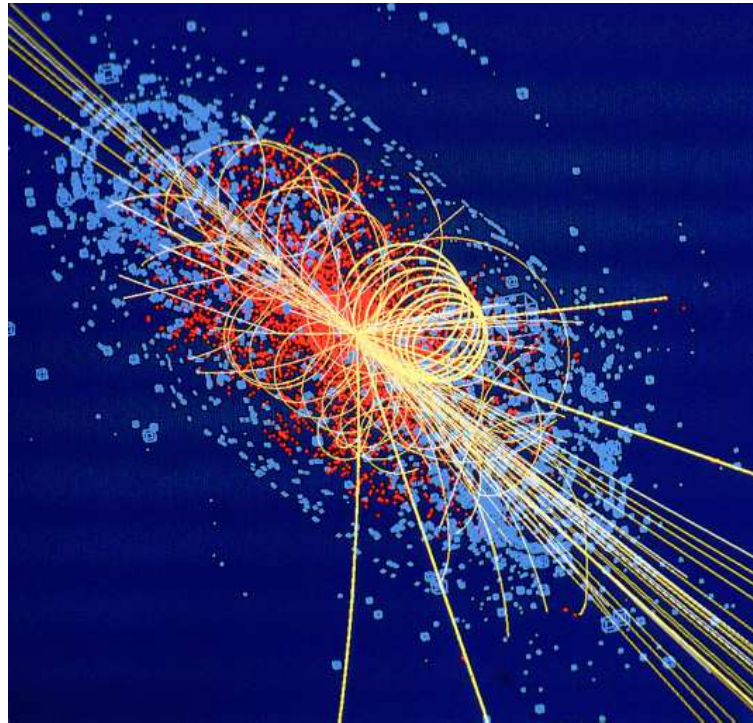


Vector Boson Fusion: Status & Open Issues



Stefan Dittmaier, Barbara Jäger, Francesco Tramontano

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VBF Hjj production: higher order corrections

* higher order QCD corrections:

- ✓ NLO-QCD: σ_{tot} and differential distributions
- ✓ NNLO-QCD: σ_{tot} in DIS approximation
- ✗ NNLO-QCD corrections for differential distributions
(DIS approximation sufficient)

* electroweak corrections:

- ✓ NLO-EW: σ_{tot} and differential distributions

* combination of NLO QCD and EW corrections:

- ✓ available at NLO in HAWK and VBFNLO (\leftarrow YR2)
- ✗ more sophisticated scheme requires QCD-EW NNLO contributions (currently out of reach)

combination of production and decay

✗ ToDo: NLO QCD+EW study in factorized approach:

$$\underbrace{pp \rightarrow H + 2 \text{ jets}} \otimes \underbrace{H \rightarrow VV^{(*)} \rightarrow 4 \text{ leptons}}$$

HAWK, VBFNLO

Prophecy4f

☞ test impact of corrections on fiducial cross sections

* full calculation for $pp \rightarrow 4\ell + jj$:

access uncertainties of factorized ansatz via
comparison with full calculation for

$$pp \rightarrow 4 \text{ leptons} + 2 \text{ jets}$$

(available in VBF approximation at NLO-QCD in
VBFNLO, POWHEG-BOX)

VBF Hjj production: matching with parton shower

- * VBF Hjj production:

NLO-QCD matched with parton shower default by now

(POWHEG-BOX, aMC@NLO, HERWIG++ ...)

- * VBF $Hjjj$ production:

NLO-QCD matched with parton shower
important for central-jet-veto observables

(POWHEG-BOX, MadGraph5_aMC@NLO)

to be discussed

* backgrounds

- ☞ are backgrounds to be covered in this WG?

note: background processes are often more complex than signal

(c.f. $pp \rightarrow t\bar{t} \rightarrow W^+W^-b\bar{b}$)

* Higgs properties

- ☞ to which extent are we going to discuss VBF/VH as a means for accessing Higgs properties in this WG?

* BSM

- ☞ are we discussing BSM aspects of VBF/VH in this WG?