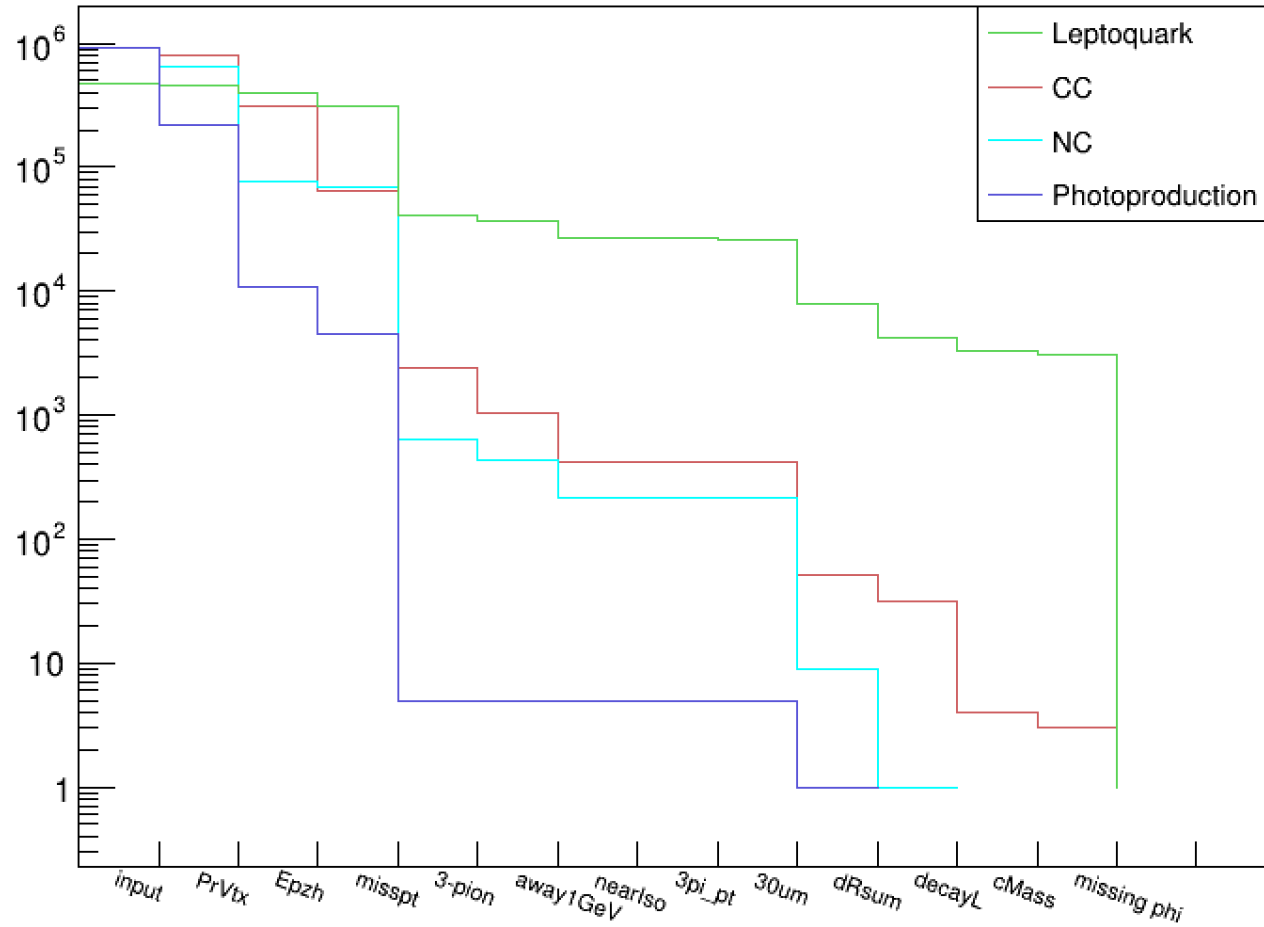


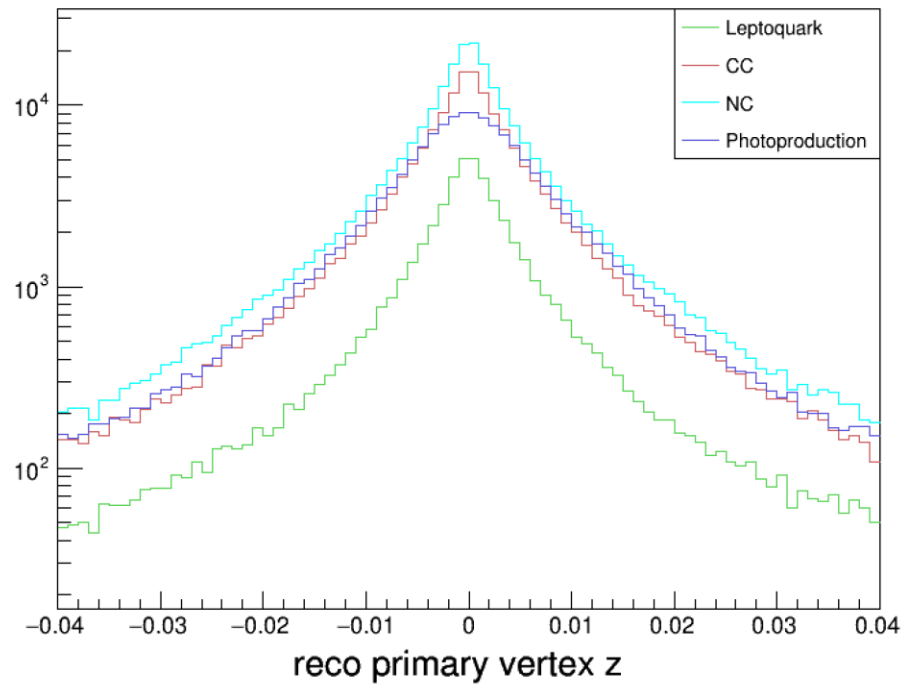
Number of Events vs Cuts



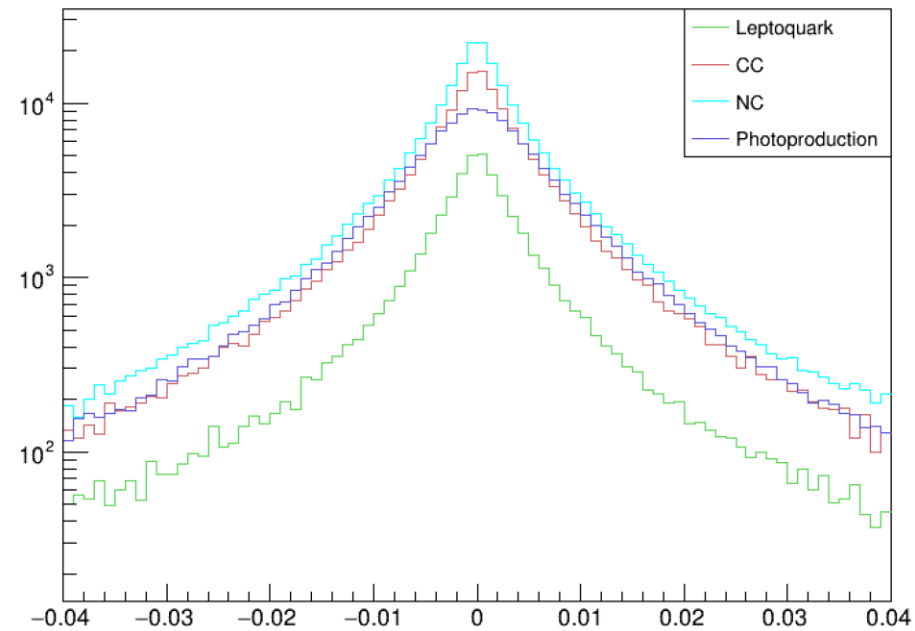
```
cut_epzh = 18;  
cut_misspt_low = 1.;  
cut_misspt_high = 9.;  
cut_asso_deltaR = 1.0;  
cut_pion_pt = 1.0;  
cut_awayPt = 1.0;  
cut_nearPt = 3.0;  
cut_3pion_pt = 3.0;  
cut_corMass = 2.0;  
cut_dR_sum = 0.3;  
cut_ave_dl = 0.05;
```

- Compare S/B using multivariable technique (Machine learning with ROOT) TMVA <https://root.cern/manual/tmva/>
- Use multivariable technique to get group of cuts
- 3-prong first, then we can go to different decay mode
- Optimization of the selection criteria
- Run the script for more event, already in a process

