

# Angular Distribution at CEPC

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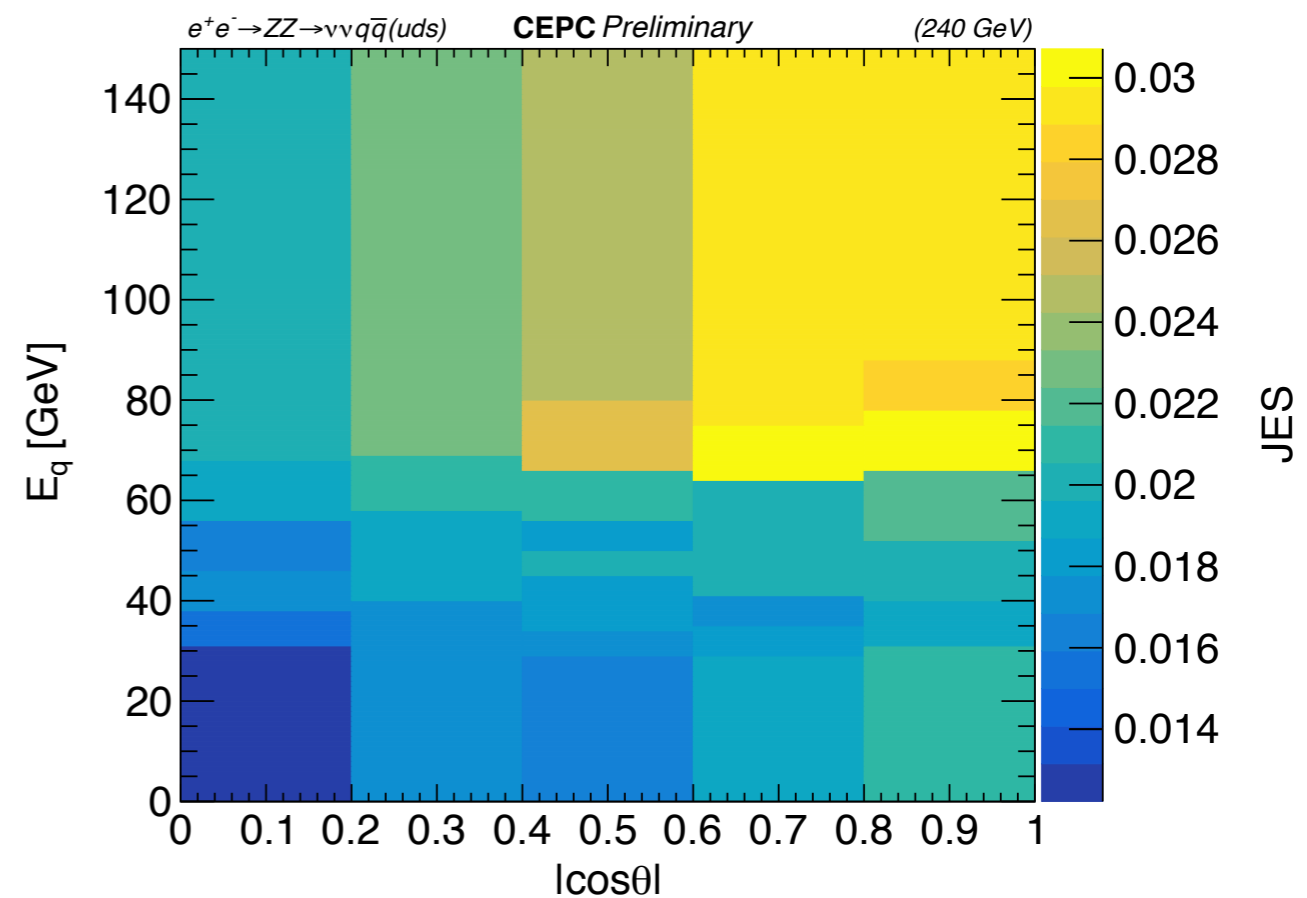
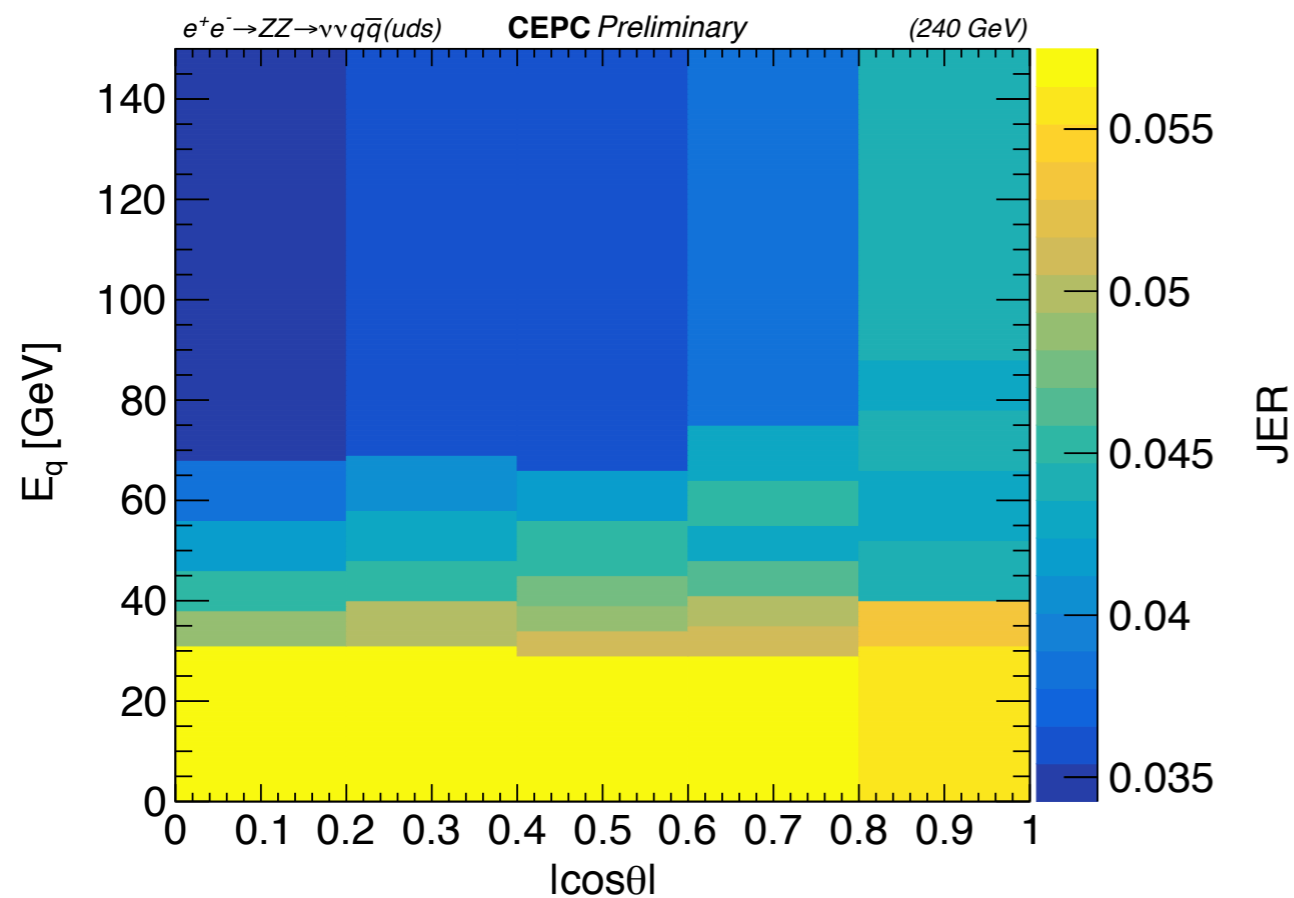
EW meeting

