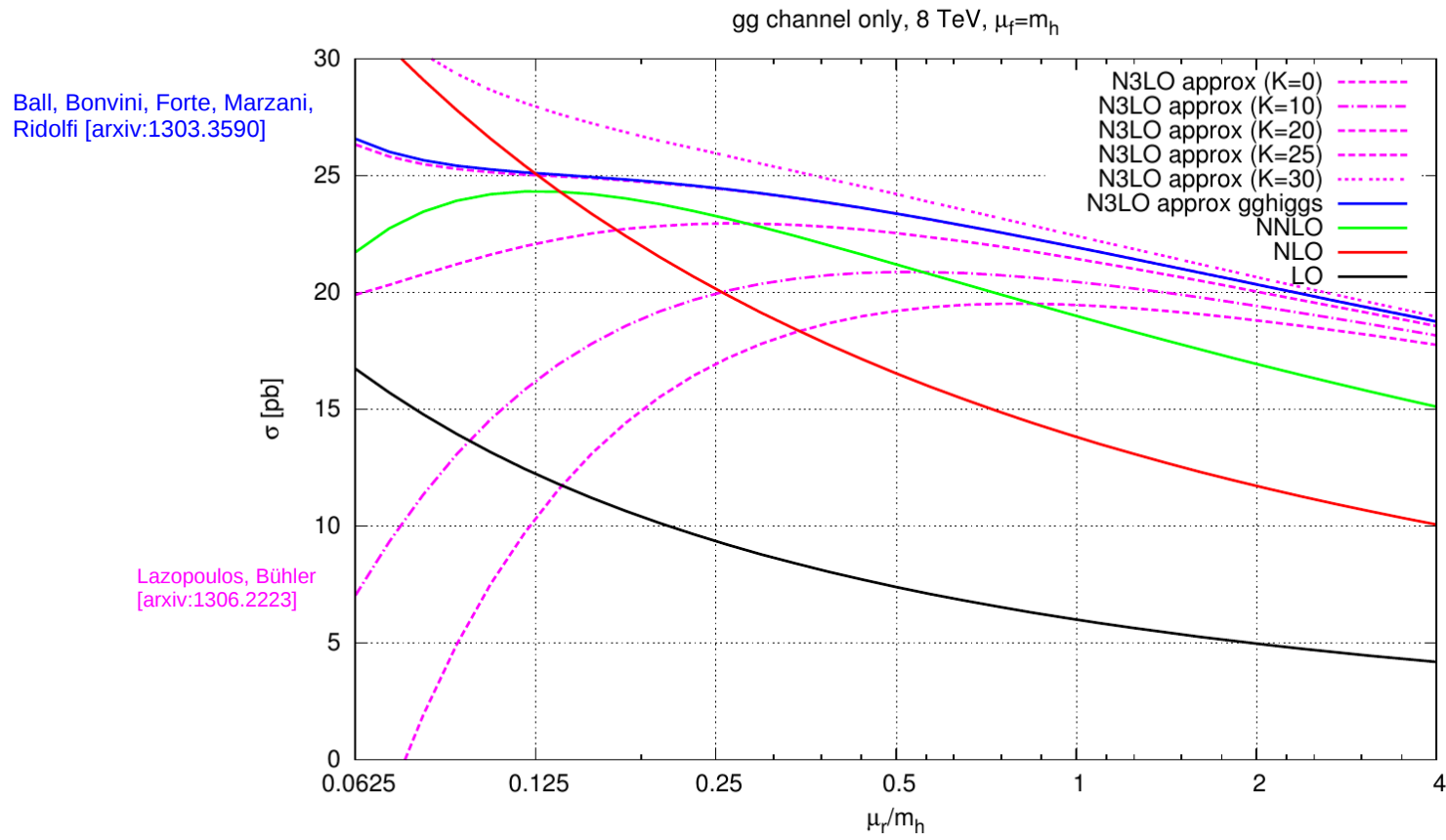
- All known fixed order corrections
- Anomalous standard model couplings
- Arbitrary Wilson Coefficients

EHiXS (FAST differential rates, soon)

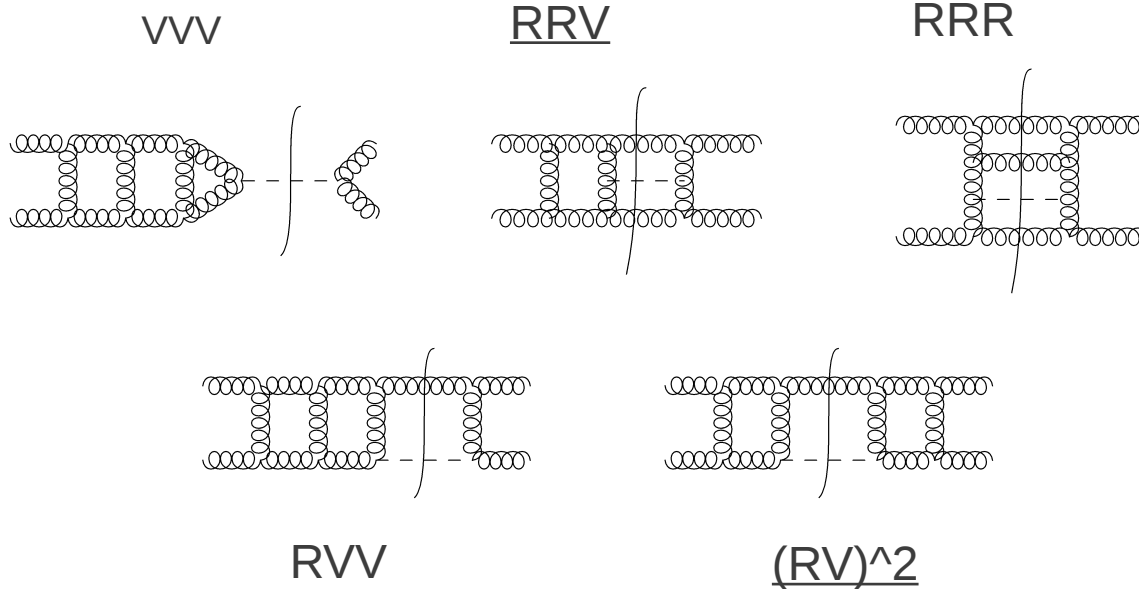
- EhiXS is interfaced with all leptonic and photonic decays (also $H \rightarrow Z$ photon)
- Also include $bb \rightarrow H$ channel