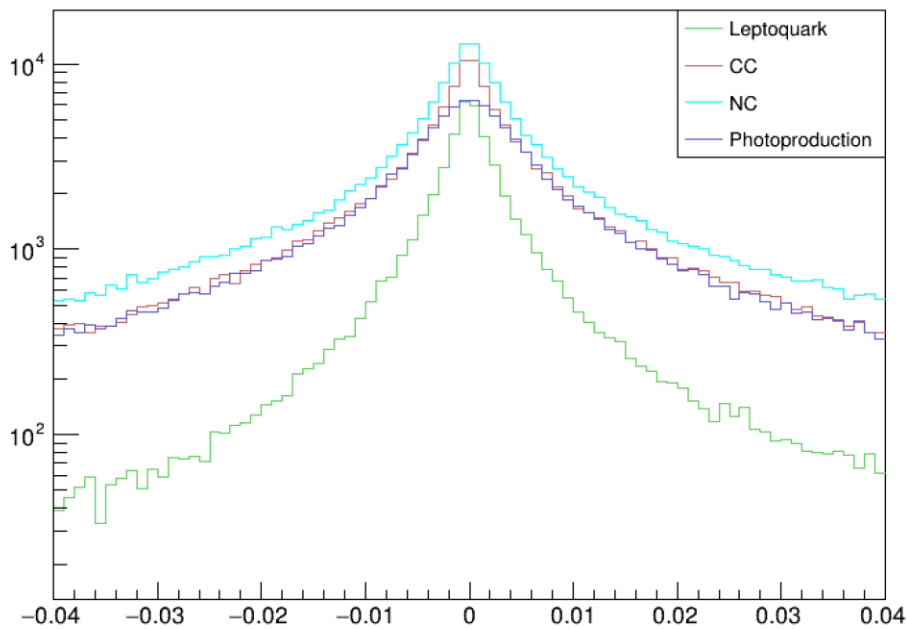
reco primary vertex x



reco primary vertex y



reco primary vertex z



Number of tracks < 4

$v_x - g_{vx}$, h_{vx_1}

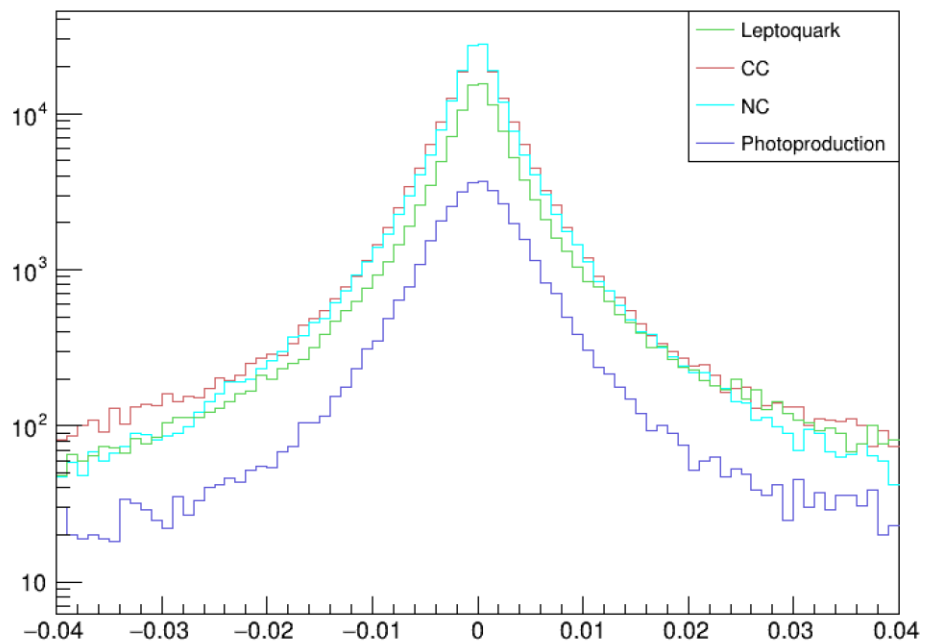
$v_y - g_{vy}$, h_{vy_1}

$v_z - g_{vz}$, h_{vz_1}

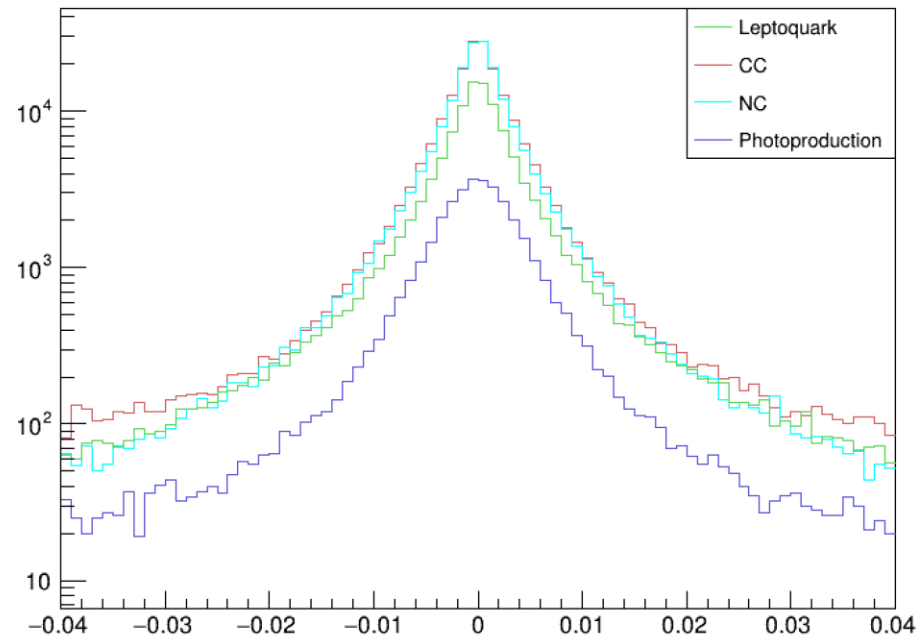
True vertex/ Generator vertex (g_{vx}, g_{vy}, g_{vz})

Primary vertex (v_x, v_y, v_z)