Sep 04, 2018

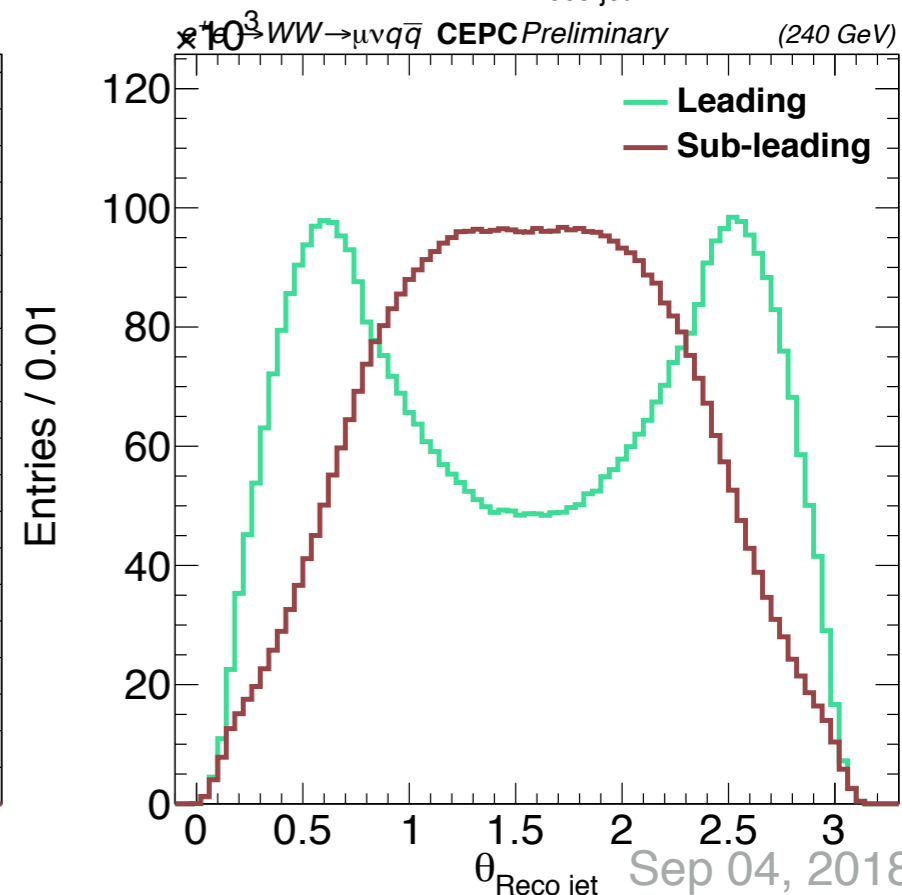
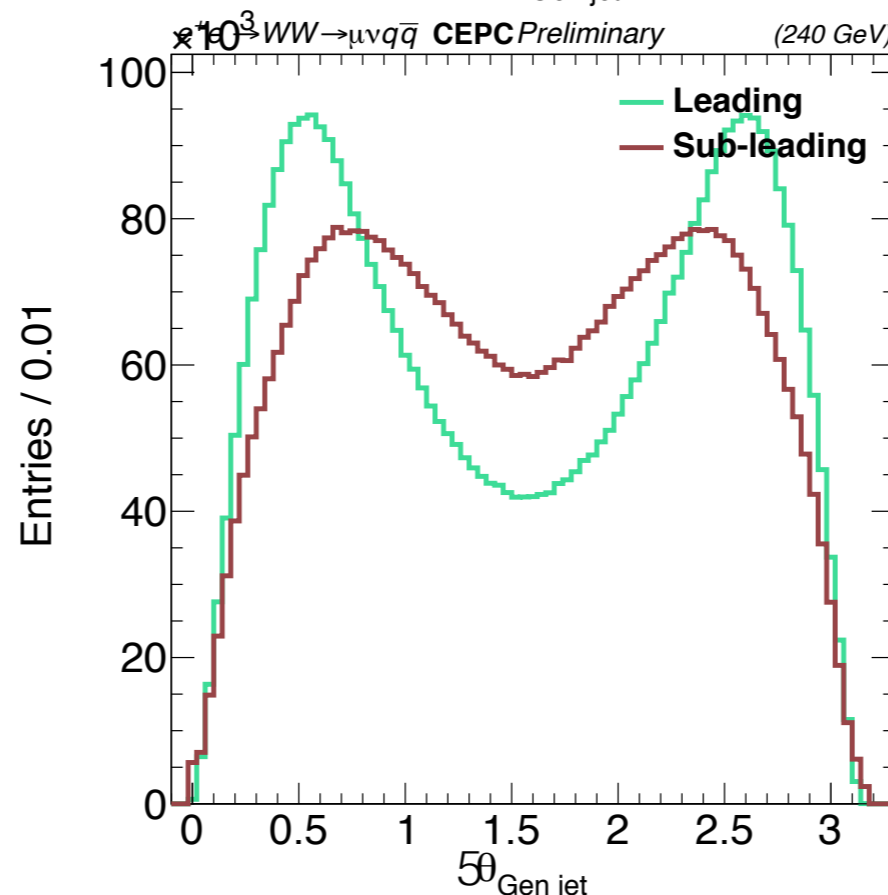
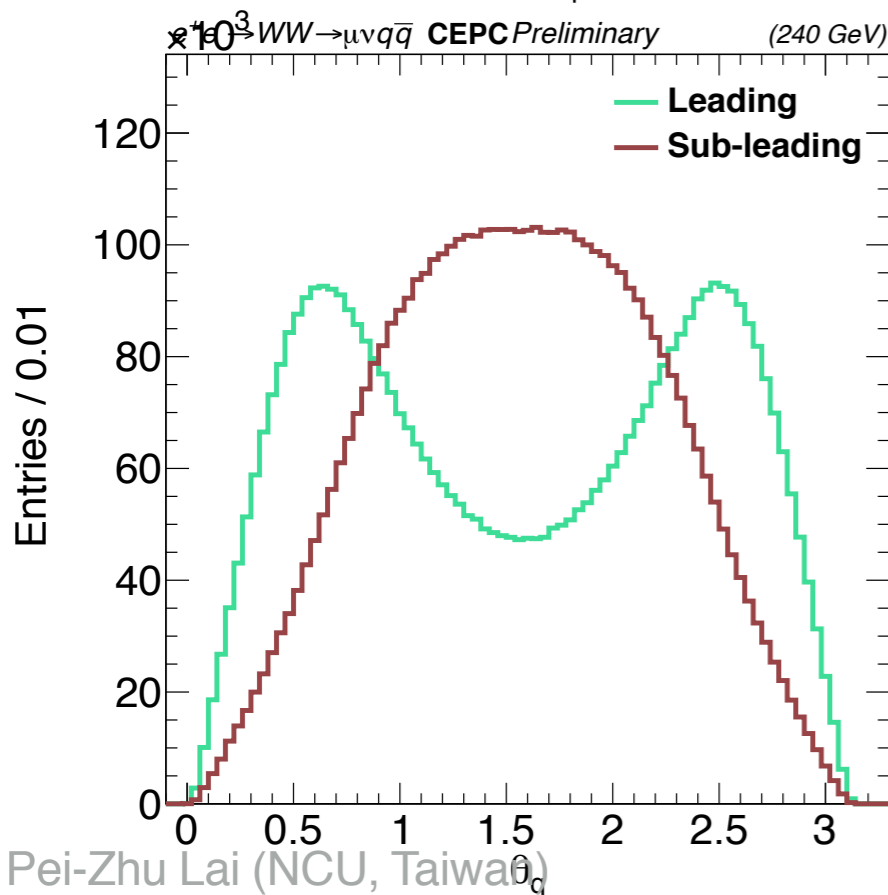
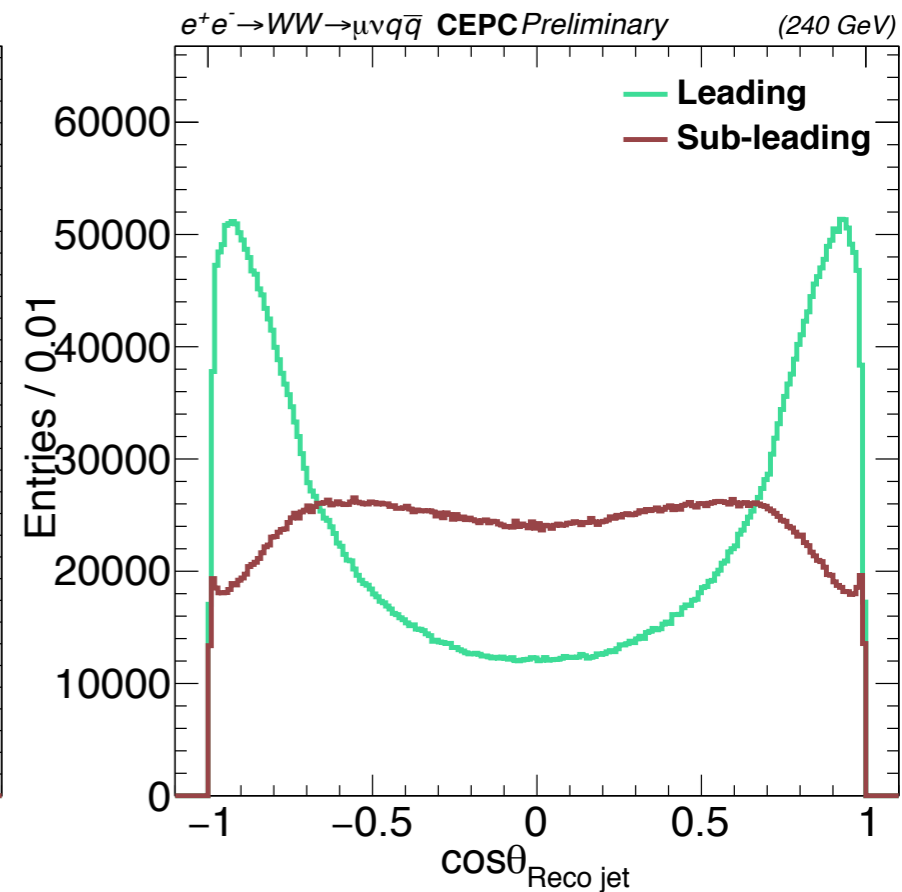
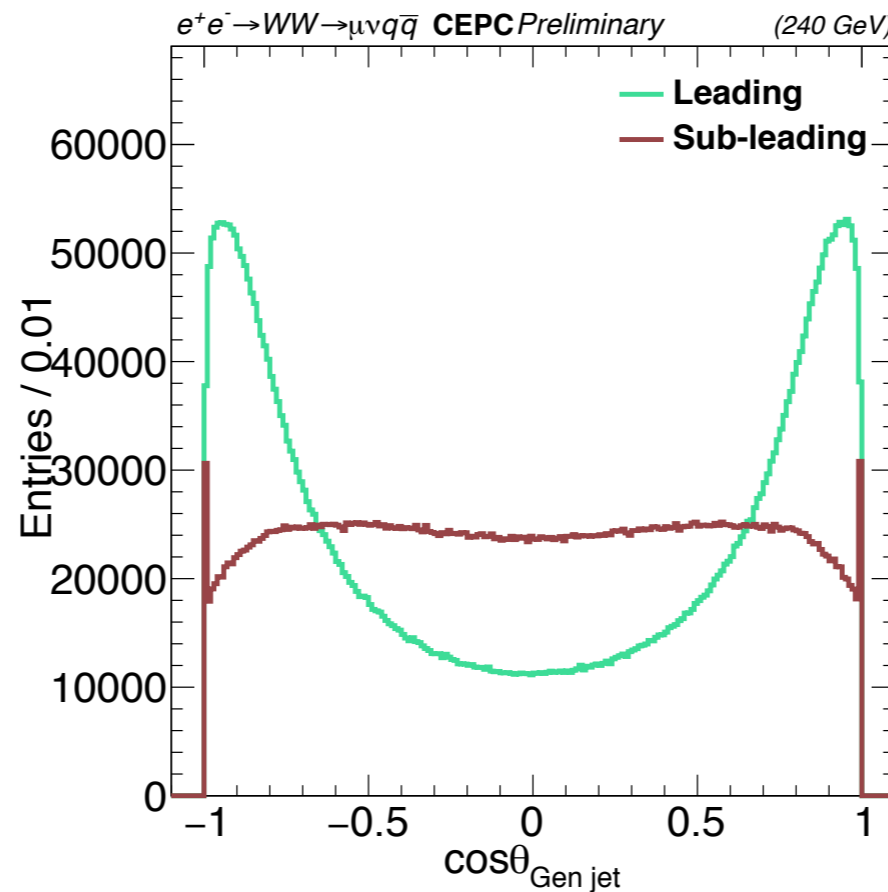
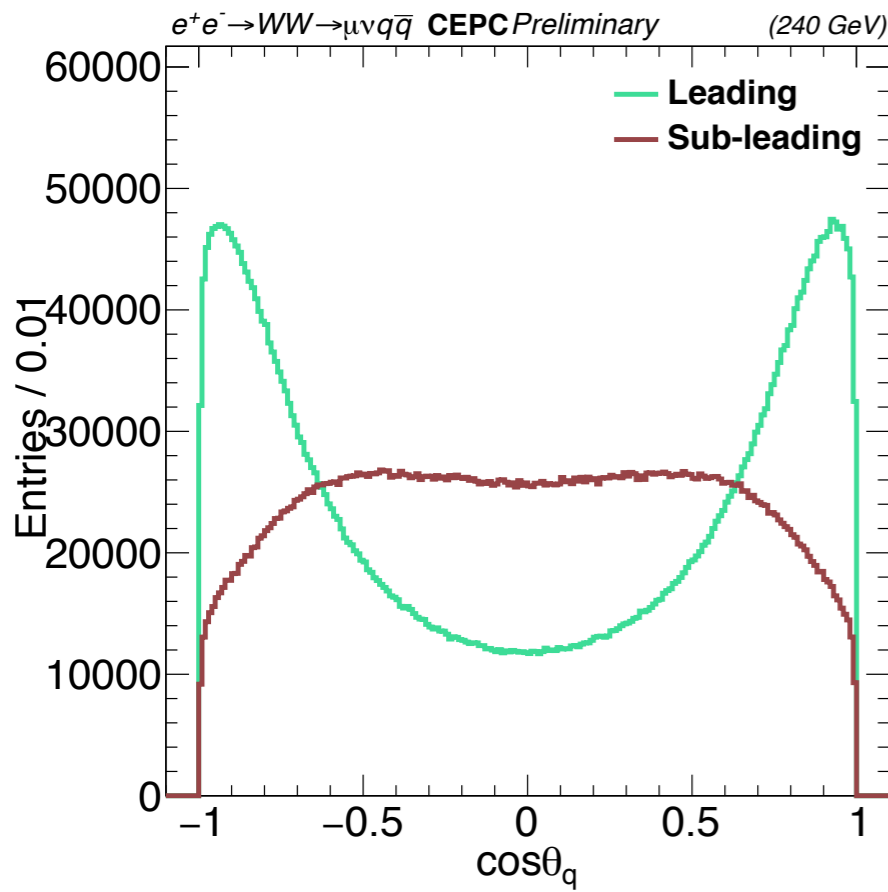


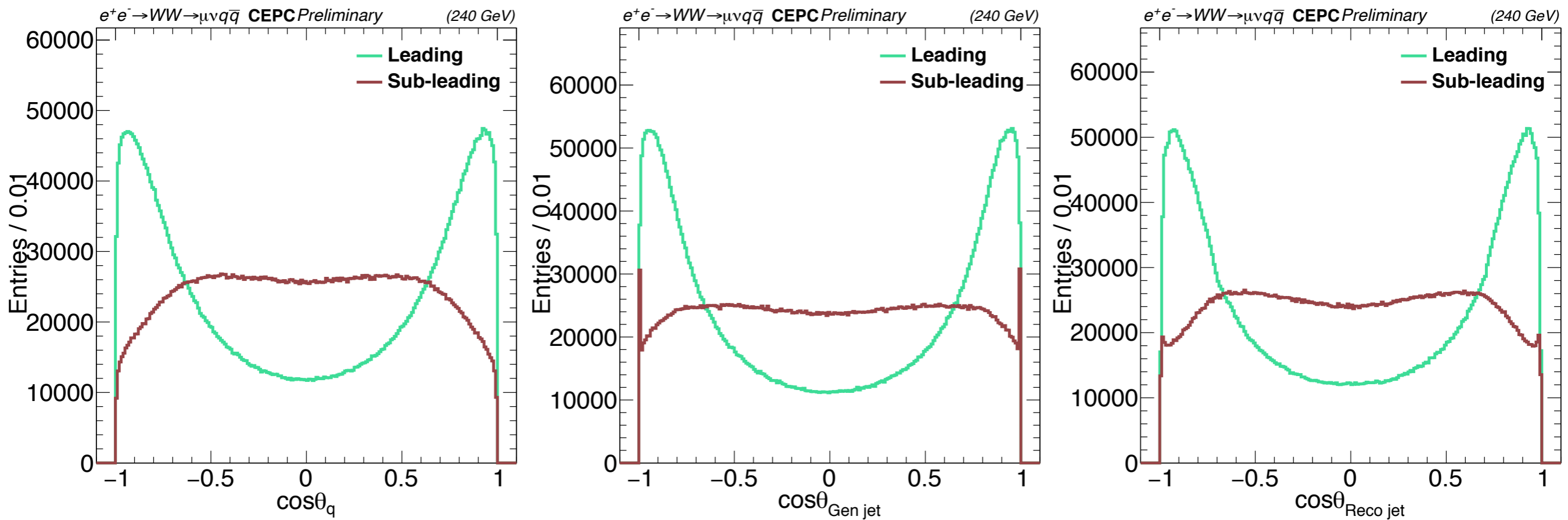
- **JER and JES in energy and  $\cos\theta$  phase space. They are studied by  $ZZ \rightarrow \nu\nu q\bar{q}$  process.**
- **The angle distribution for  $ZZ$ ,  $WW$ , and  $ZH$  in dijet final state after requiring  $\text{ISR } P_t < 1 \text{ GeV}$ .**

- Compare the energy of two objects (quark or jet), the energetic one is called “Leading”, the other one is called “Sub-leading”.
- **q**: The MC true quark which before fragmentation. Only two particles in  $WW \rightarrow \mu\nu q\bar{q}$  process.
- **Gen jet**: The MC true particles which decayed from two quarks. The ISR photon would be included as well.
- **Reco jet**: Force from all final state particle flow objects (PFOs). The ISR photon and prompt are vetoed but may be not completely.

