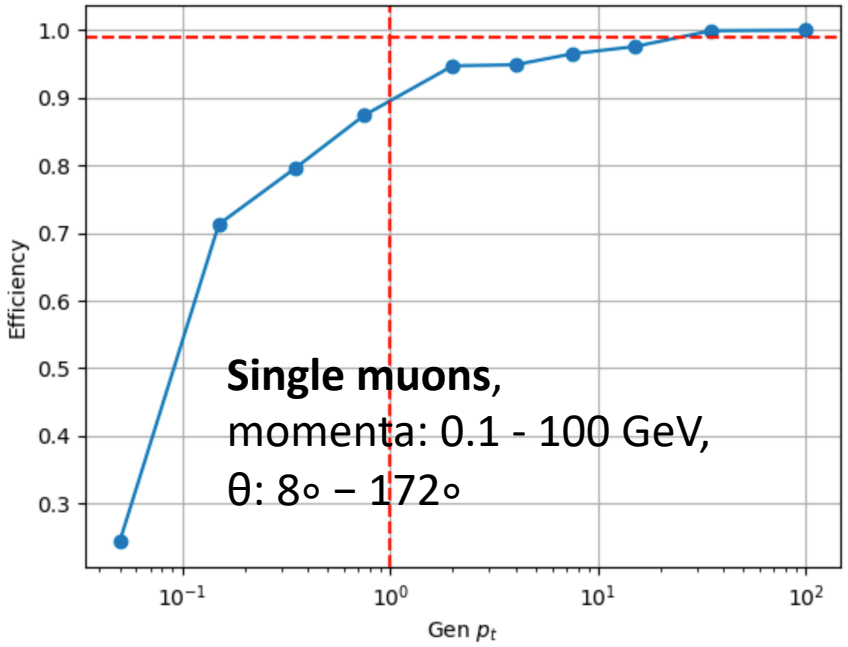
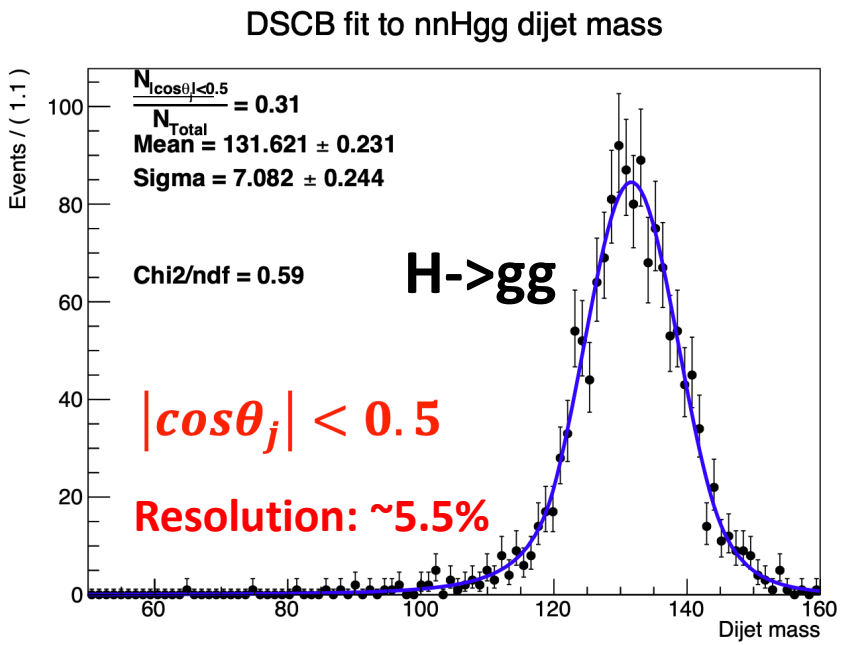
Physics Performance