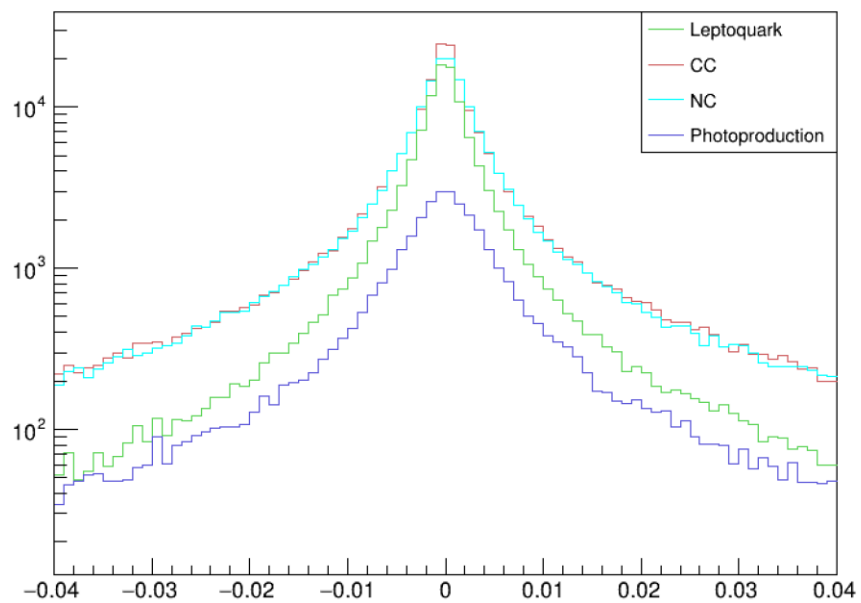
reco primary vertex x



reco primary vertex y



reco primary vertex z



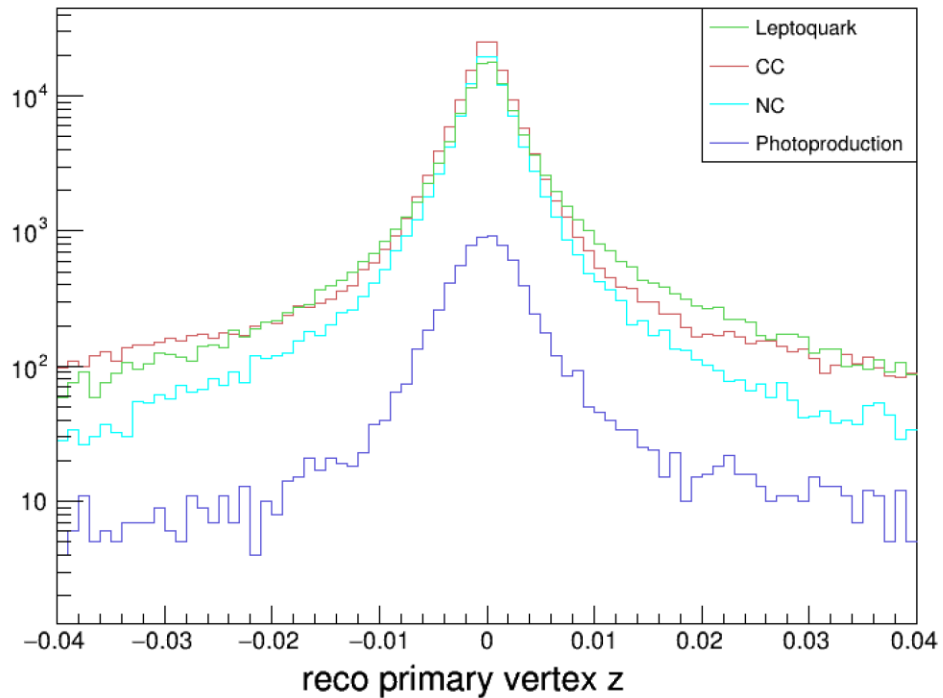
Number of tracks < 6

$v_x - g_{v_x}, h_{v_x_2}$

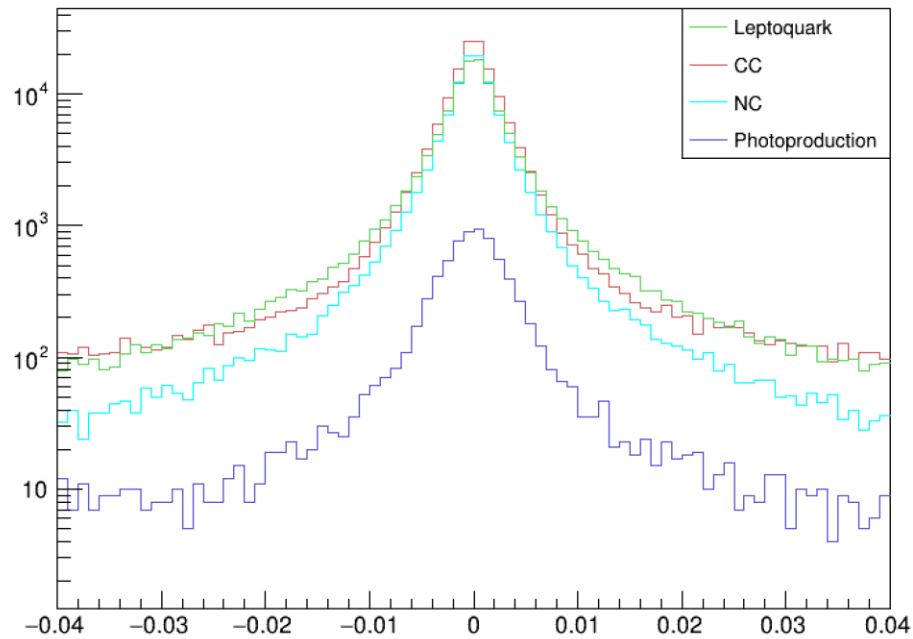
$v_y - g_{v_y}, h_{v_y_2}$

$v_z - g_{v_z}, h_{v_z_2}$

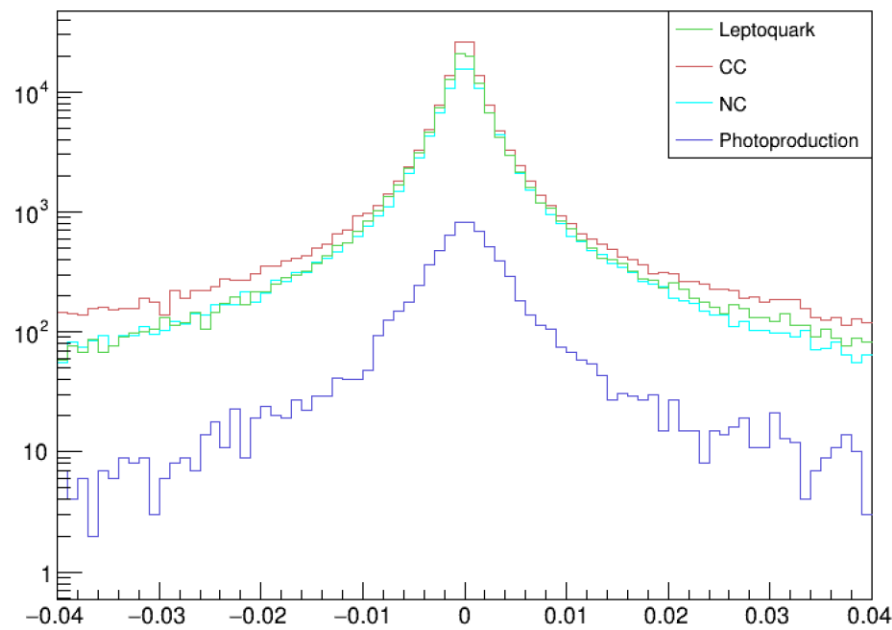
reco primary vertex x



reco primary vertex y



reco primary vertex z



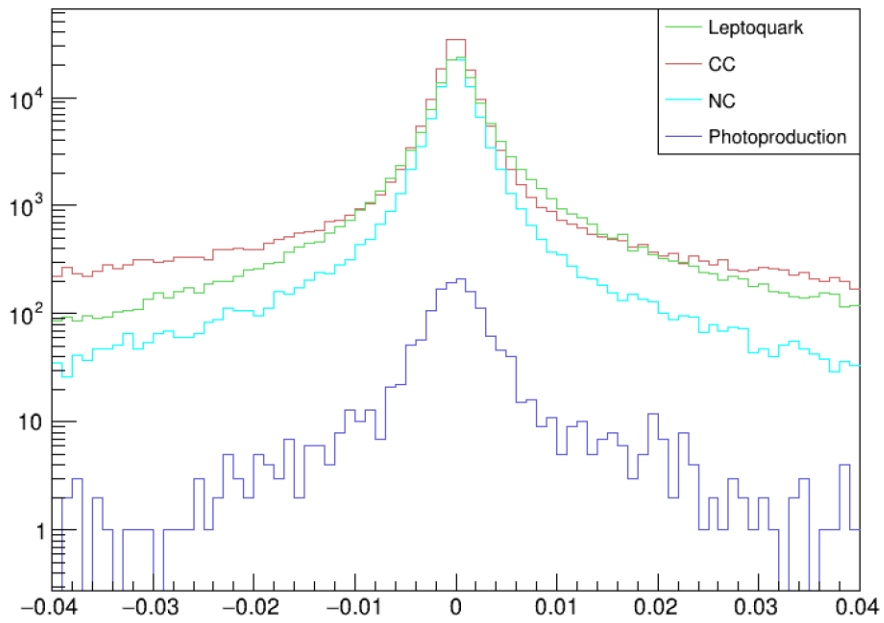
Number of tracks < 8

$v_x - g_{vx}$, h_{vx_3}

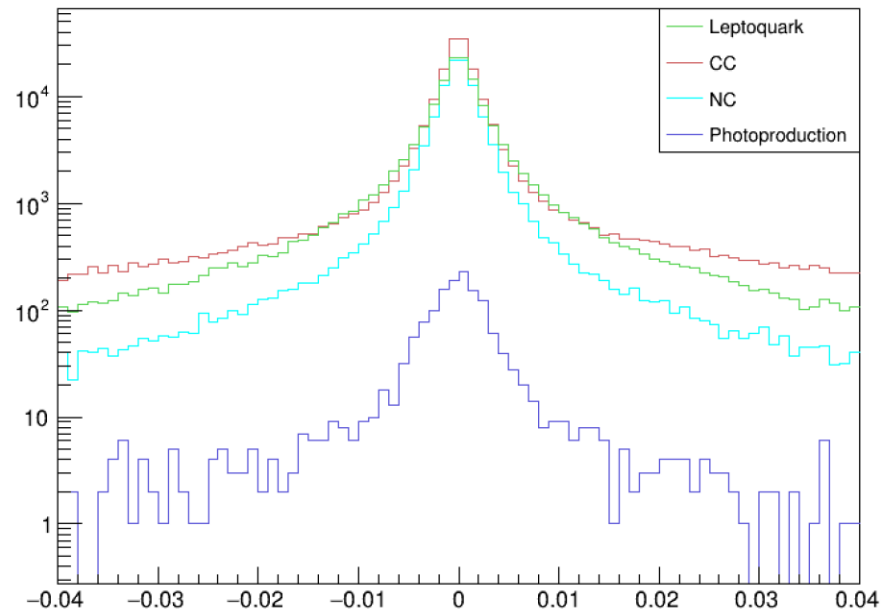
$v_y - g_{vy}$, h_{vy_3}

$v_z - g_{vz}$, h_{vz_3}