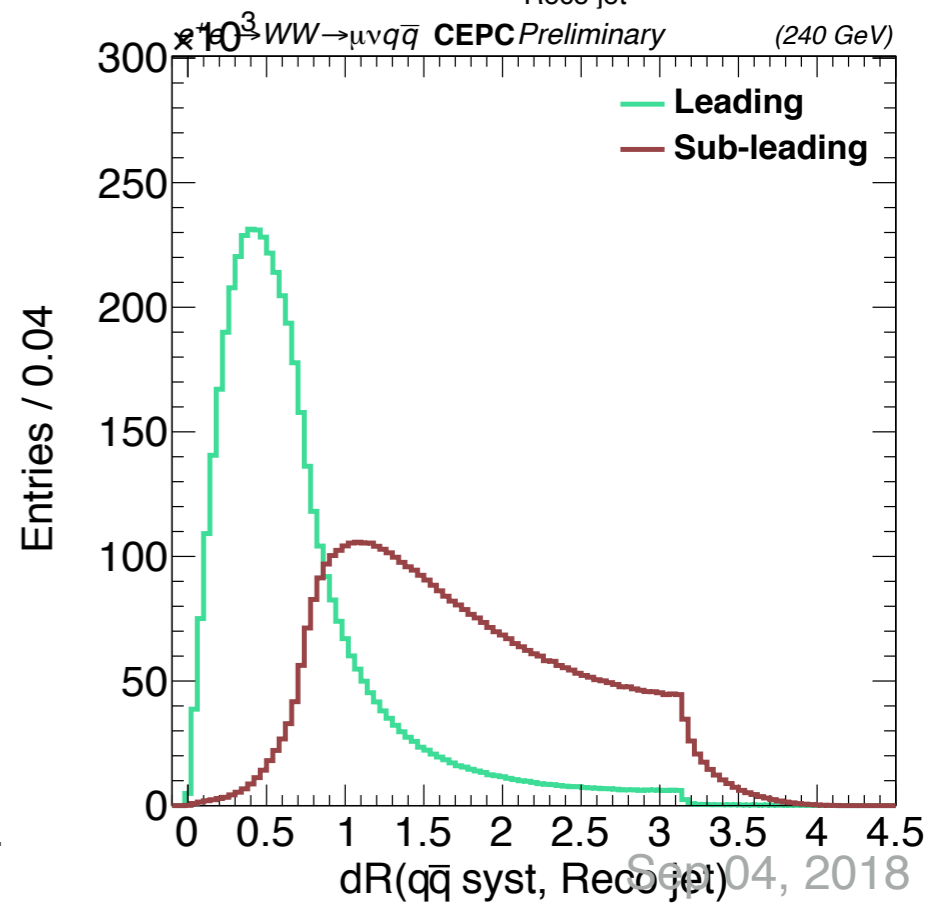
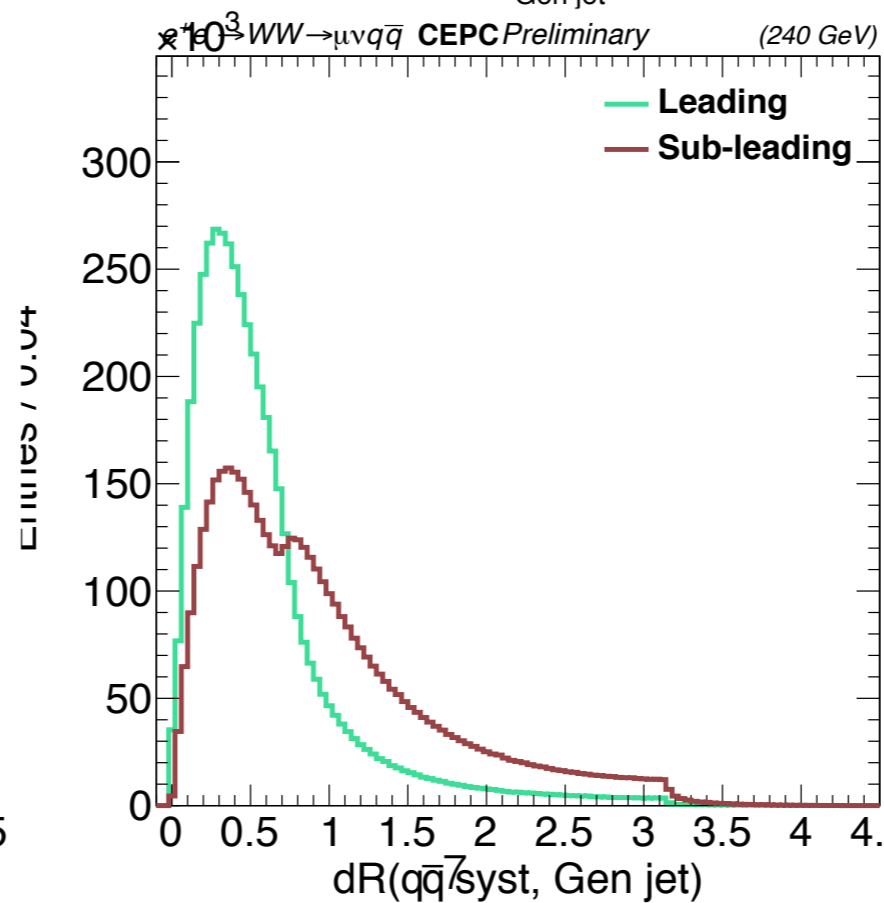
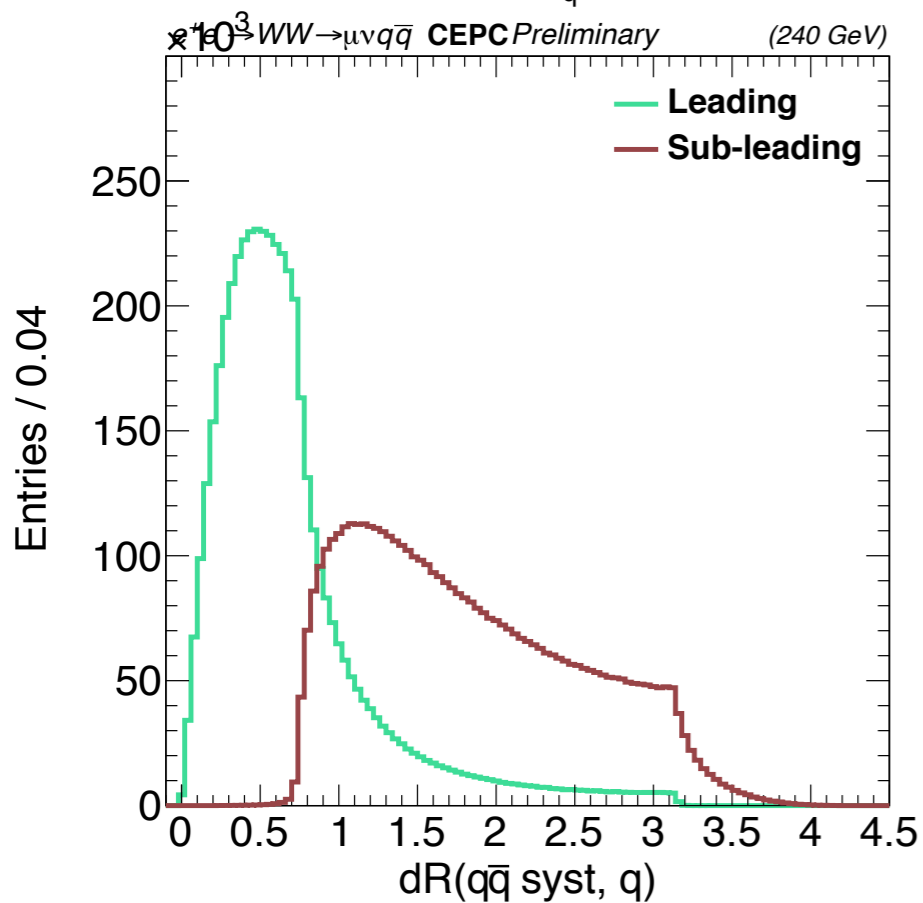
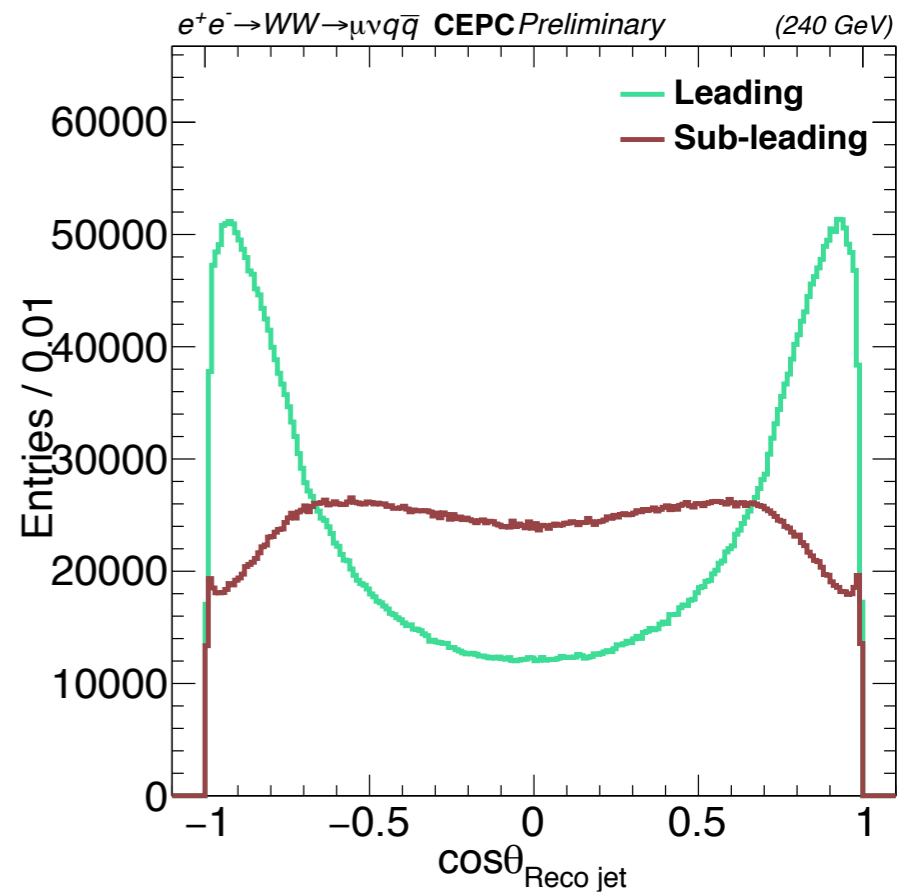
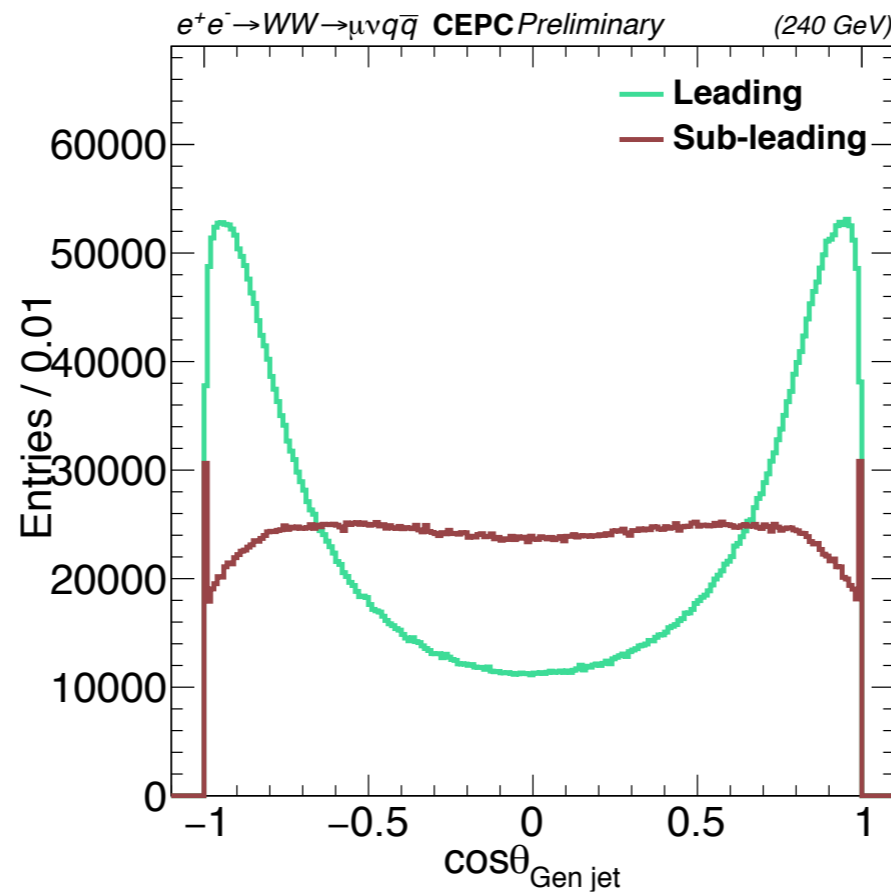
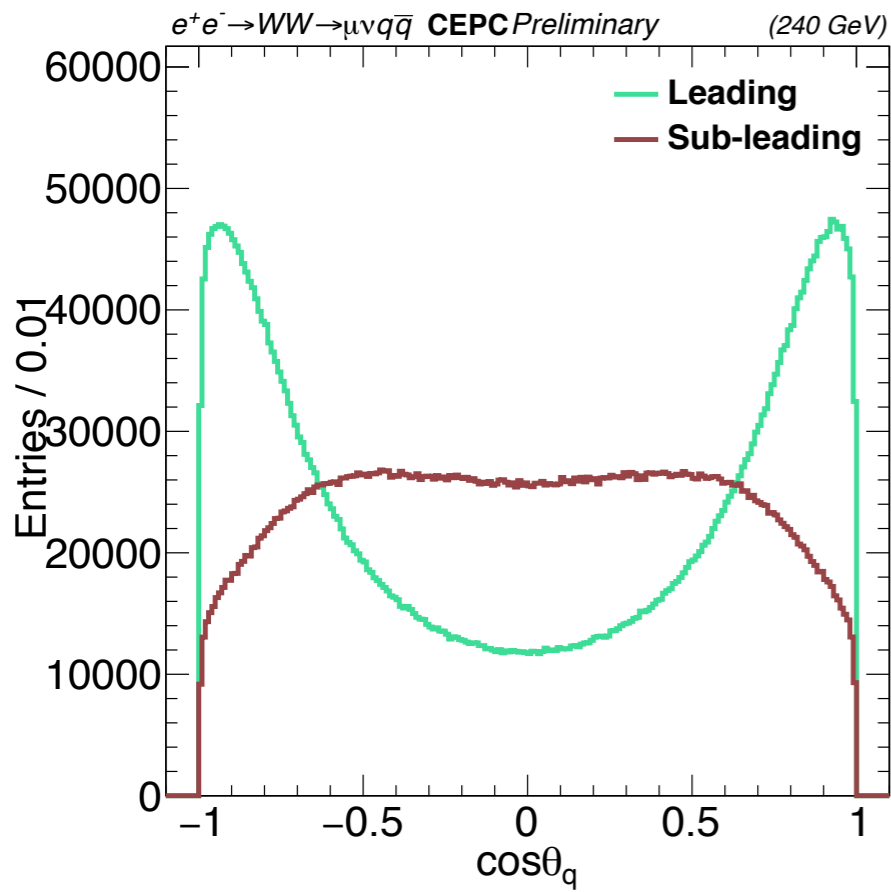


- The performance is between Reco Jet and Gen Jet. Here only shows the light flavor jets (uds).
- In the left plots, the JER is worse when energy is low and barrel is better than endcaps.
- In the right plots, the JES increase when energy goes higher and endcaps is greater than barrel.





