

# Precision SM Shapes

Assessing the state of the art for Z & h spectra at hadron colliders

Gieseke, Melnikov, Mrenna, Nadolsky, Skands, more?

- NNLO fully diff results available for Z, h. NN(N?)LL also available.
- But tools are either:
  - LO + (real) NLO + parton showers ([Herwig](#), [Pythia](#))
  - NLO + parton showers ([MC@NLO](#))
  - LO + (real) NNN...LO + parton showers ([Sherpa](#), [Patriot](#), [Ariadne](#))
- Need to assess tools: what to use where, how good are they?
- Shapes & K-factors

Will Study Z & h + jets production, producing comprehensive comparisons

# Sudakov Uncertainties

Gieseke, Huston, Mrenna, Sjöstrand, Skands

- Continuation of study by Gieseke (there, PDF uncertainties)
- Large phase space for radiation at LHC -> Want to understand uncertainties & differences between parton showers (new+old) -> **realm of applicability**:
  - **General Studies**: Herwig(++), Pythia 6.2/6.3, comparing to Fixed Order & Resummation calculations. Understanding “**power showers**” and “**wimpy showers**”.
  - **Black Sudakovs**. Finite  $k_T$  restriction in MC evolution -> mismatch with (longitudinal) PDF evolution. Different for each shower. **How important?**