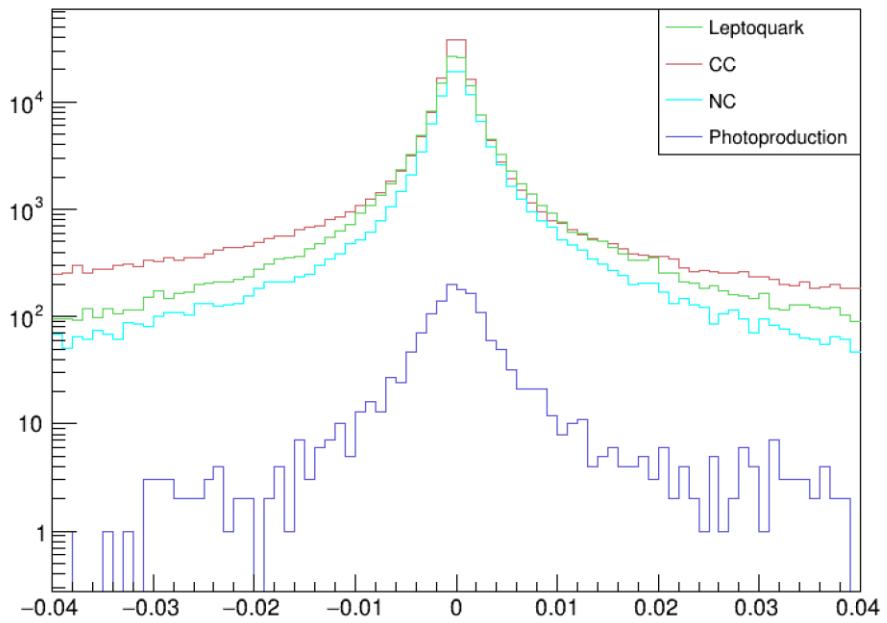
reco primary vertex x



reco primary vertex y



reco primary vertex z



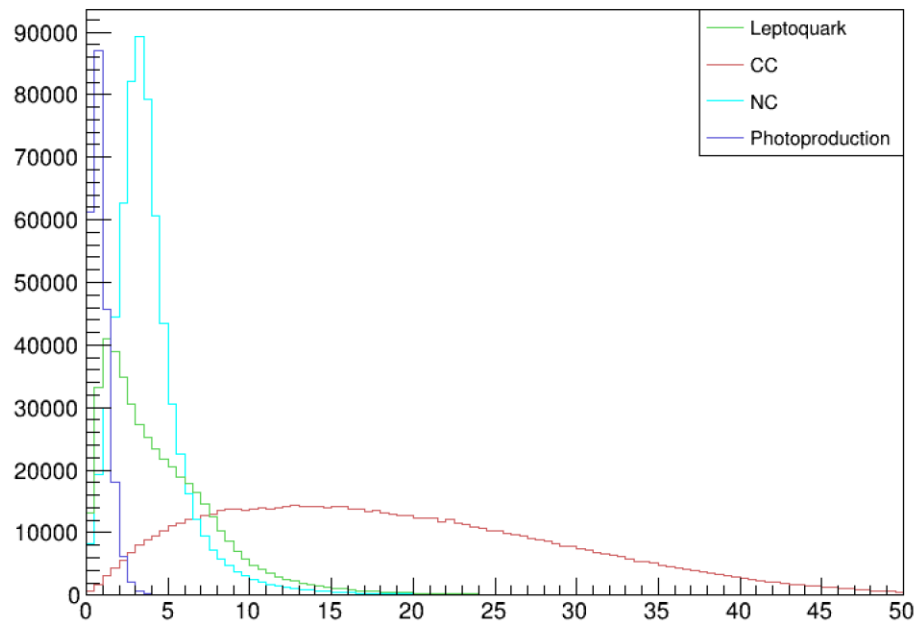
Number of tracks < else

$v_x - g_{v_x}$, $h_{v_x}_4$

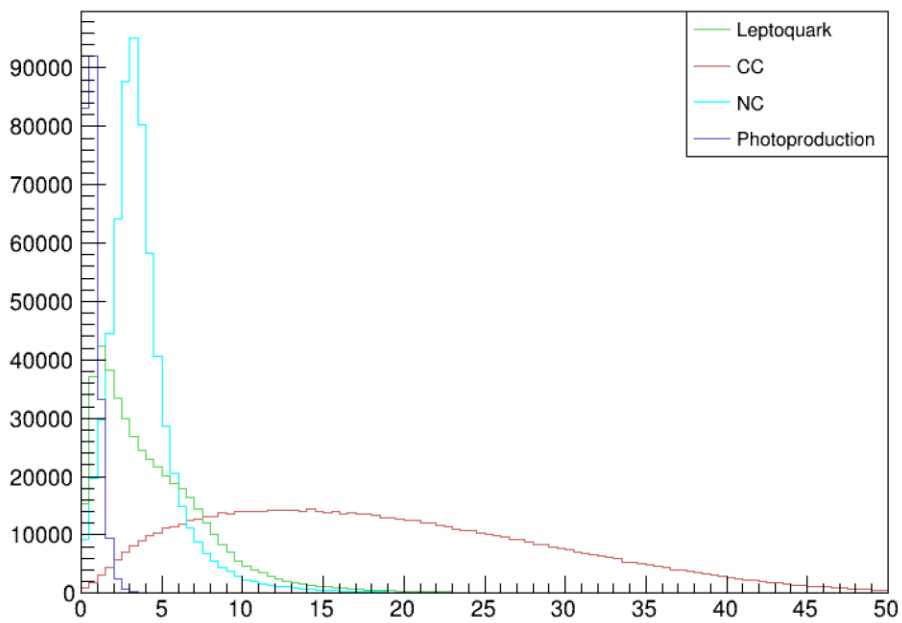
$v_y - g_{v_y}$, $h_{v_y}_4$

$v_z - g_{v_z}$, $h_{v_z}_4$

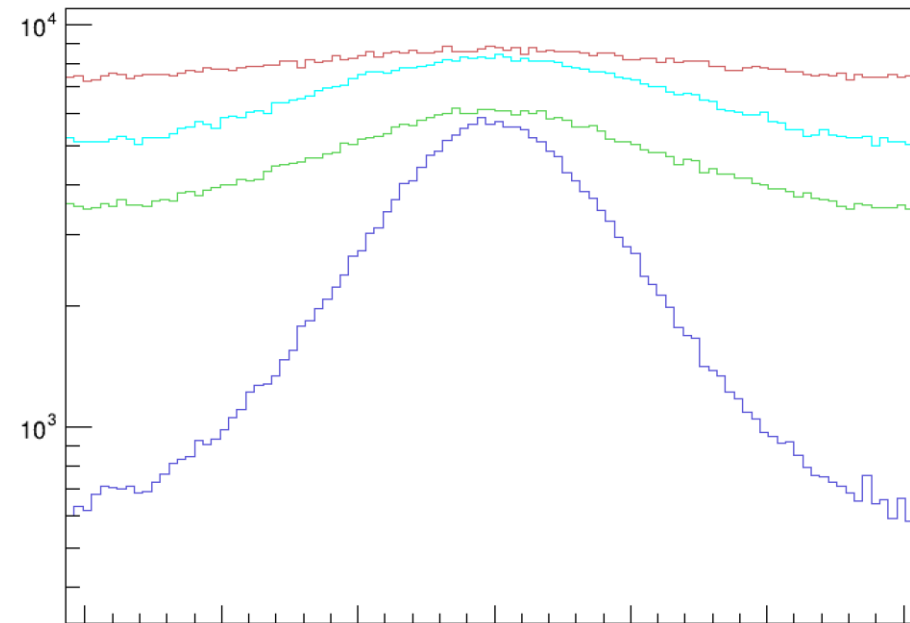
Lab frame: missing pt



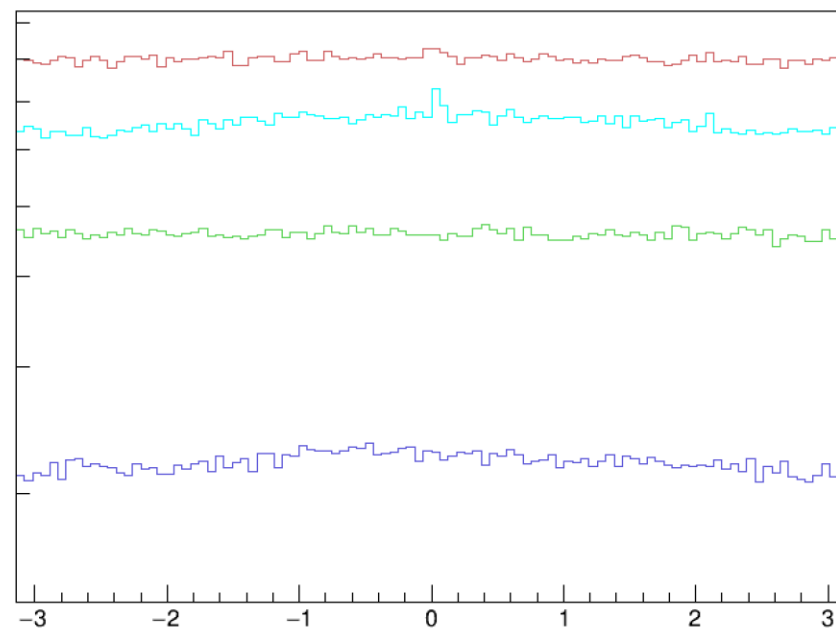
Head-on frame: missing pt

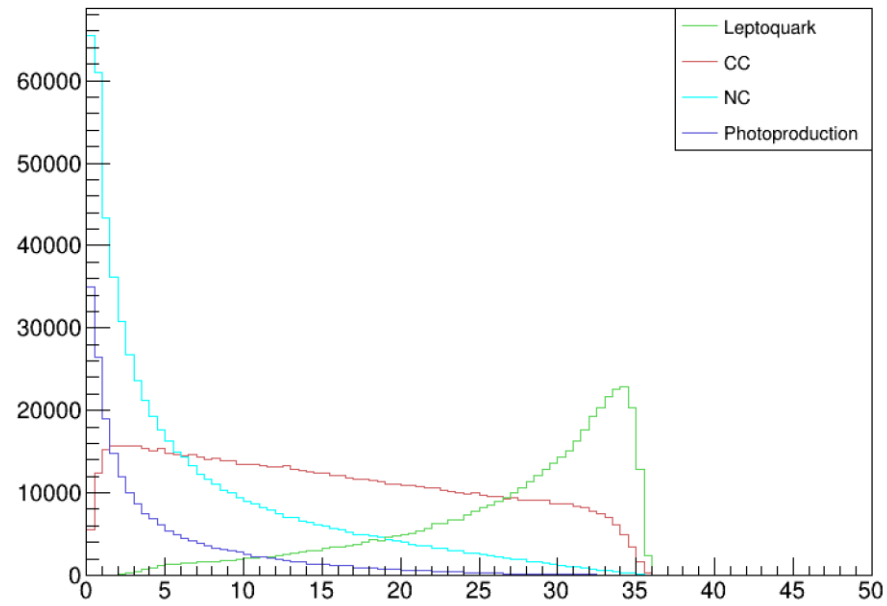
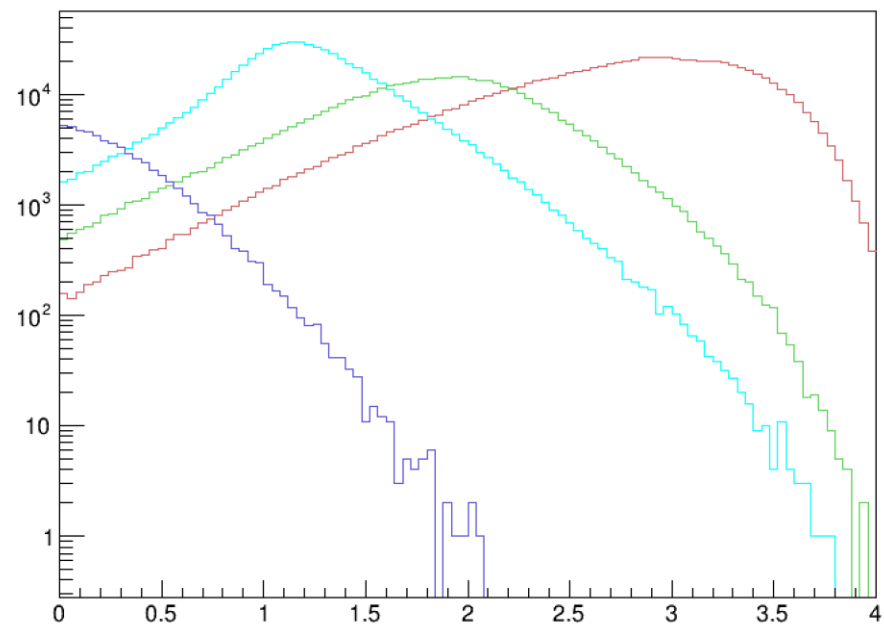
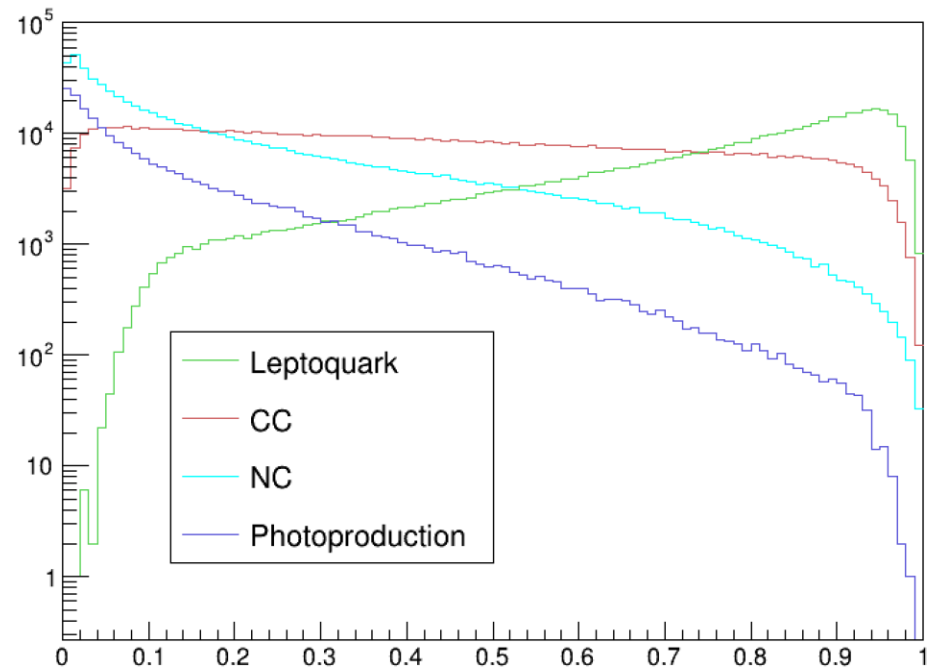
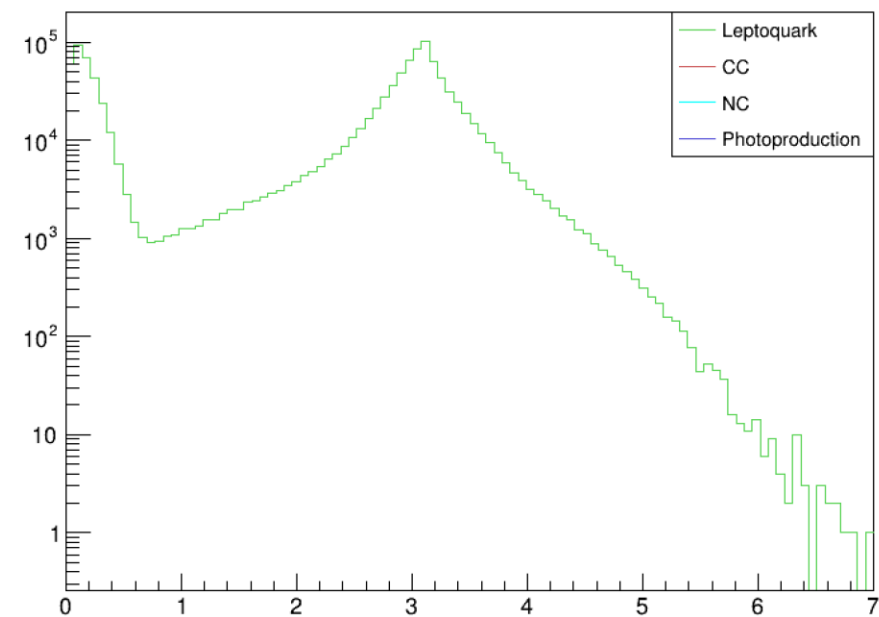