Inner Product	Parton-Gen	Gen-Reco	MCP-Reco
Leading	99.677%	99.577%	99.676%
Sub-leading	99.165%	99.619%	99.802%



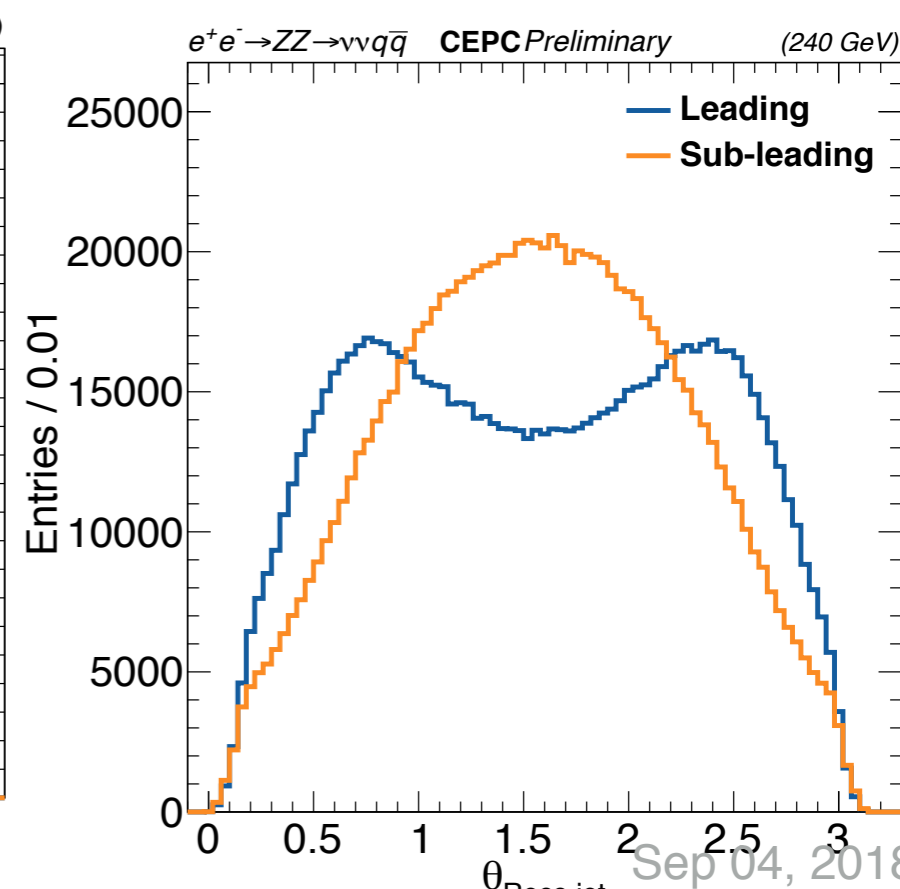
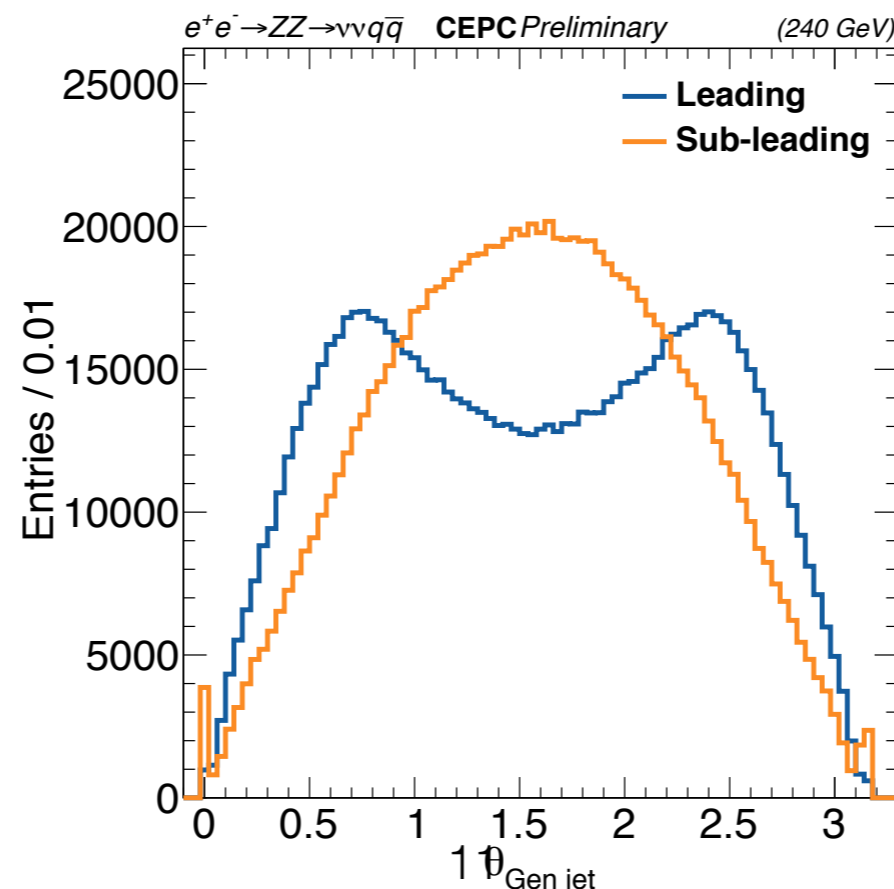
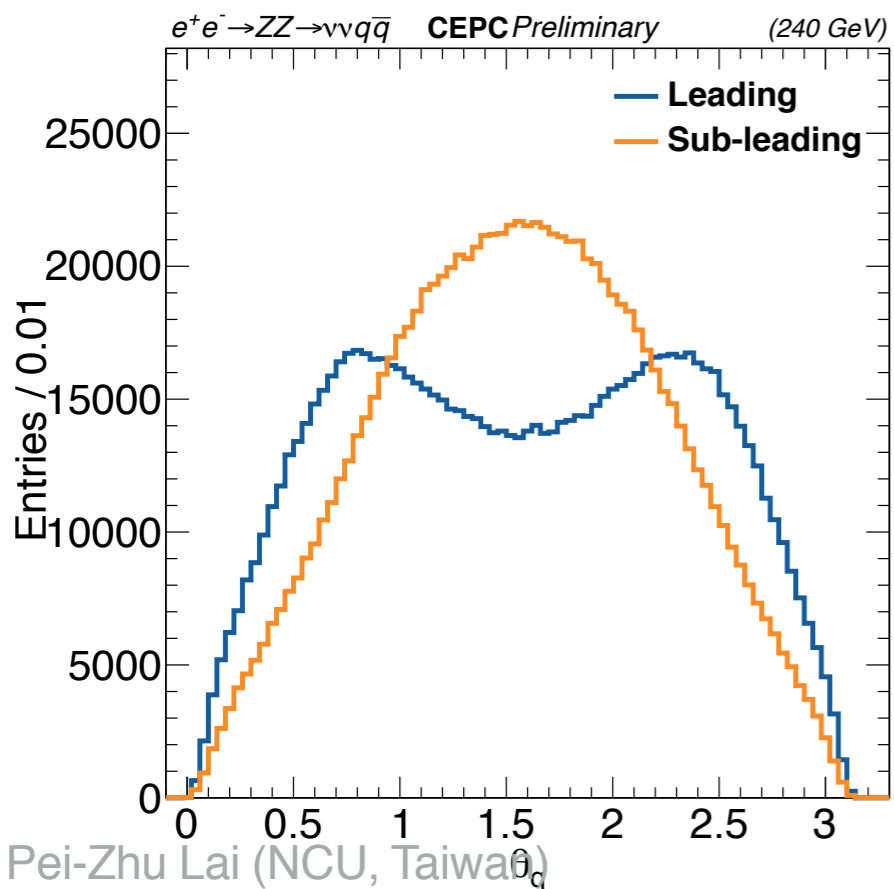
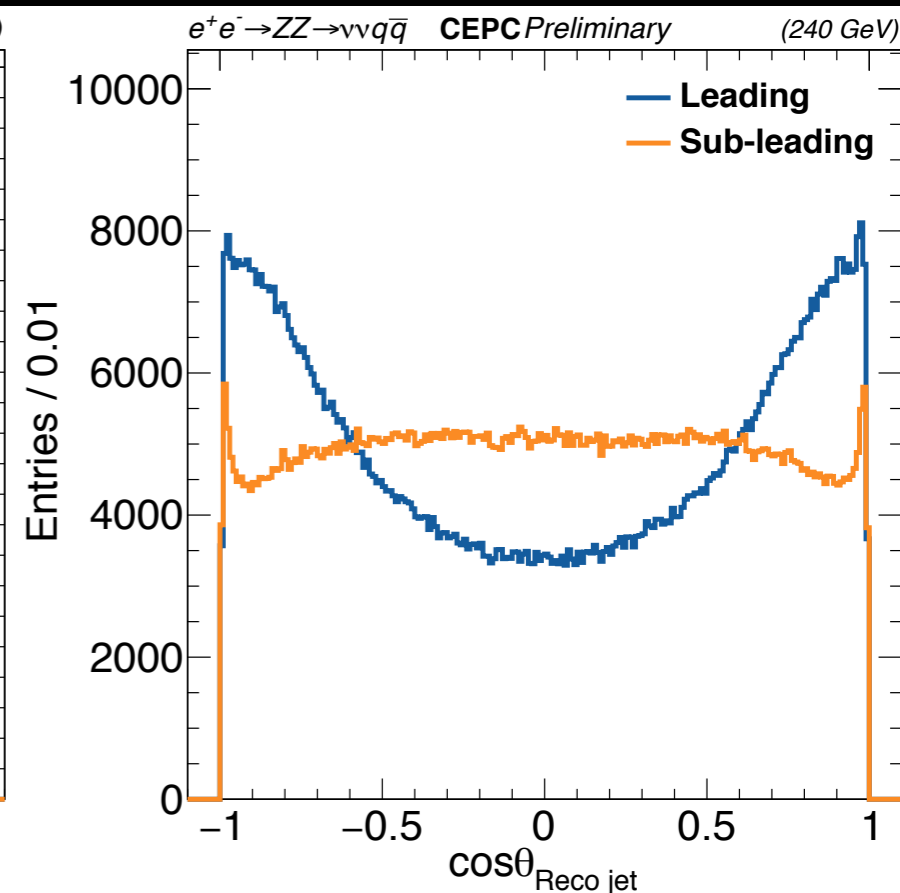
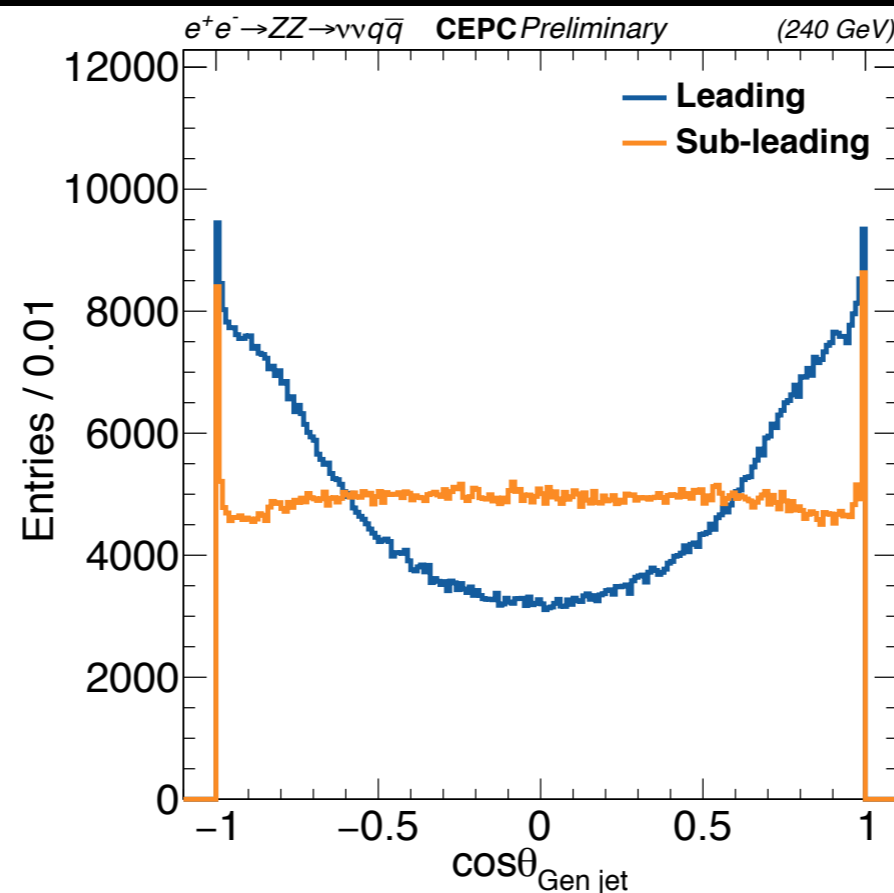
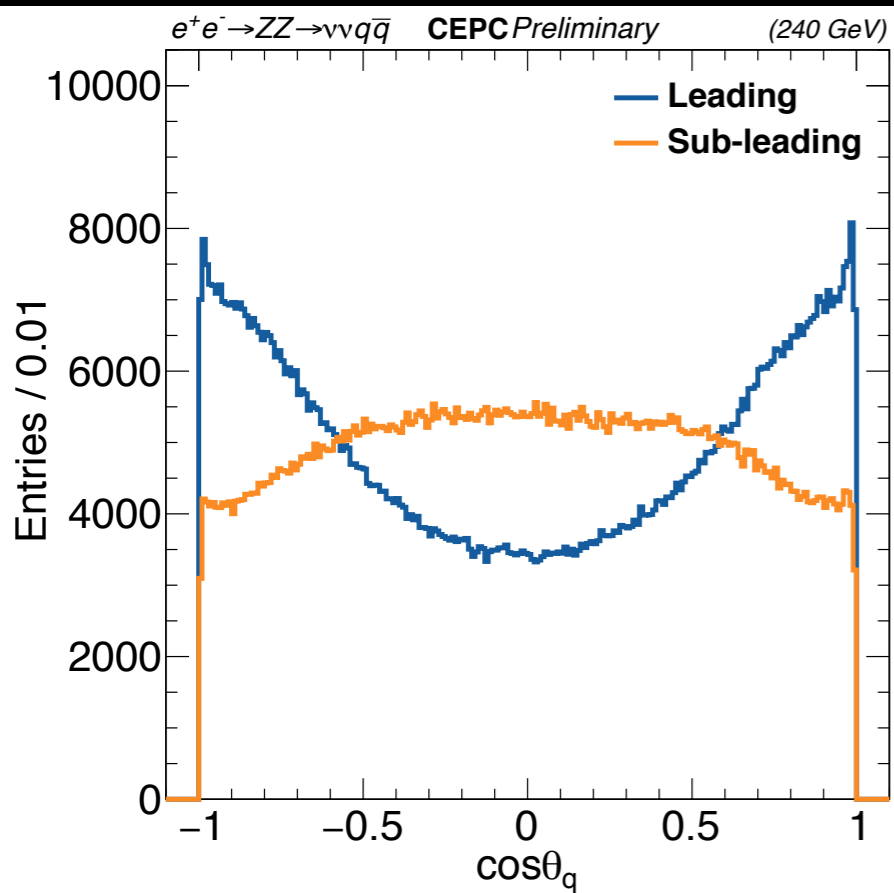
- **In ideal case, the angular distributions should be consist between three stages. However, some processes do not satisfy our expectations because of ISR effects, the prompt muon effects, etc.**
- **From my point of view, requiring ISR  $P_t < 1$  GeV is not improve the agreement huge between three simulation stages. The improvement embodies on inner product around 0.1~0.3%. I will try to remove the ISR photon before forcing Gen jet.**
- **After removing the prompt muon from the Gen jet, it makes Gen jet angular distribution more similar than the others.**

