Background strategy-I. S.Chekanov (ANL)

- Hard to invent something different from what we already know:
  - → best "background "is background from actual data (side-bands, control regions etc..)

- But LO+PS MCs (with k-factors from NLO, NNLO) are unavoidable
  - Each study needs a dedicated set of background samples
  - What we call "background" MC for one study can be a "signal" MC for another

- It would be ideal to have overlaps between signal MC and "background" MC samples, assuming that some fraction of MC samples should be generated centrally.

Background strategy-II. pp collisions

- There is a well established set of processes which are very popular for background studies and can be reusable by many studies:
  - 1) Multijets "QCD"
  - 2) gamma+jet, gamma+gamma
  - 3) Z+N(jets). (N=0,1,2,3,4)
  - 4) W+N(jets)
  - 5) WW+WZ
  - 6) ttbar
  - 7) single top
  - 8) Z/W+gamma

- Example:
  - 3)-4) is background for ttbar, but ttbar is background for W/Z measurements!

Background strategy-III

- Multijets "QCD" → **PYTHIA8/HERWIG++**
- gamma+jet, gamma+gamma → **PYTHIA8/HERWIG++**
- Z+N(jets). (N=0,1,2,3,4) → **ALPGEN /SHERPA**
- W+N(jets) → **ALPGEN/SHERPA**
- WW+WZ → **MADGRAPH**
- $t\bar{t}$:
  - **MC@NLO, ALPGEN/PYTHIA** → popular at ATLAS
  - **MADGRAPH/PYTHIA** → popular at CMS
- single top → **MC@NLO, ALPGEN**
- Z/W+gamma → **ALPGEN**

Watch the k-factors!
Z+jets/W+jets – as large as 20-30% (for ALPGEN)

Notes:
1) ALPGEN – is rather challenging to generate (CPU intensive).
2) k-factor estimates may need to be redone if cannot find anything in the literature