Lab frame: missing phi

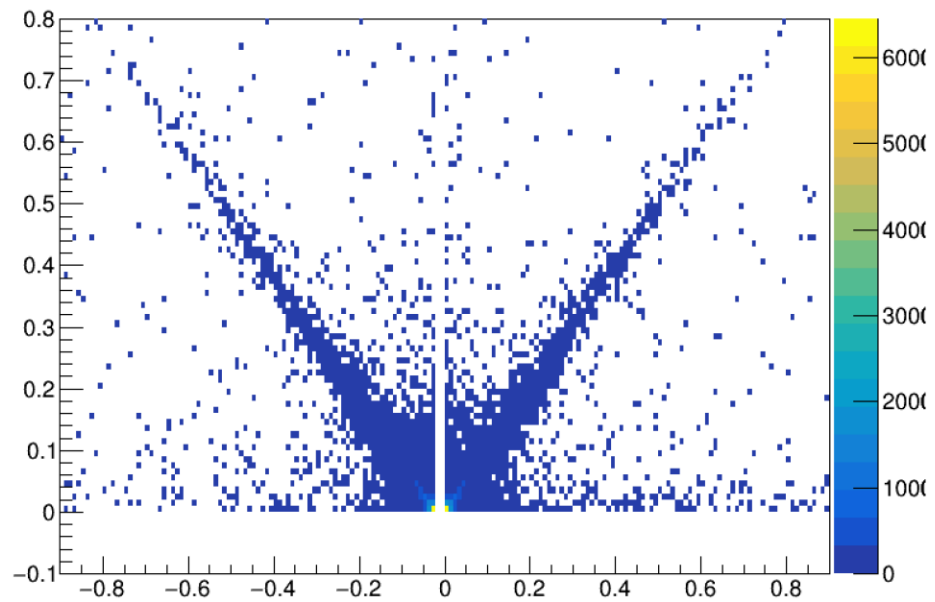


Head-on frame: missing phi

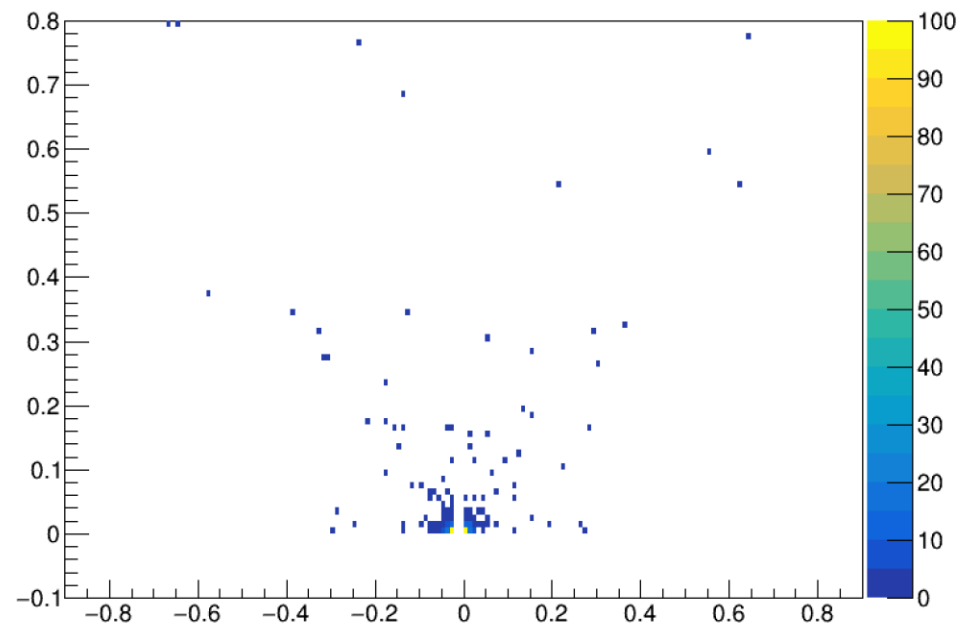


Head-on: Σ ($E-p_z$)event Q^2 (JB)event y (JB) $\Delta R(\tau-\pi)$ 

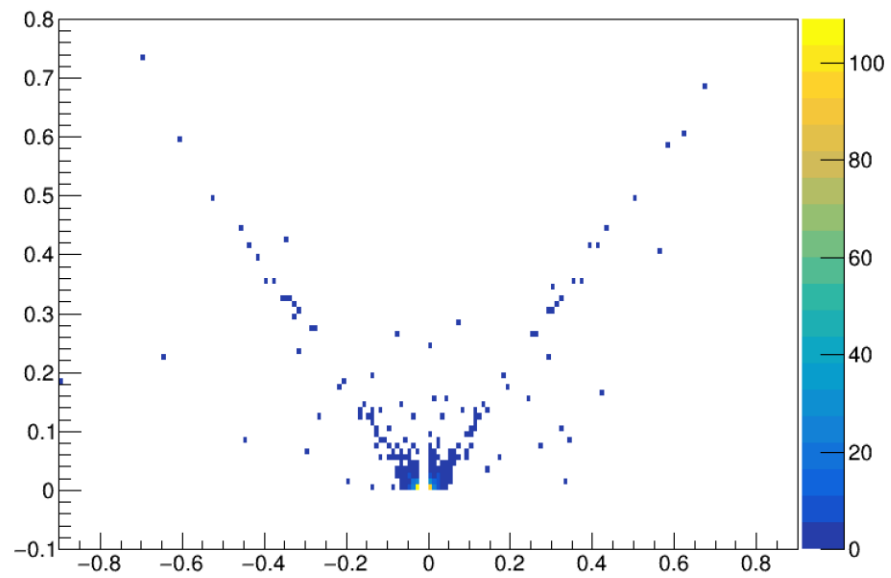
dl 12



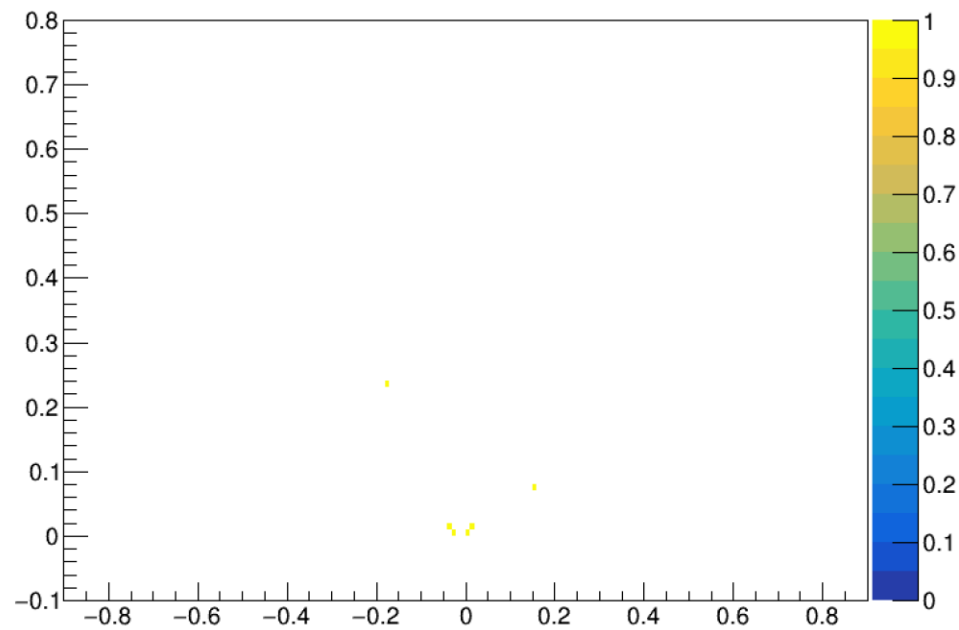
dl 12



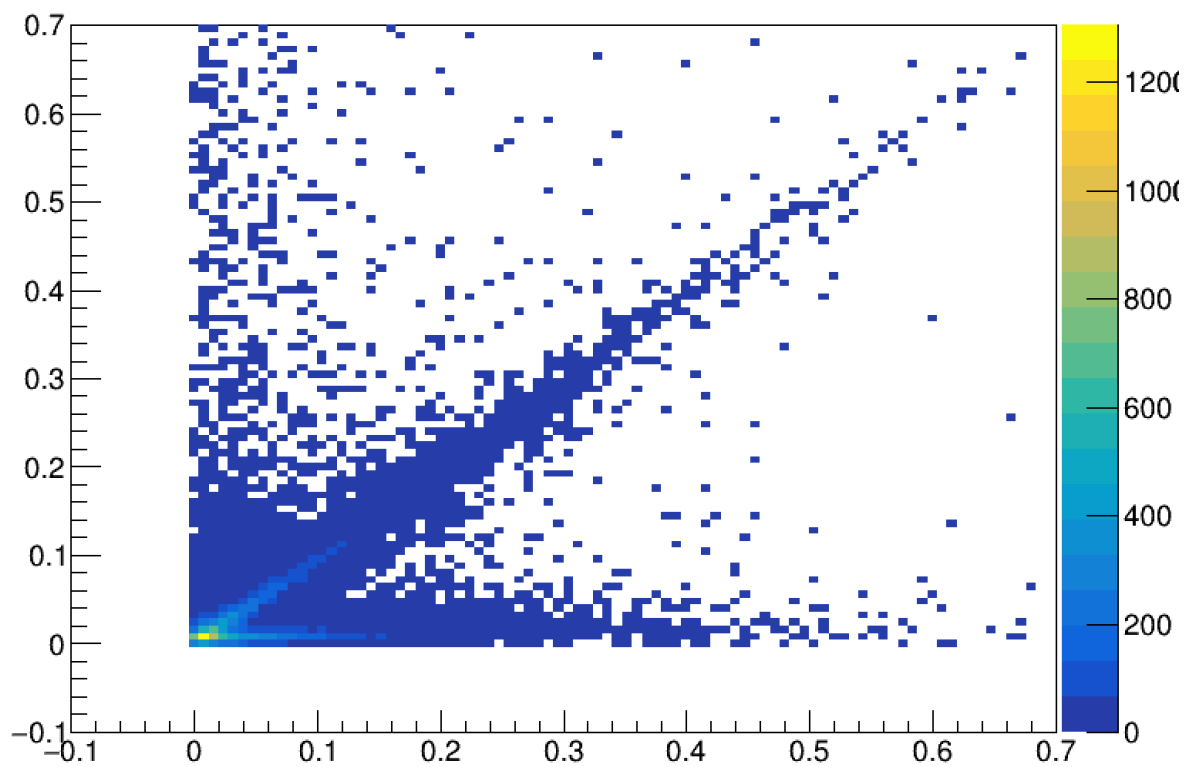
dl 12