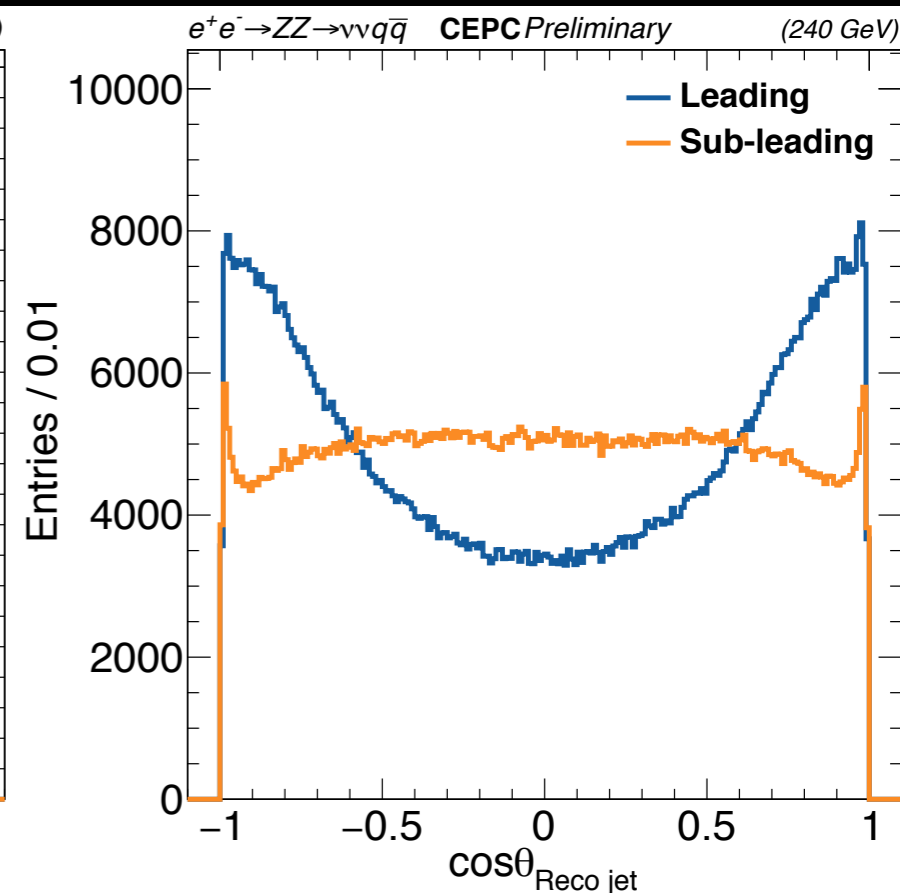
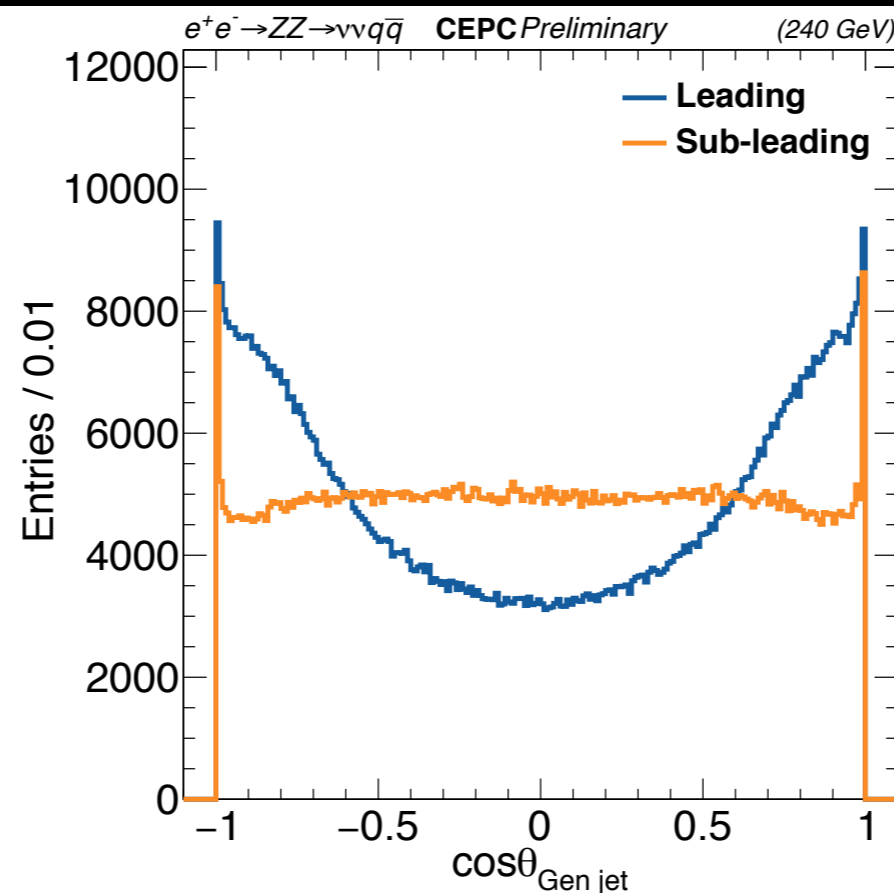
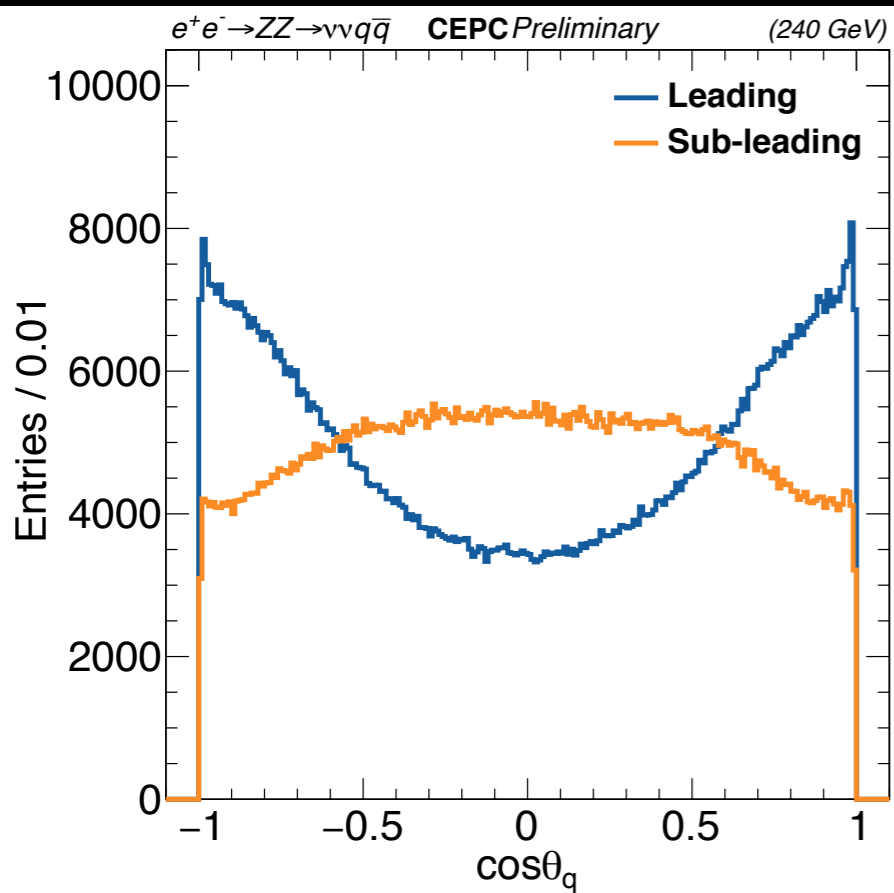


- **For JER and JES studies, I will divide the  $\cos\theta$  into smaller binning and different flavor.**
- **Making the angular distribution consist. Try to remove the ISR photon before forcing Gen jet and turn off FSR effect.**
- **These are the preparations for jet energy calibration.**
- **Need some time to write travel report.**

