Hints for discussion from CMS about VBF and VH

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VH

- **ggZH in MC** :
  - done already, thanks to POWHEG team (in particular C.Oleari)
  - going to use it for 13 TeV
  - missing dependencies on k_g and k_V for combination purposes
- **VH signal**: NNLO QCD and NLO EWK corrections
  - -> any chance to interface to some parton shower?
  - If not, we need again the differential distribution, at 13TeV, used to compute pt and jet multiplicity dependent K-factors
- **backgrounds**: gluon splitting to bb is mismodelled in the parton showers.
  - CMS had measurements of QCD g->bb and Z+bb angular correlation that should help the PS tuning...
  - are there any theory efforts?
  - need some other kind of measurements?

VBF

- **inclusive cross-section**
  - NNLO calculations @ 13 TeV performed with VBFNNLO (D. Rebuzzi, M. Zaro, PG), at 125 GeV, 125.5 GeV, 126 GeV
  - do we want more points, or a refined sampling?
- **events generation**
  - several NLO codes are available (madgraph5, powheg, vbfnlo, sherpa?)
  - to which showers can they be coupled? do experiments have the proper tunes to be used? how do we assess the systematics related to the shower and tunes choice?
  - we could use a full review of the most recent updates
- **ggH contamination** (strong overlap with the former H + jets wg)
  - MINLO and aMC@NLO existing and being studied, what about SHERPA?
  - generations at 13 TeV need to be addressed
- **backgrounds**
  - EWK VV+2jets exists at LO, is there any chance of having it at NLO?
- **off-shell studies**
  - single recipe how to treat the interference properly? (Phantom, VBFLO + REPOLO)
  - will need NNLO/LO scale factors for the Higgs virtuality
- **high mass**
  - the recipe for the interference treatment that is being developed in the past months needs to be finalised and documented (Phantom, VBFLO + REPOLO)
  - missing a generator with 2HDM implemented