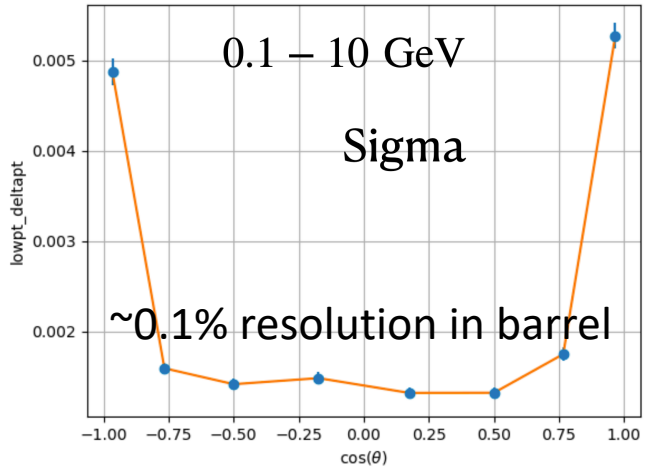
- Plan to incorporate additional BSM benchmarks
  - Long Lived Particles to motivate muon detector design: LLP, smuon
  - MET-related processes: existing H->inv
  - H->aa->4γ to assess the separation power and resolution of Ecal
- Current status of full simulation/reconstruction in V240901
  - Ongoing work on implementing digi+reco of the endcap calo system in CEPCSW
  - Manageable computing time for full sim+digi+reco: ~1 minute/event, enabling processing of **1 million events for vvH(gg) with <1000 CPU*day**
    - Reevaluation planned for 4-jet events and full detector, including the endcap
- First look at object performance with FULL simulation
  - Tracking: efficiency <95% for muons with pT<10 GeV
  - BMR dijets resolution > 5% in barrel ($|\cos\theta|<0.5$)
  - PID efficiency and purity studied
  - Work closely with the software group to address and resolve issues
- Two task forces created for in-depth object performance studies
  - Tracking/PID, contact Chenguang Zhang
  - Jets/Clusters, contact Zebing Wang/Kaili Zhang
- Plan to conduct analysis-oriented tutorials to engage more students

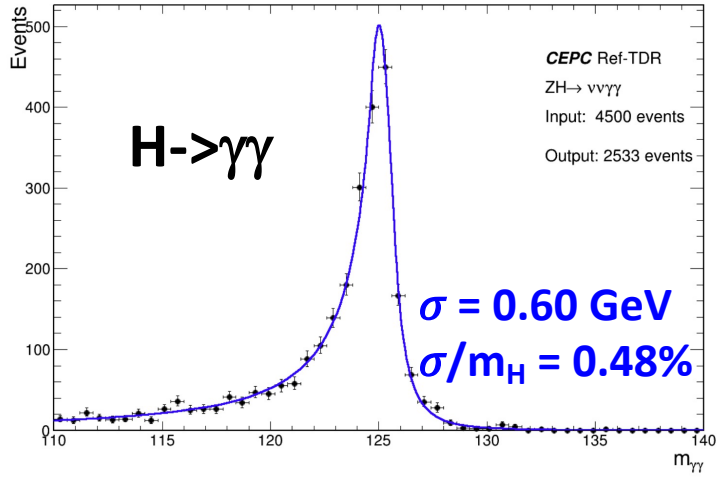
Chenguang, Zebing, Kaili

Preliminary Object Performances









Todo: Tracking/PID performance studies

- **Differential tracking efficiency/resolution**
  - Tracking efficiency/resolution vs pT and/or cosθ
    - @different level: Vertex+ITK+TPC+OTK, Vertex+ITK, TPC only, etc.
  - Tracking angular resolutions vs pT and/or cosθ
  - detector design requirements: pT>~100MeV, |cos(θ)|<0.99, δ(pT)~0.1% in barrel
- **Differential resolution of track impact parameters**
  - dx, dy, dz, $\delta(d0/z0)$ vs pT, etc.
  - detector design requirements: in the barrel δ(d0/z0)~3 micro meter at 20 GeV
- **Differential PID capability: eff, mis-ID rates, purity**
  - 1d/2d distributions on eff/mis-ID vs. pT/cosθ
  - and for different particles (π,k,p,e,μ)
  - with/without TOF
  - relative resolution of dE/dX
  - detector design requirements: eff*purity>90% for all charged Kaon with E>2GeV(**@Z pole**); ~relative resolution of dE/dX better than 3%.; ToF of 50ps; efficiency >99% for 3-prong tau
- **vvH(μμ)**: H invariant mass resolutions in barrel and endcap
- **Z(μμ)H**: recoil mass resolutions in barrel and endcap

Todo: Jet/Clusters performance studies

- **Differential efficiency, and energy/angular resolution for photon, neutron, charge hadrons**
  - detector design requirements:
    - EM resolution: 3%/√E⊗0.5% (Ref:JHEP12(2022)135)
    - Had resolution: 50%/√E⊗2% (Ref:CDR baseline performance)
- **Differential efficiency and energy/angular resolution for jet**
  - and for different jet reconstruction algorithms
- **H->diphoton** mass resolutions for barrel and endcap
- π^0 eff and resolution vs. pT/cosθ
- **dijet** resolution for different flavors, versus pT/cosθ