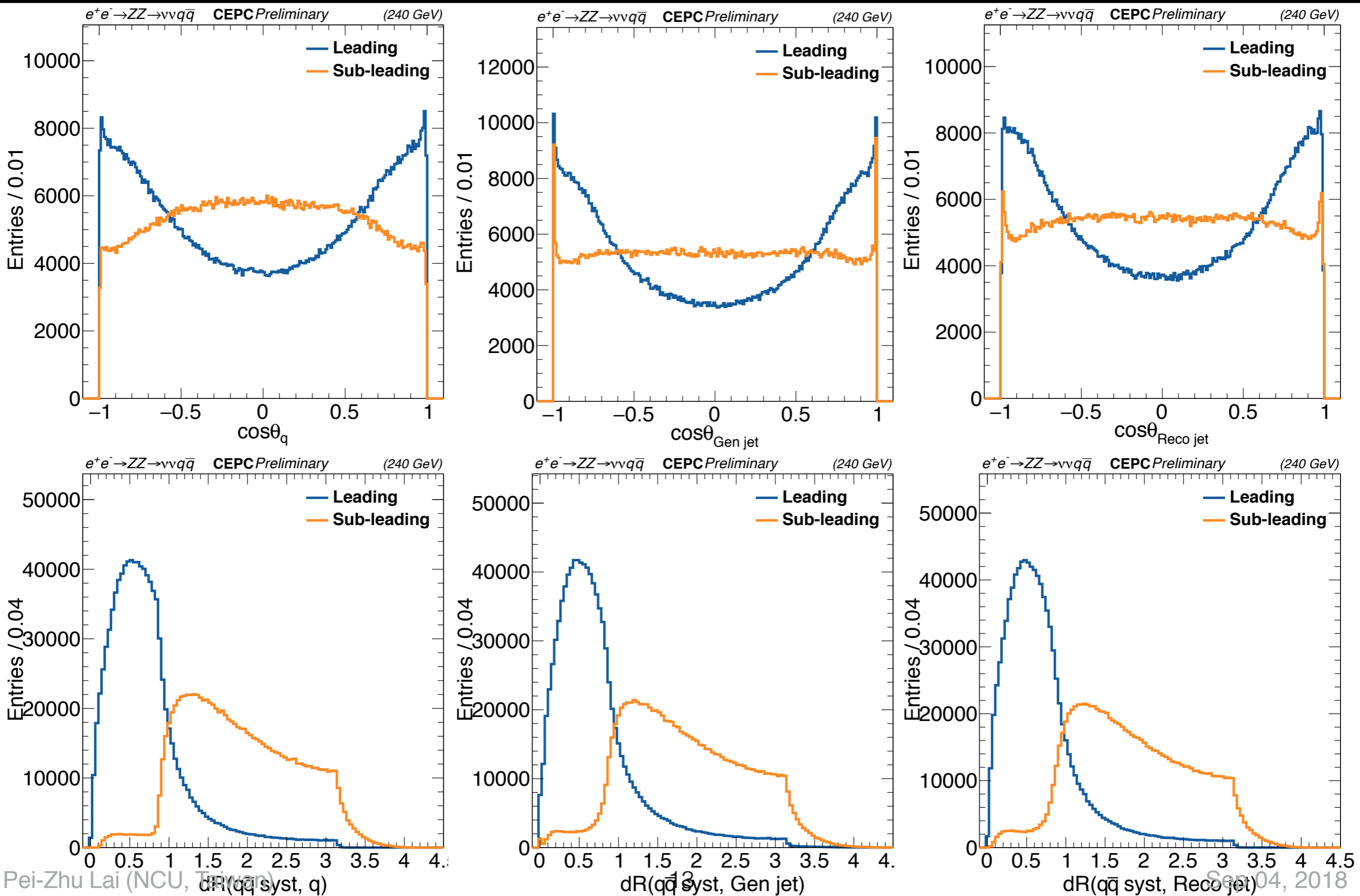


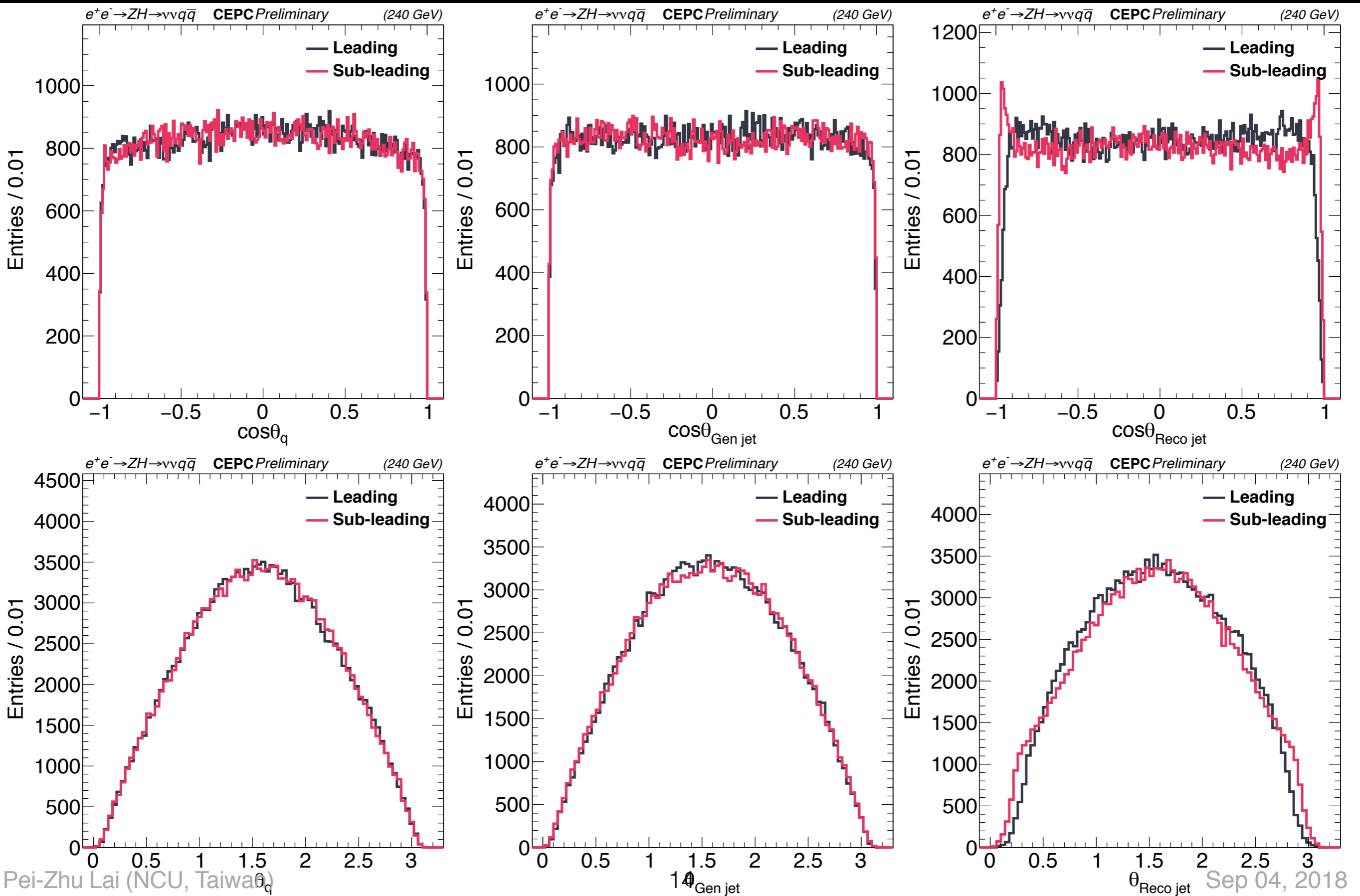
# Back up

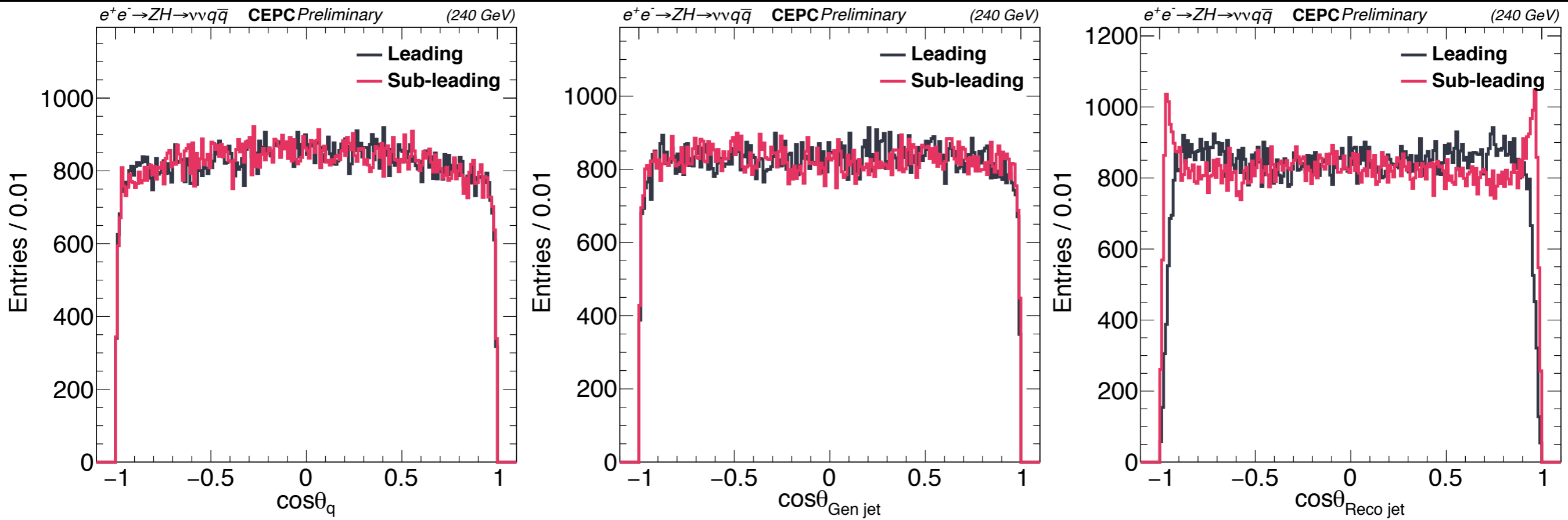




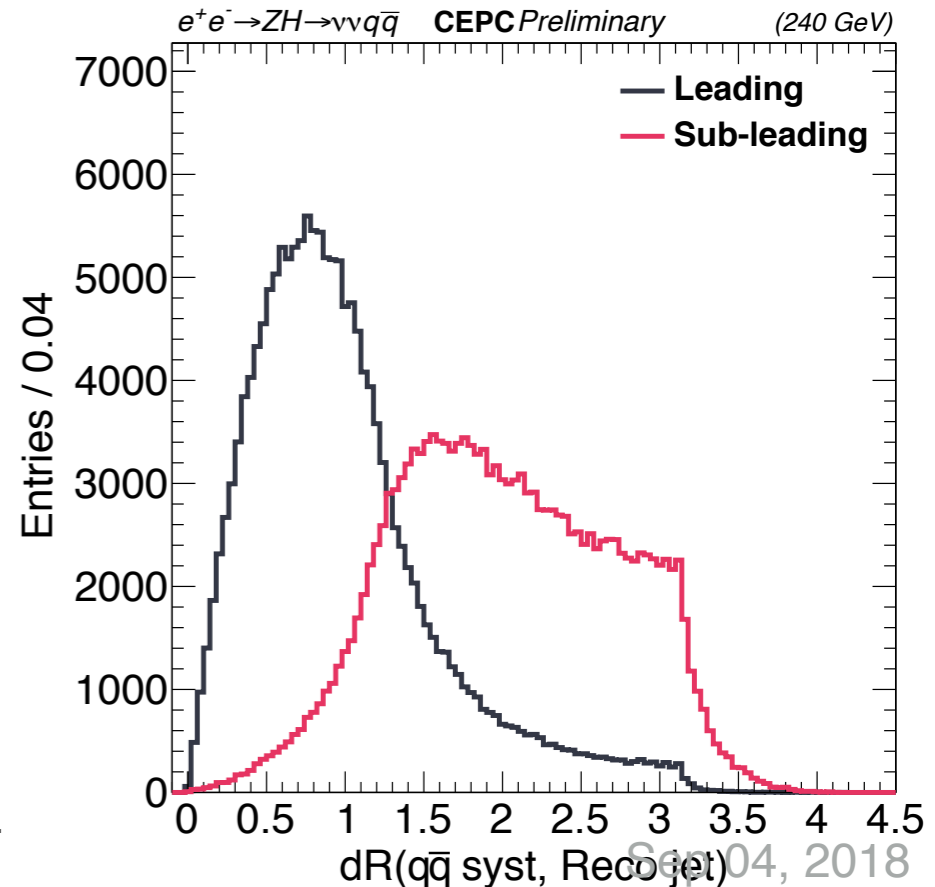
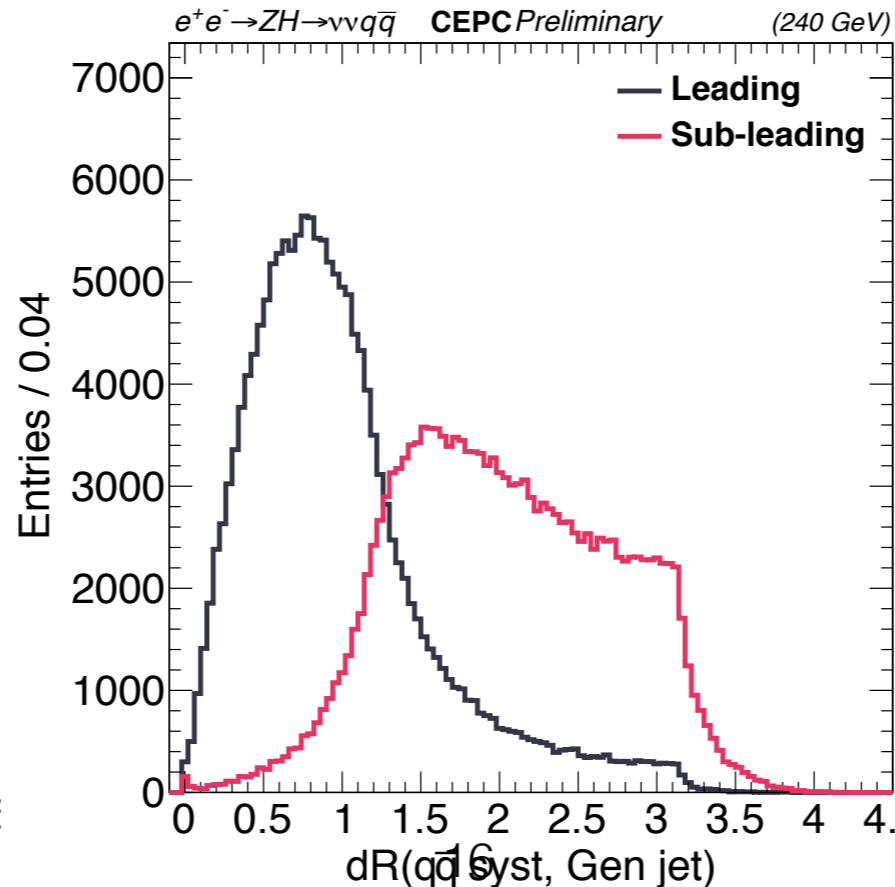
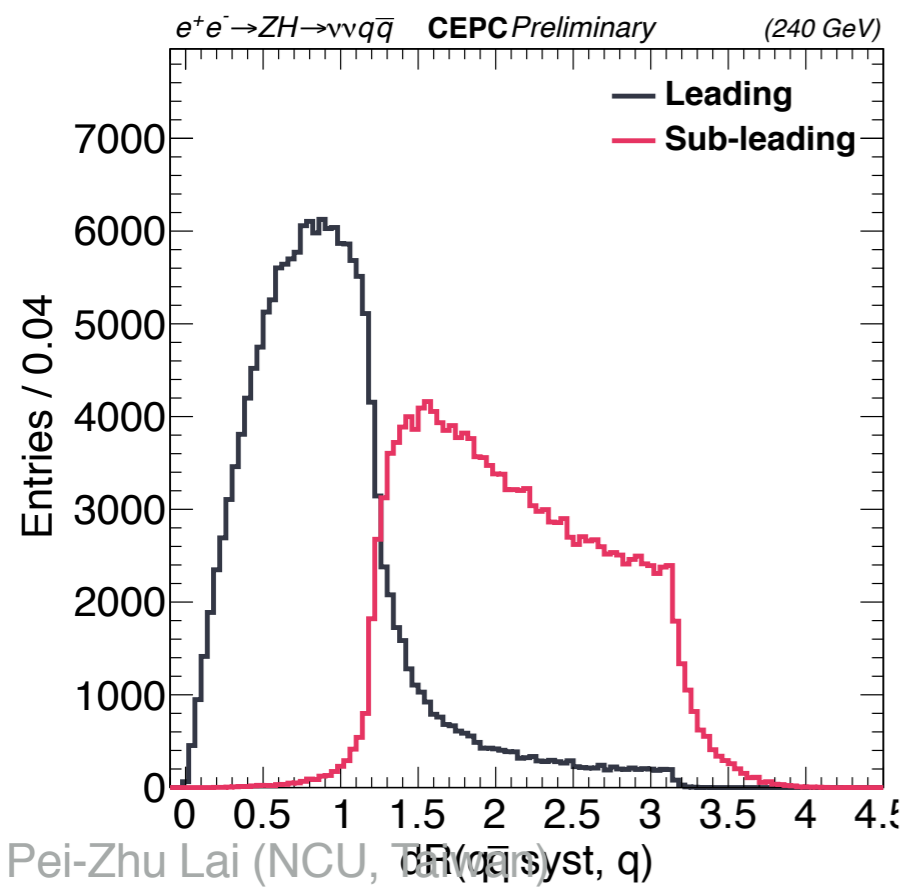