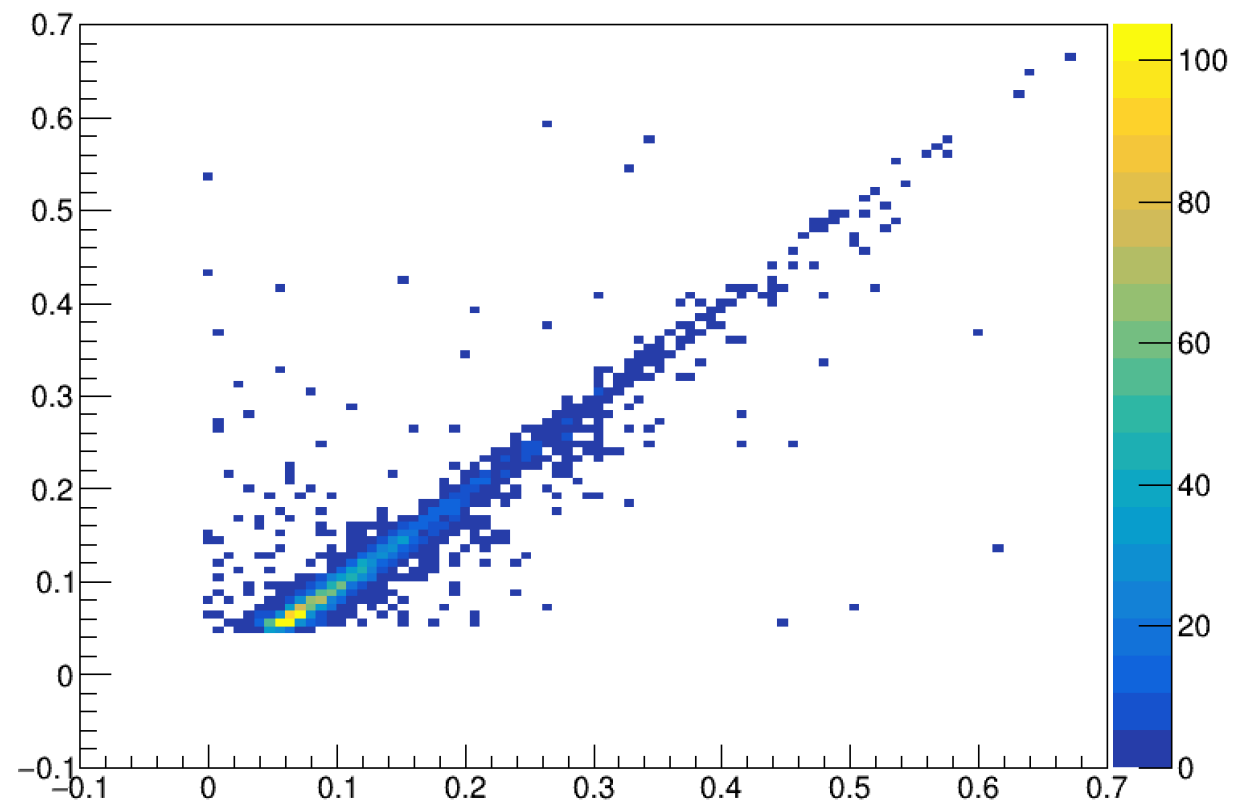
dl 12



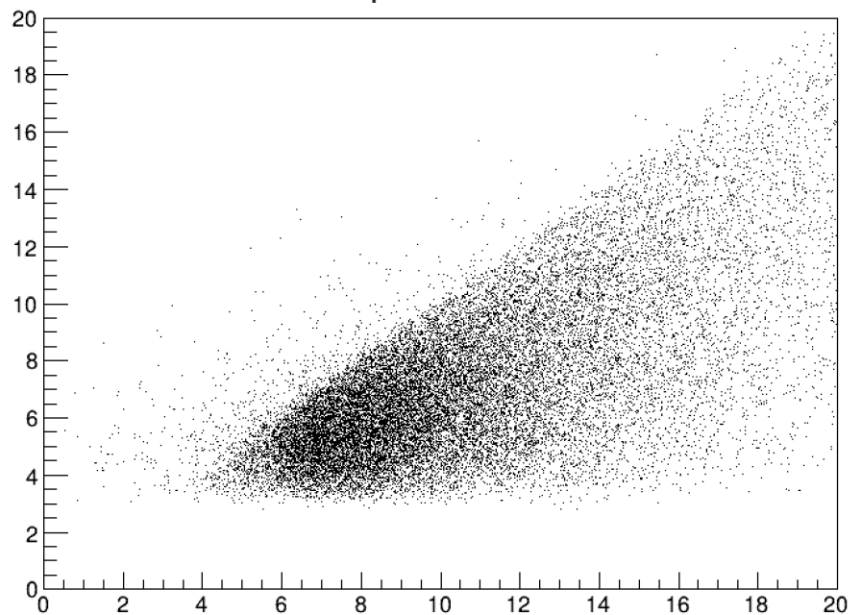
decay length: truth vs. reco



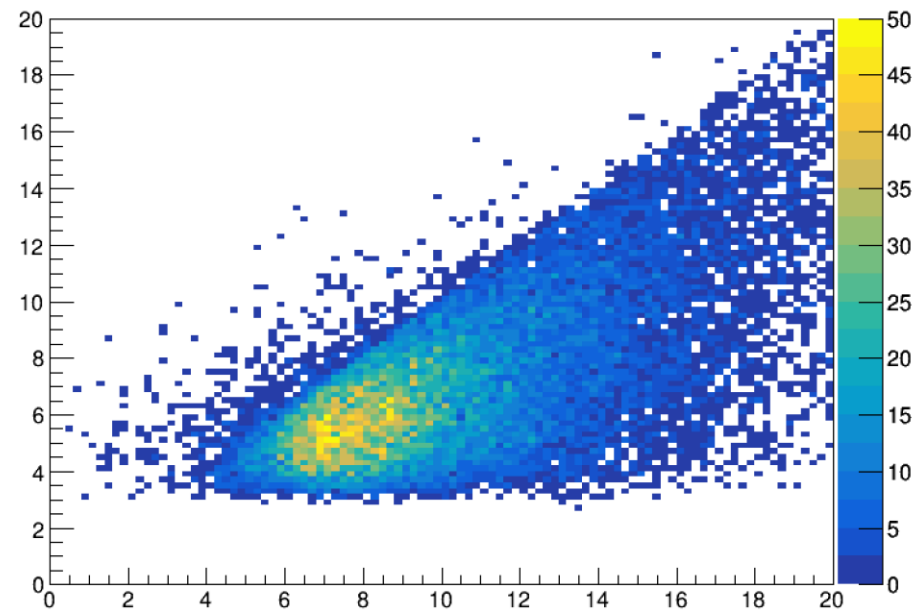
decay length (final): truth vs. reco



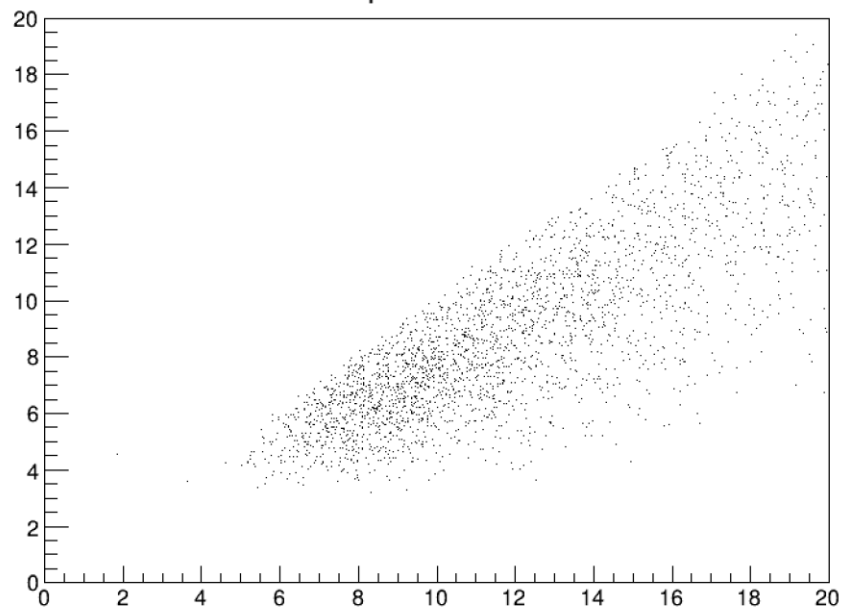
$\rho_T: \tau$ vs. 3π



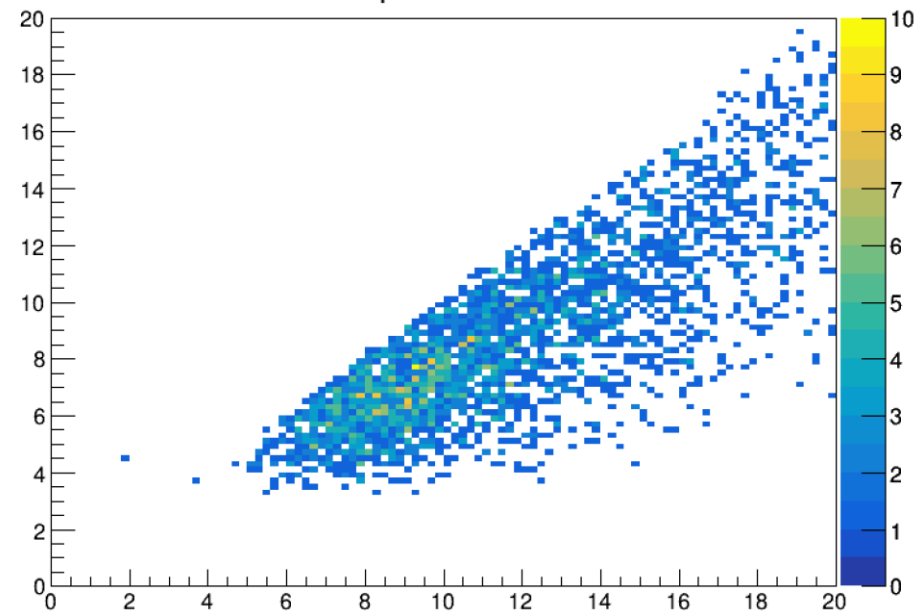
$P_T: \tau$ vs. 3π



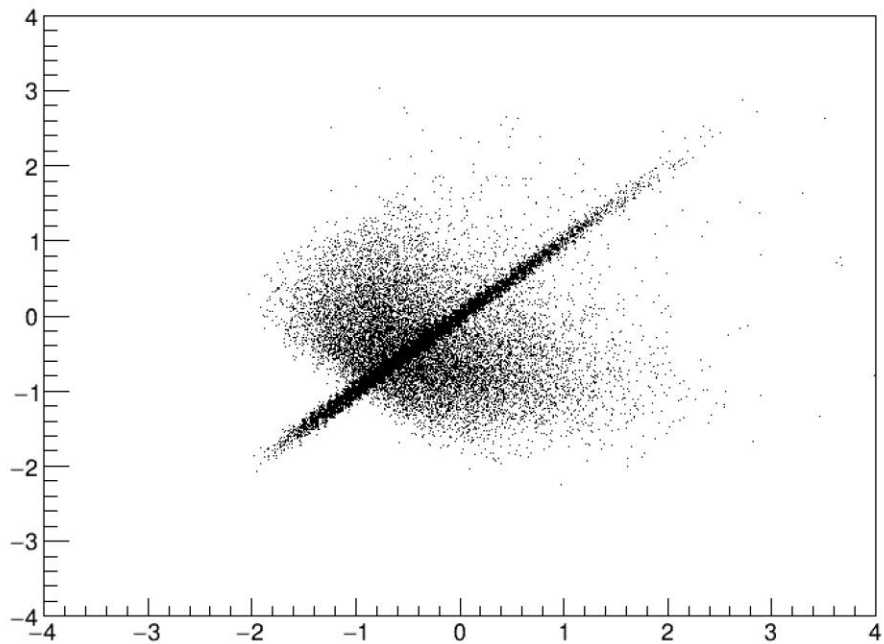
