Plans for MC production

Michele Selvaggi
CERN

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SnowMass Strategy

- Detailed in (arXiv:1308.1636)
- Produce 2 → 4 **merged** samples, i.e:
  - pp → V + 0/1/2/3 jets
  - pp → VV + 0/1/2 jets
  - pp → VVV + 0/1 jets
- Binned in $H_T = \Sigma\ p_T$(final state)

Dataset Name	Main Processes	Final States	Order
Dominant Backgrounds			
B-4p, Bj-4p[a]	vector boson + jets	$V + nJ$	$\mathcal{O}(\alpha_s^n \alpha_w)$
BB-4p	divector + jets	$VV + nJ$	$\mathcal{O}(\alpha_s^n \alpha_w^2)$
TT-4p	top pair + jets	$TT + nJ$	$\mathcal{O}(\alpha_s^{2+n})$
TB-4p	top pair off-shell $T^* \to Wj$ + jets	$TV + nJ$	$\mathcal{O}(\alpha_s^{n+1} \alpha_w)$
TJ-4p	single top (s and t-channel) + jets	$T + nJ$	$\mathcal{O}(\alpha_s^{n-1} \alpha_w^2)$
LL-4p	off-shell $V^* \to LL$ + jets	$LL + nJ$ $[m_{ll} > 20$ GeV$]$	$\mathcal{O}(\alpha_s^n \alpha_w^2)$
Subdominant Backgrounds			
TTB-4p	top pair + boson	$(TTV + nJ), (TTH + nJ)$	$\mathcal{O}(\alpha_s^{2+n} \alpha_w)$
BLL-4p	off-shell divector $V^* \to LL$ + jets	$VLL + nJ$ $[m_{ll} > 20$ GeV$]$	$\mathcal{O}(\alpha_s^n \alpha_w^3)$
BBB-4p	tri-vector + jets, Higgs associated + jets	$(VVV + nJ), (VH + nj)$	$\mathcal{O}(\alpha_s^n \alpha_w^3)$
H-4p	gluon fusion + jets	$H + nJ$	$\mathcal{O}(\alpha_s^n \alpha_h)$
BJJ-vbf-4p	vector boson fusion + jets	$(V + nJ), (H + nJ)$ $[n \geq 2]$	$\mathcal{O}(\alpha_s^{n-2} \alpha_w^3)$

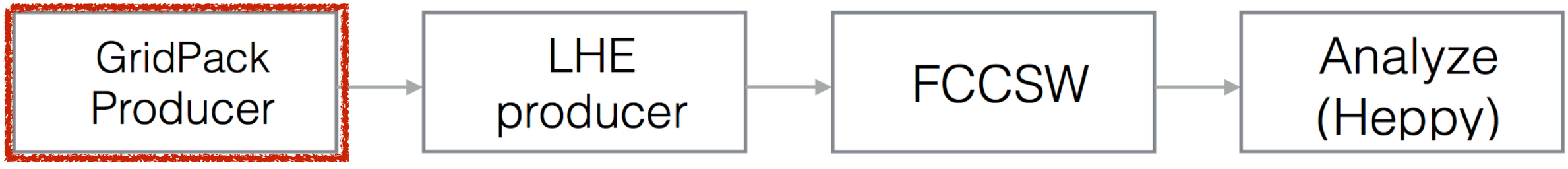
Our Strategy

- Cannot use SnowMass samples because of gen. level acc. cuts
- Produce separate V and H samples
- Adding:
  - ggH, VBF H, VH, ttH,
  - ggHH, VBF HH
- We plan on producing the following samples (work in progress):

Samples **H_T bins**

```
"pp_v0123j_5f":[0,1500,2900,5100,8500,100000],
"pp_vvv01j_5f":[0,1200,3000,6000,100000],
"pp_vv012j_5f":[0,300,1400,2900,5300,8800,100000],
"pp_vbf_v01j_5f":[0,2000,4000,7200,100000],
"pp_llv01j_5f":[0,800,2000,4000,100000],
"pp_ll012j_5f":[0,200,700,1500,2700,4200,100000],
"pp_tv012j_5f":[0,500,1500,2800,4700,7400,100000],
"pp_t123j_5f":[0,1900,3500,5900,100000],
"pp_ttv01j_5f":[0,1100,2700,4900,8100,100000],
"pp_tt012j_5f":[0,600,1200,2100,3400,5300,8100,100000],
"pp_h012j_5f":[0,100,1900,4400,8500,100000],
"pp_vh012j_5f":[0,300,1400,2900,5300,8800,100000],
"pp_hh01j_5f":[0,300,1400,2900,5300,8800,100000],
"pp_tth01j_5f":[0,1100,2700,4900,8100,100000],
"pp_vbf_h01j_5f":[0,2000,4000,7200,100000],
"pp_vbf_hh01j_5f":[0,2000,4000,7200,100000]
```

Workflow: GridPacks



- GridPack Producer[1]
  - makes MG5_aMC@NLO GridPacks (i.e standalone script that produces LHE files)
  - Can be used either locally or on lxbatch/condor queues

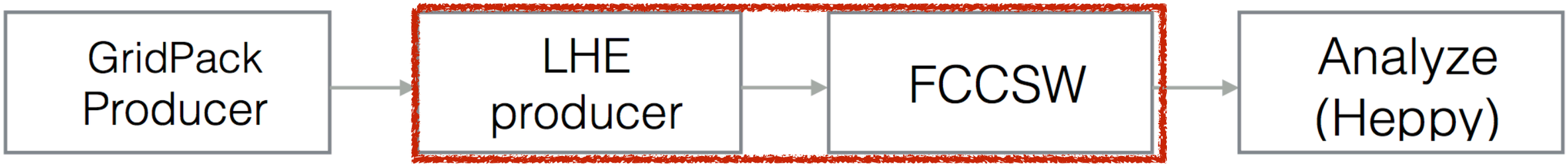
```
./run.sh [nevents] [seed]
```

- **For simplicity, GP that are of common interest will be produced centrally (WIP) and stored here:**

/eos/fcc/hh/generation/mg5_amcatnlo/gridpacks

[1] https://github.com/selvaggi/GridPackProducer

Workflow: LHEs



- LHE Producer[1]
  - Produces Les Houches Event (LHE) files using GridPacks using lxbatch queues (working on extending to HTCondor)
  - Produces FCCSW files using LHE files
  - This part should be carried out by the user

[1] https://github.com/clementhelsens/LHEventProducer

Conclusion

- Samples
  - We have defined a list of samples to be produced centrally
  - GridPack production of "common" samples will happen centrally (MS and C. Helsens)
  - LHE/FCCSW output will carried out by the user

- We have a workflow ready for producing large MC event samples
  - Working on extension to HTCondor
  - Will announce a tutorial shortly (although instructions are already available)