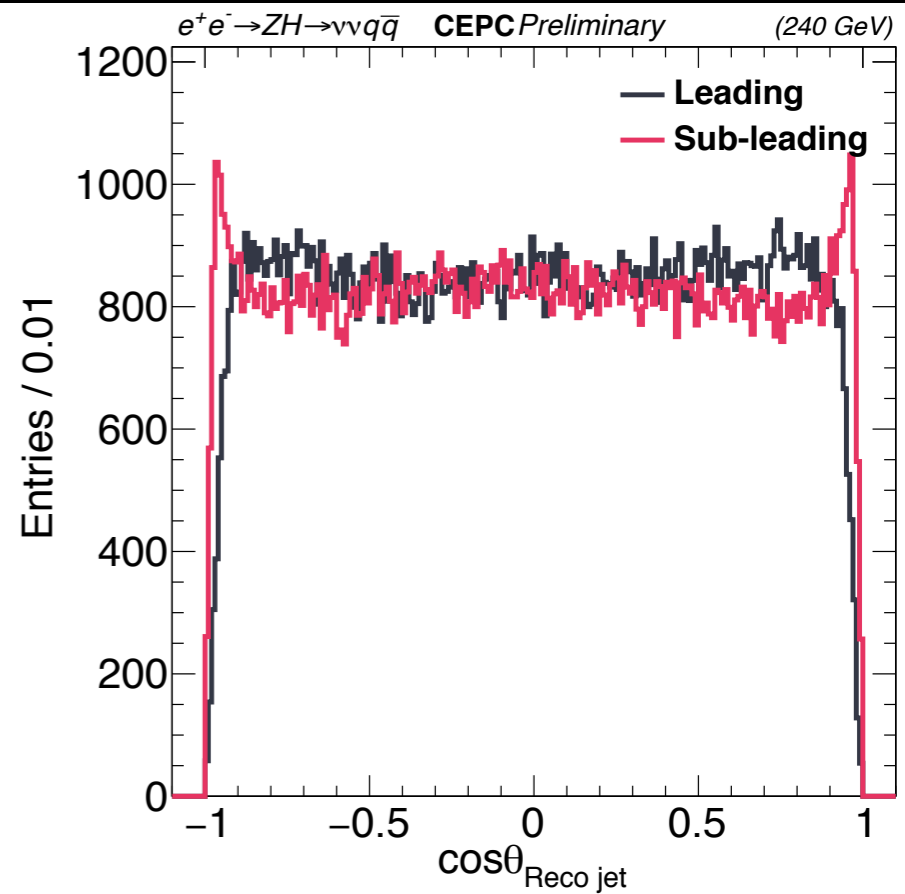
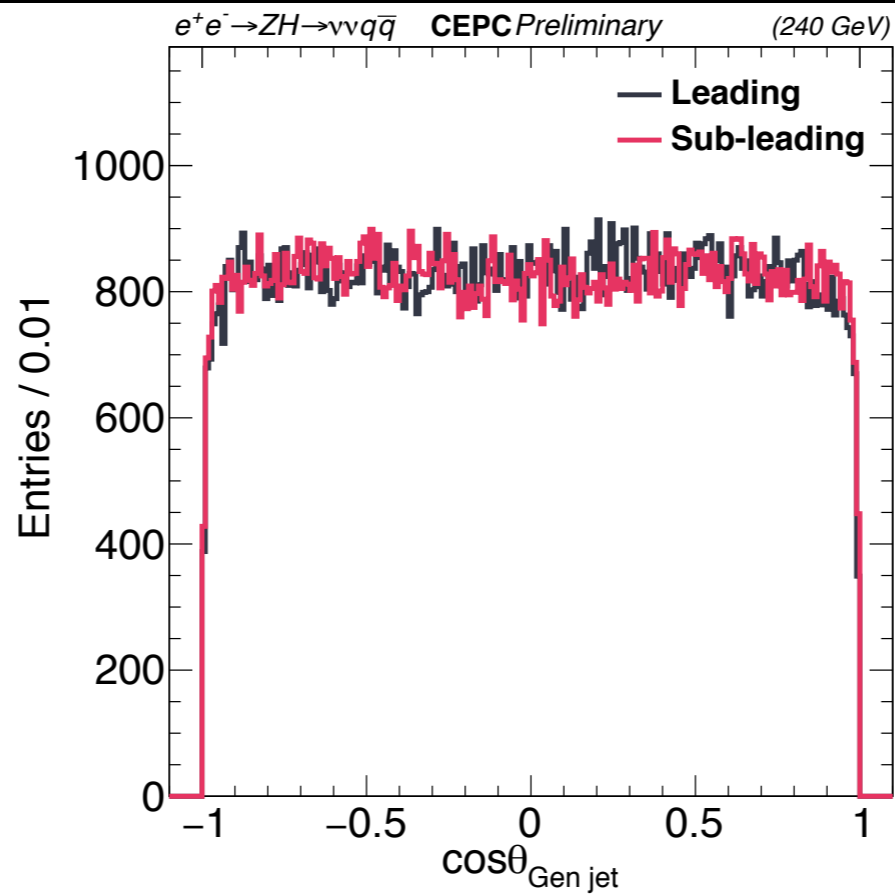
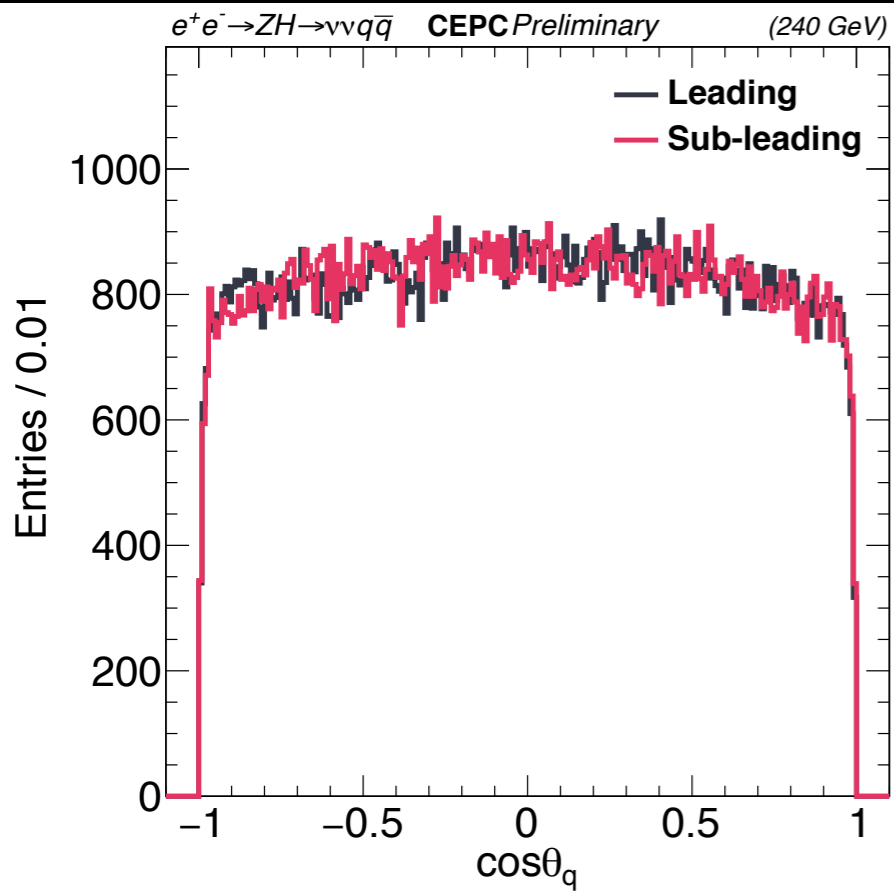
Inner Product	Parton-Gen	Gen-Reco	MCP-Reco
Leading	99.718%	99.329%	99.699%
Sub-leading	99.145%	99.508%	99.767%