$\rho_T: \tau$ vs. 3π



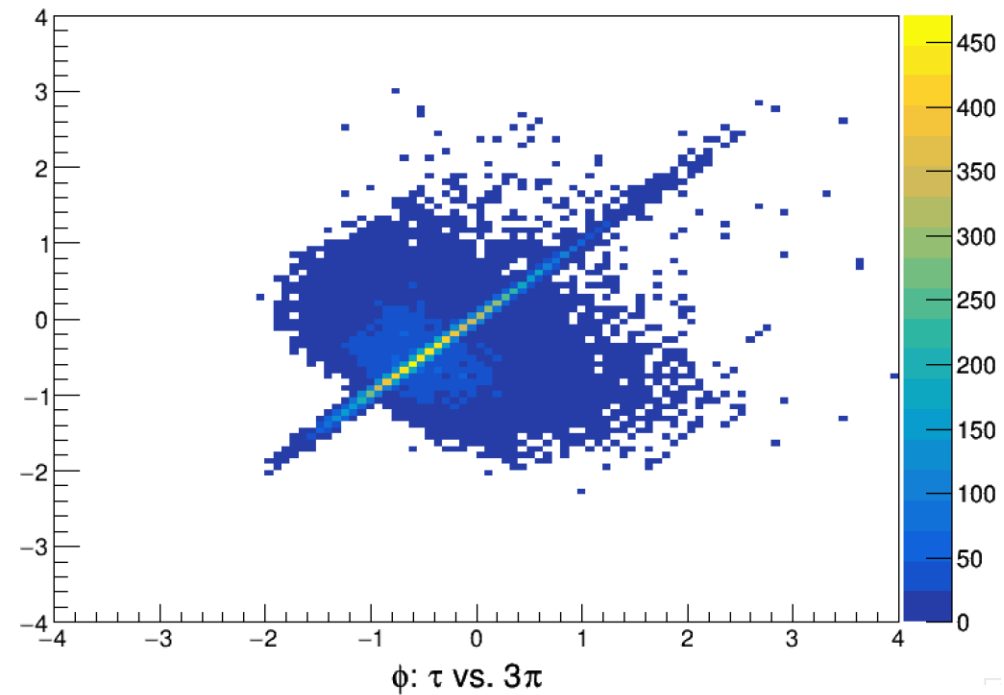
$\rho_T: \tau$ vs. 3π



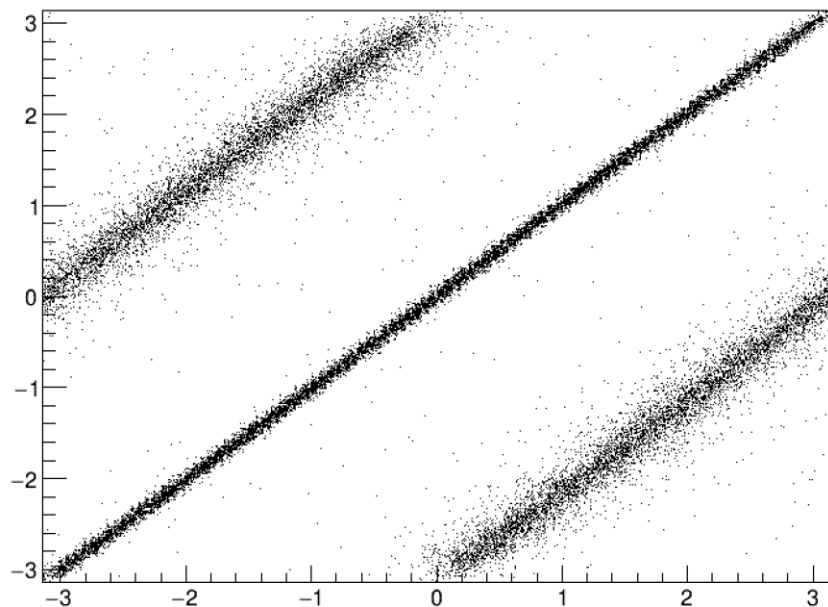
Eta: τ vs. 3π



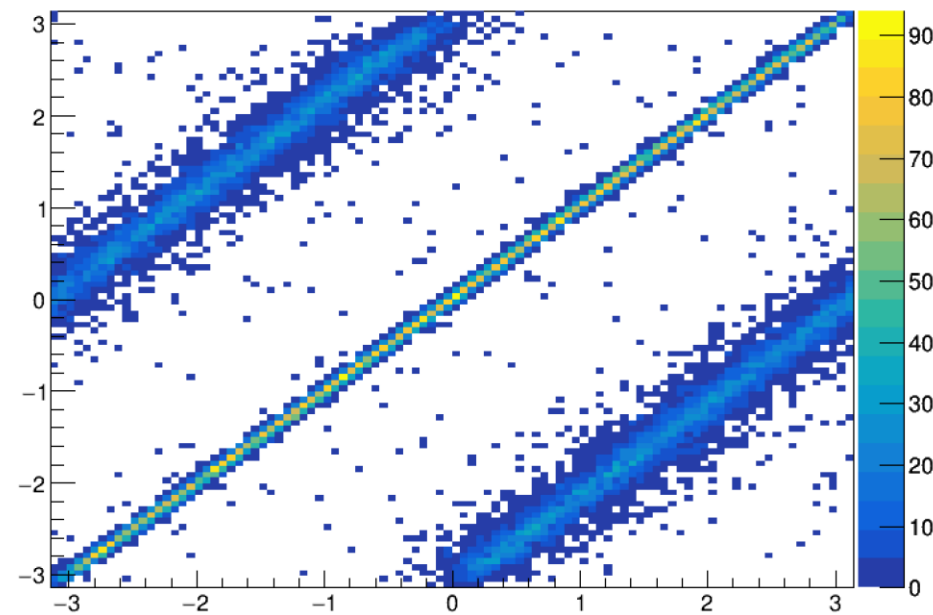
η : τ vs. 3π

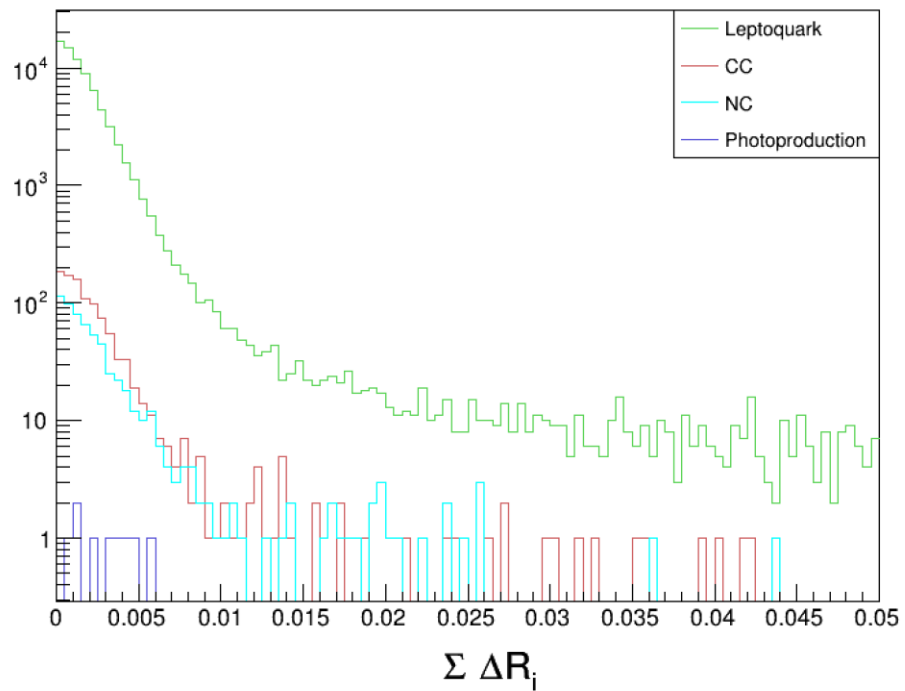
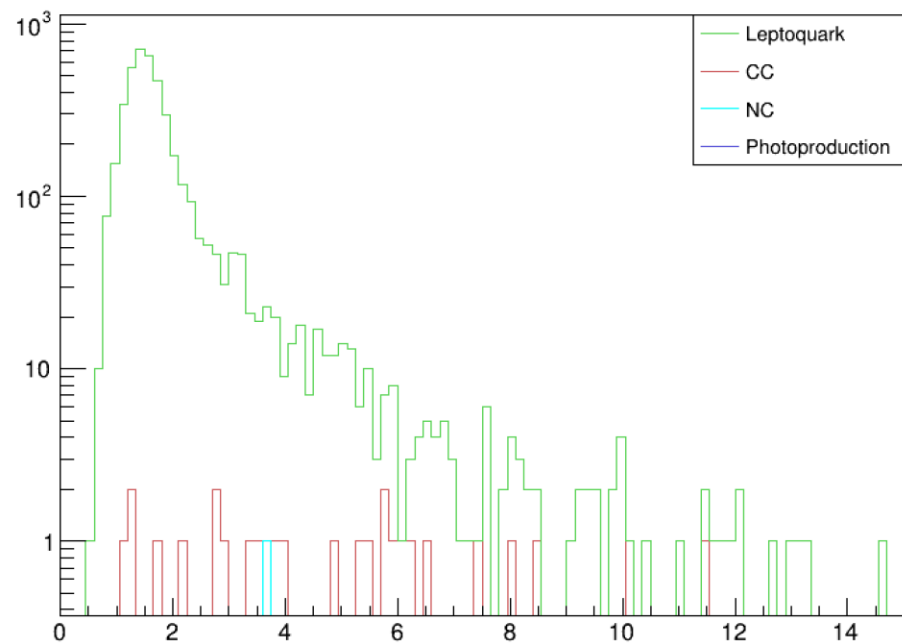
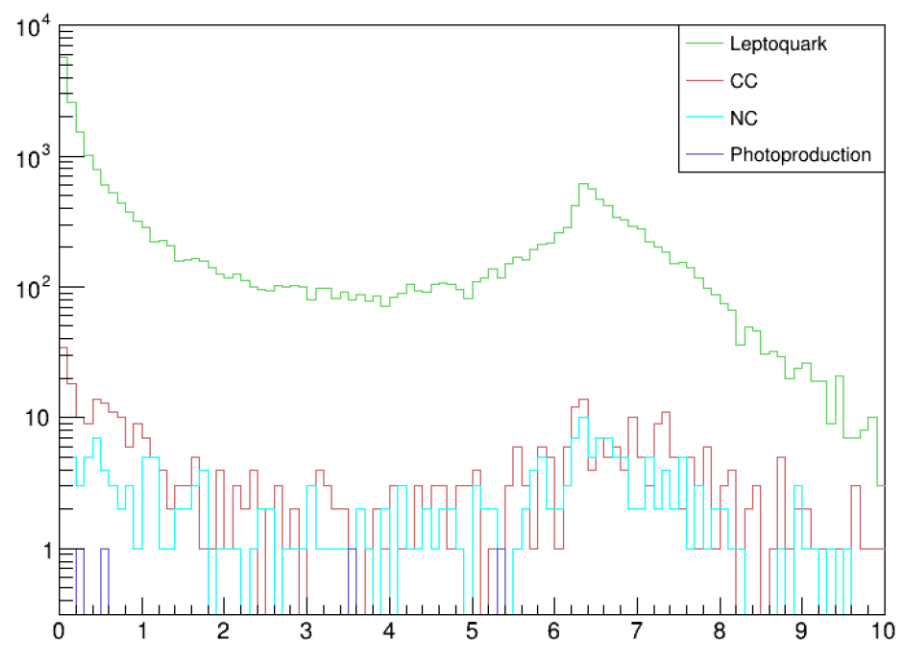
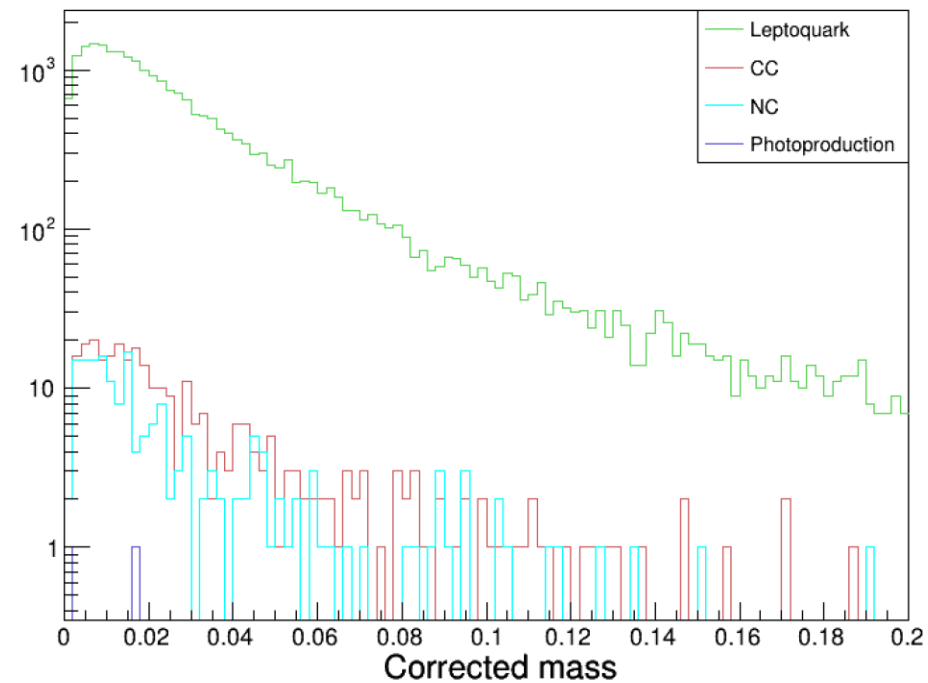


