Tutorial proposal and draft agenda

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100 TeV related tutorial

Day 1: (Event generation and decay at LO and NLO)

- Madgraph + BRIDGE, Introduction, SM and BSM processes.

- LHE generation of major SM processes.

- LHE generation of SUSY and BSM processes.

- NLO: aMC@NLO (+ Madspin) - SM processes

Day 2: (Matching and merging associated with Shower & Hadronization)

- Matching at a given scale for LO processes with N Jets

- Matching and Merging at NLO (Pythia and Herwig showers)

- Underlying event tunes

- Output formats : hepmc, stdhep etc

- Simple macros to analyze root outputs

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Day 3: (Event simulations)

- Introduction to Parametric simulations, fastsim and fullsim

- Delphes with Pileup

- Particle propagation, Tracking parametrization

- Calorimeter segmentation

- Analysis objects: Jets, Fast Jet subtraction, boosted jets

- Flavour tagging: b-tag, tau tag etc.

- MET reconstruction and pileup subtraction

- Pileup mixing and subtraction schemes

- Event generation and simulation with pileup

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Day 4: (Detectors)

- Detector geometries, Magnetic fields

- Tracking efficiencies

- Calorimeter segmentation (separately for ECAL and HCAL)

- Clusterization techniques for ECAL and HCAL hits

- Electron, Muon, and Photon ID & isolation modules

- Flavour tags using smearing and track/IP based ID and Isolation

Day 5: (Physics Analysis in 4 subgroups)

- W, Z and top reconstruction in presence of PU

- Higgs and di-higgs analysis

- SUSY significance/expectations at 100 TeV collider

- BSM studies

Day 5: (Advanced topics and algorithm implementation)

- Implementation of boosted algorithms, jet sub-structures, etc.

- b-tag based on Track counting, Jet probability, Secondary vertex smearing

- tau tag algorithm development

- BDT/Neural Net based b-tag and tau-tag ID

Exercises:

- Gluino, productions and significance using Snowmass bkg samples

- Sbottom and stop production and significance

- di-higgs, di-boson, tri-boson analysis in leptonic modes

- etc.