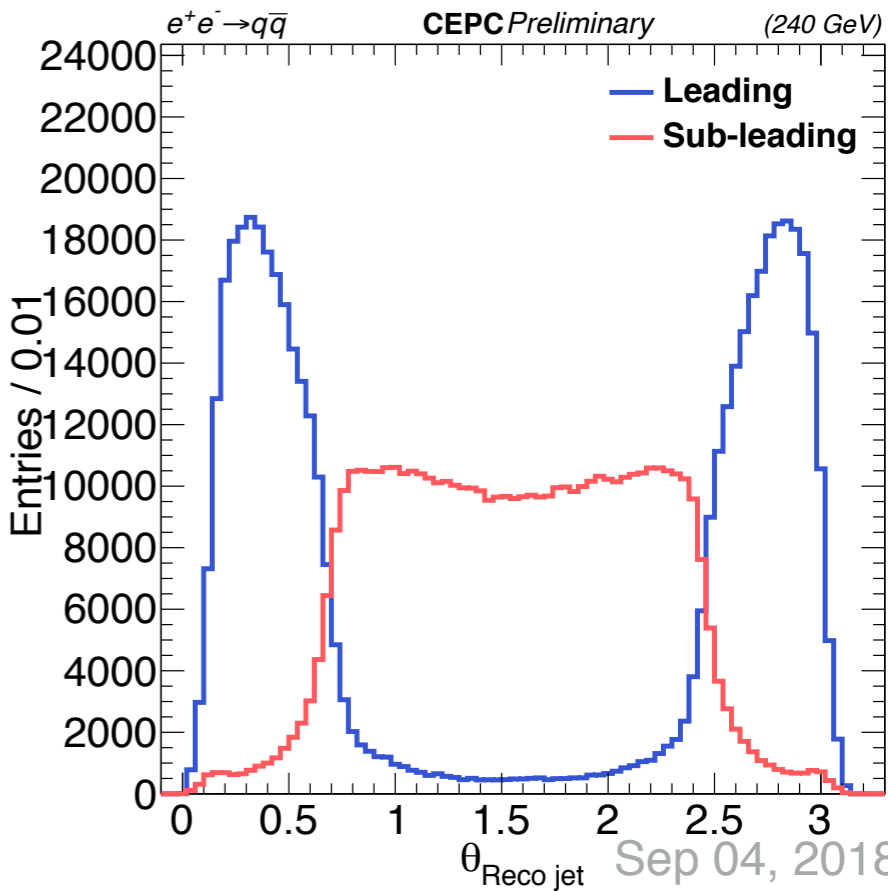
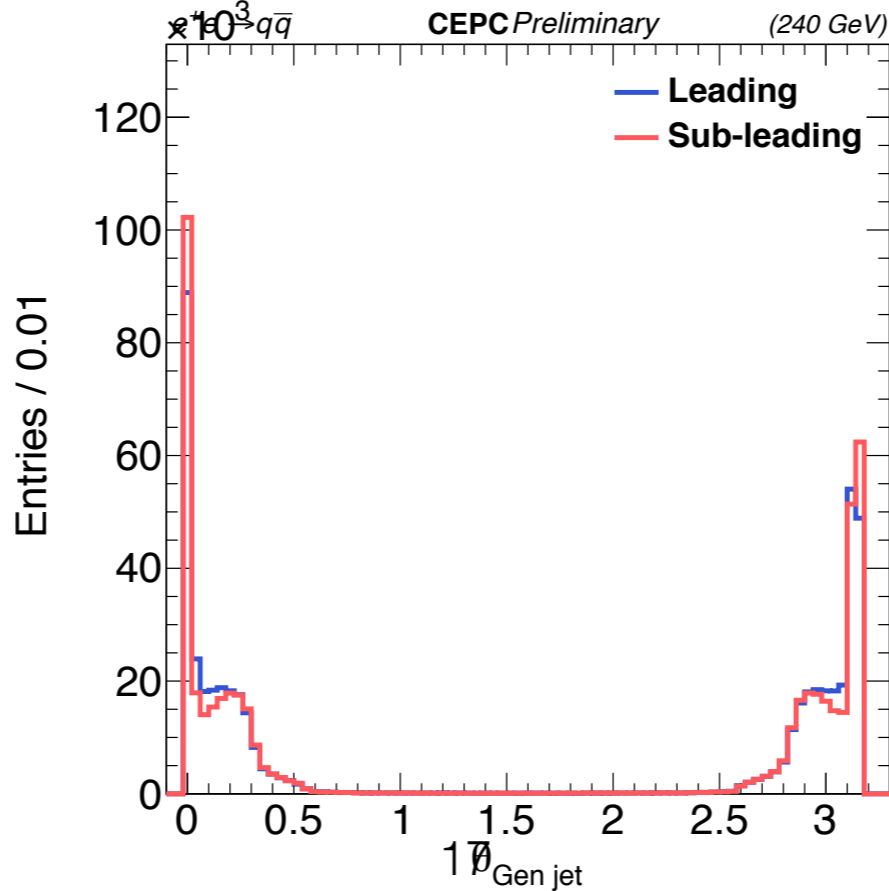
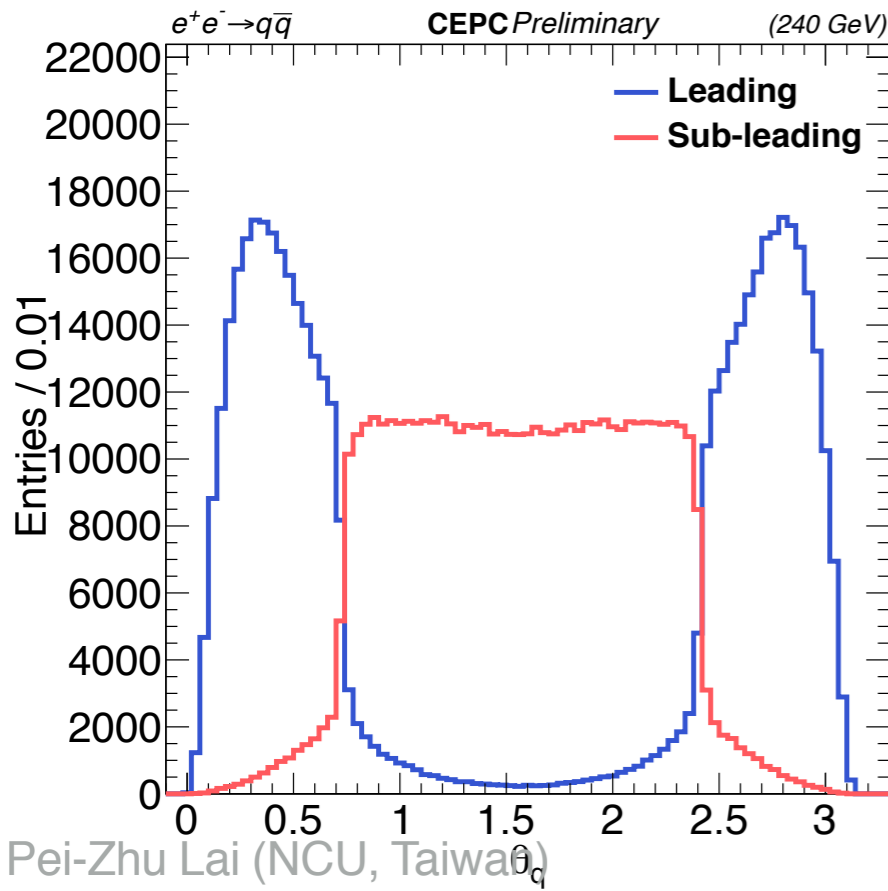
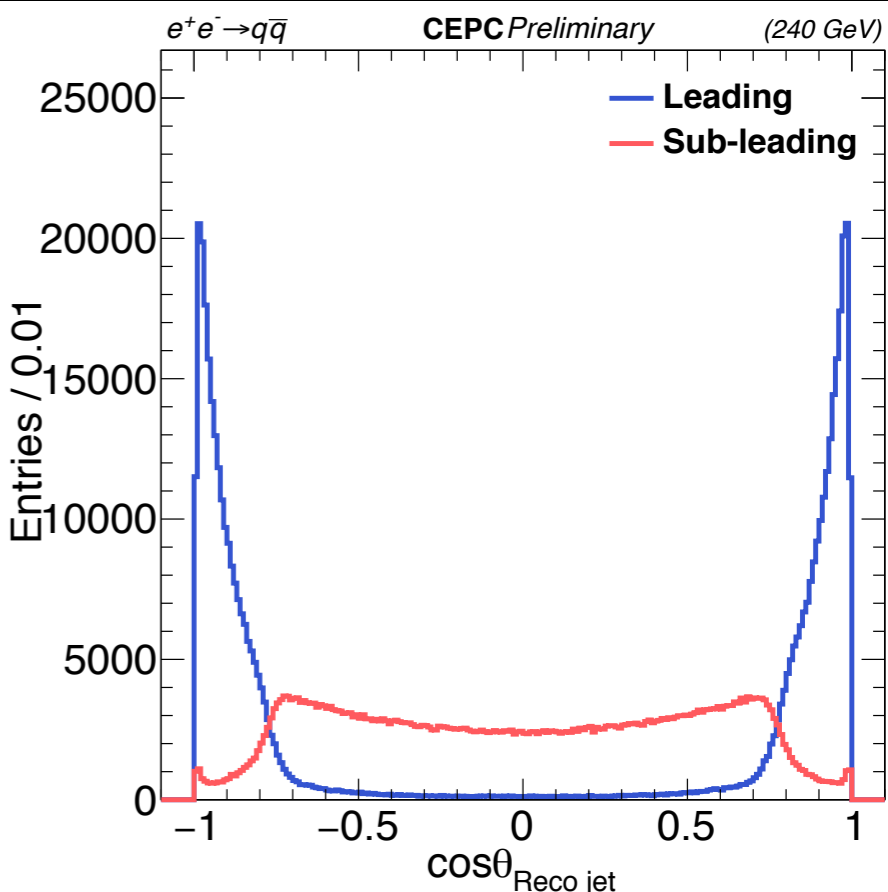
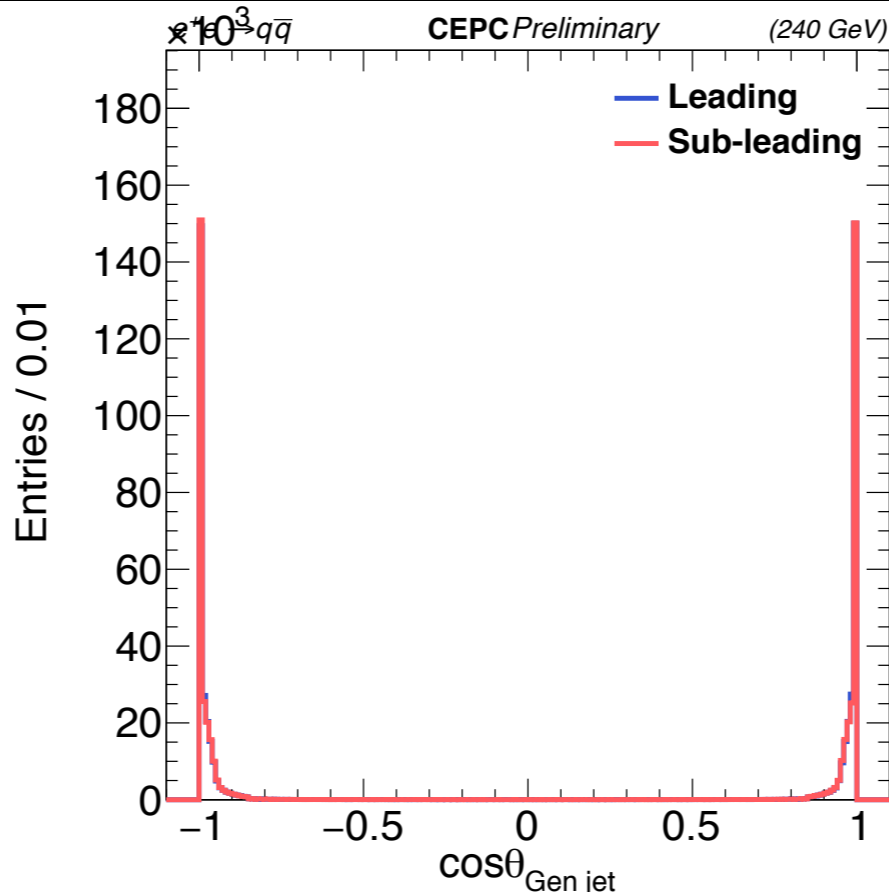
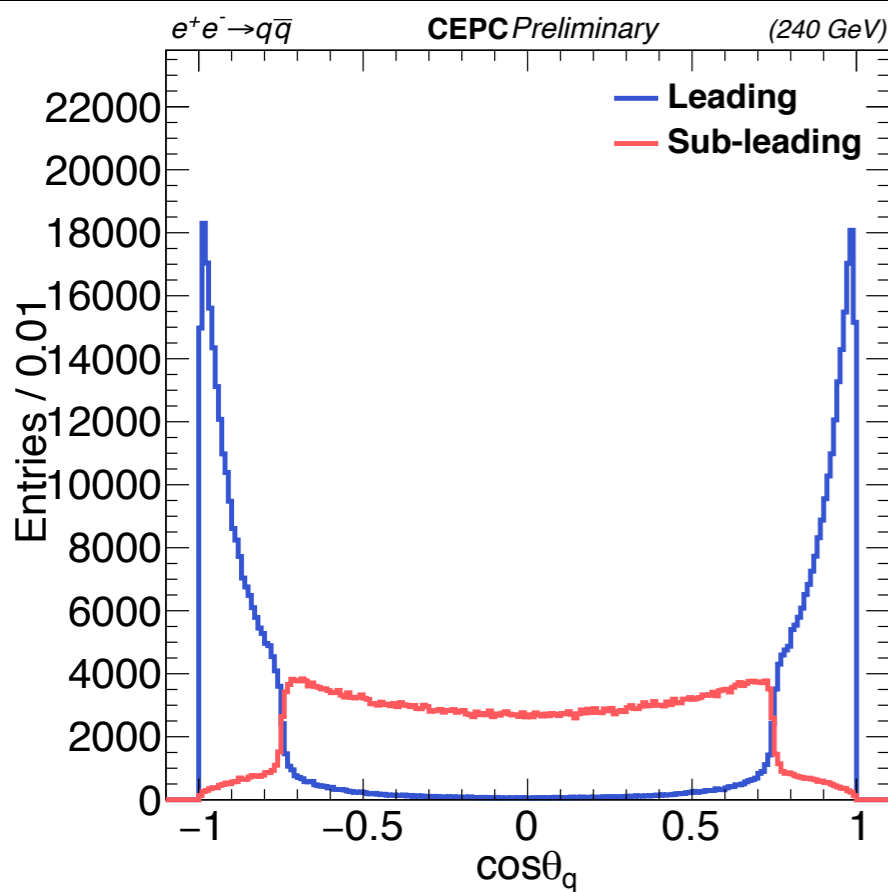


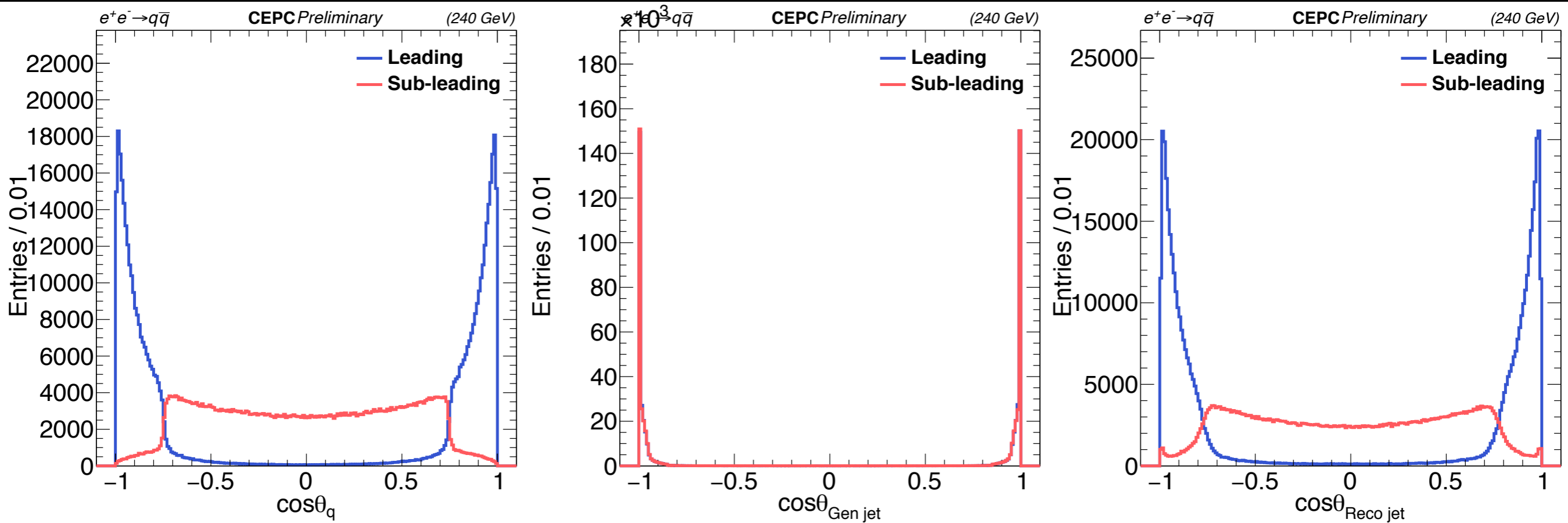


Inner Product	Parton-Gen	Gen-Reco	MCP-Reco
Leading	99.886%	99.338%	99.372%
Sub-leading	99.817%	99.716%	99.654%









Inner Product	Parton-Gen	Gen-Reco	MCP-Reco
Leading	47.503%	41.153%	99.161%
Sub-leading	1.48%	5.91%	98.485%