How big are the perturbative uncertainties in Higgs production?



N³LO Corrections to Higgs production



VVV:

Known [Baikov, Chetyrkin, Smirnov, Smirnov, Steinhauser; Gehrmann, Glover, Huber, Izkizlerli, Studerus]

RVV: in progress

2-loop amplitude known up to $O(\epsilon)$ [...]

Further singularities in phase space integral

$(RV)^2$:

Will be published this week!

RRV: in progress

Not even 1-loop known to all orders in ϵ

RRR:

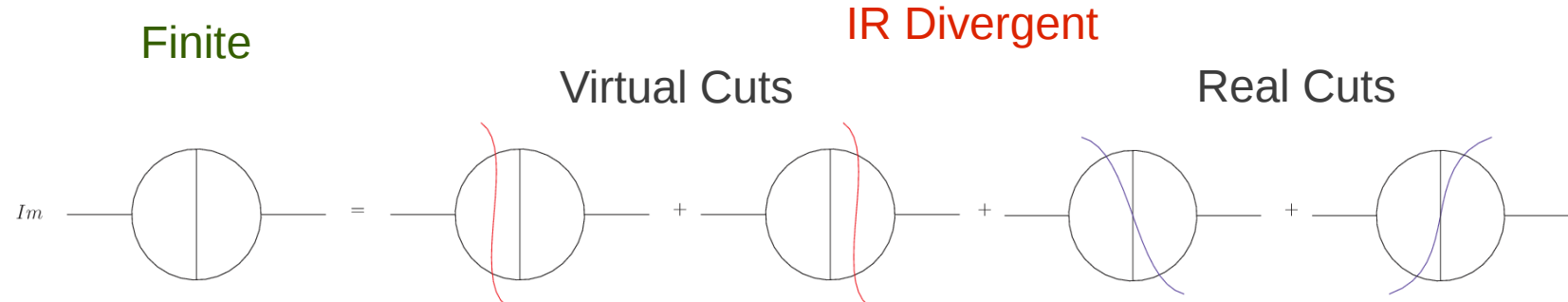
Now know first two terms in soft expansion [Anastasiou, Duhr, Dulat, Mistlberger]

Collinear/UV counterterms:

known [Pak, Rogal, Steinhauser; Anastasiou, Buehler, Duhr, FH; Höschele, Hoff, Pak, Steinhauser, Ueda; Buehler, Lazopoulos]

In Collaboration with C. Anastasiou, F. Dulat, C. Duhr & B. Mistlberger

Canceling infra-red divergences via Unitarity



We have found a mechanism to make this cancellation explicit, but retaining the full dependence on the measurement function.

Some “Recent” Papers

- *“Real-Virtual contributions to the inclusive Higgs cross-section at N³LO”* Charalampos Anastasiou, Falko Dulat, Bernhard Mistlberger (Zurich, ETH), Claude Duhr (ETH, Zurich), Franz Herzog (CERN) Nov 2013. (this week)
- *“NNLO phase space master integrals for two-to-one inclusive cross sections in dimensional regularization”* Charalampos Anastasiou, Stephan Buehler (Zurich, ETH), Claude Duhr (ETH, Zurich), Franz Herzog (Zurich, ETH). Aug 2012.
- *“The fully differential hadronic production of a Higgs boson via bottom quark fusion at NNLO”* Stephan Bühler, Franz Herzog, Achilleas Lazopoulos, Romain Müller (Zurich, ETH). Apr 2012.
- *“The fully differential decay rate of a Higgs boson to bottom-quarks at NNLO in QCD”* Charalampos Anastasiou, Franz Herzog, Achilleas Lazopoulos (Zurich, ETH). Oct 2011.
- *“Total cross-section for Higgs boson hadroproduction with anomalous Standard Model interactions”* Charalampos Anastasiou, Stephan Buehler, Franz Herzog, Achilleas Lazopoulos (Zurich, ETH). Jul 2011
- *“On the factorization of overlapping singularities at NNLO”* Charalampos Anastasiou, Franz Herzog, Achilleas Lazopoulos (Zurich, ETH) Nov 2010