Phi: τ vs. 3π

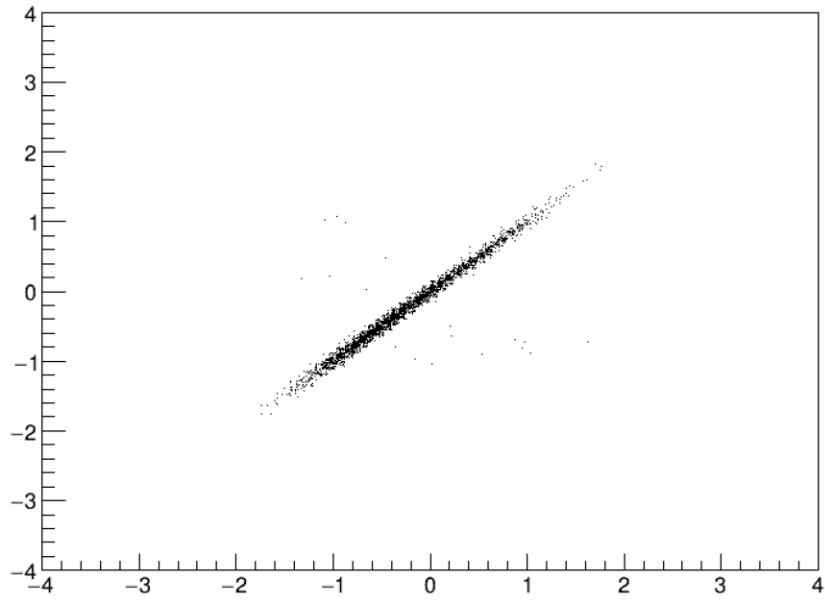


ϕ : τ vs. 3π

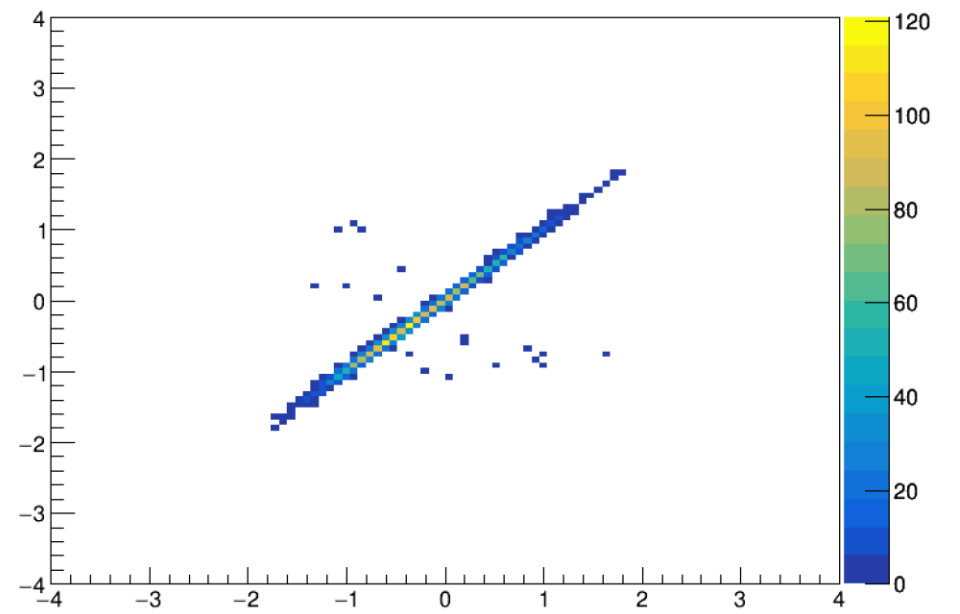


dca for two π  $\Sigma |d_i - d_j|$ 

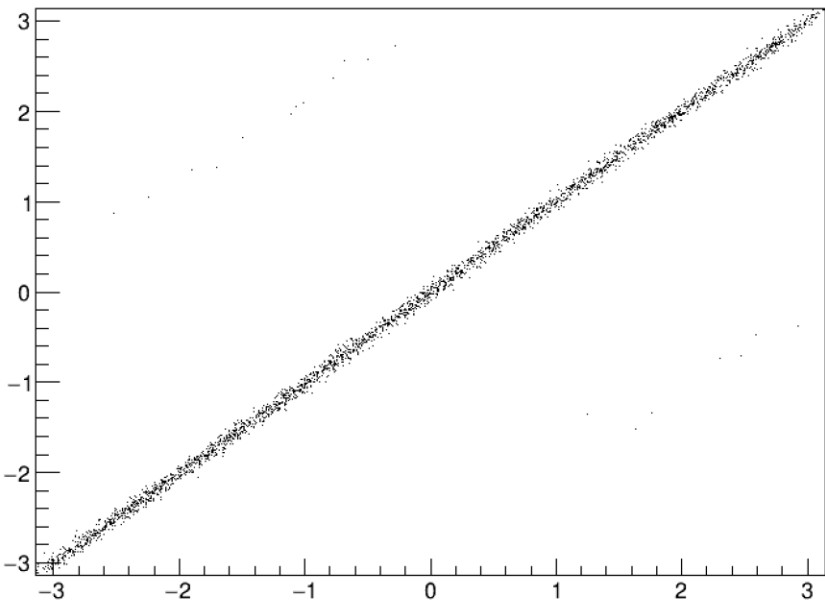
Eta: τ vs. 3π



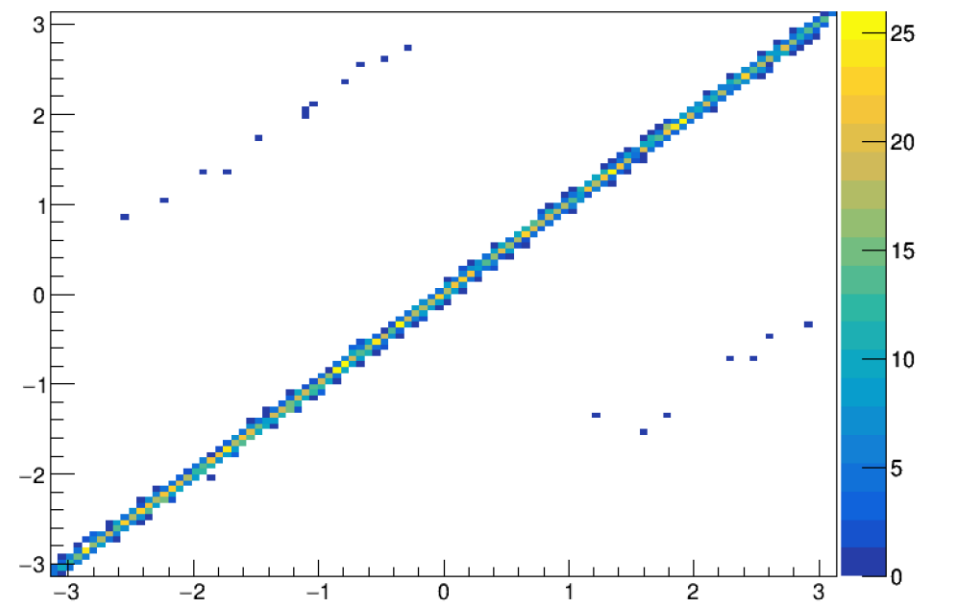
η : τ vs. 3π

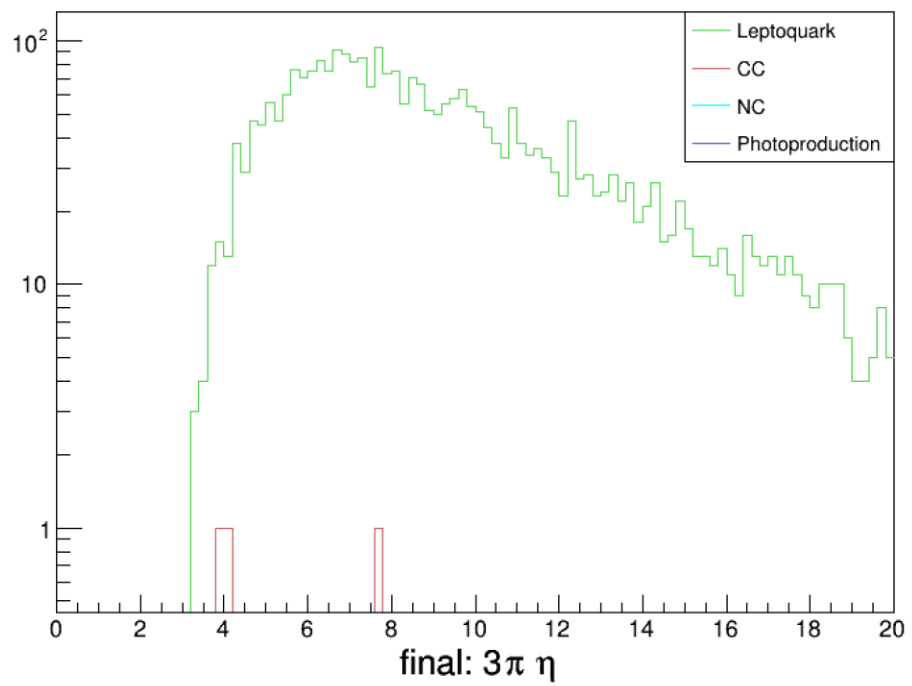
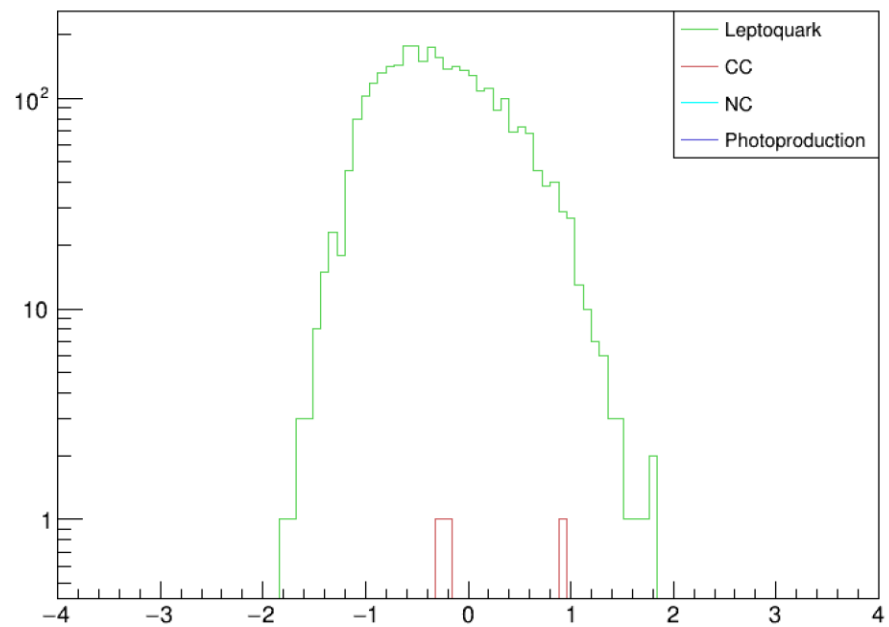
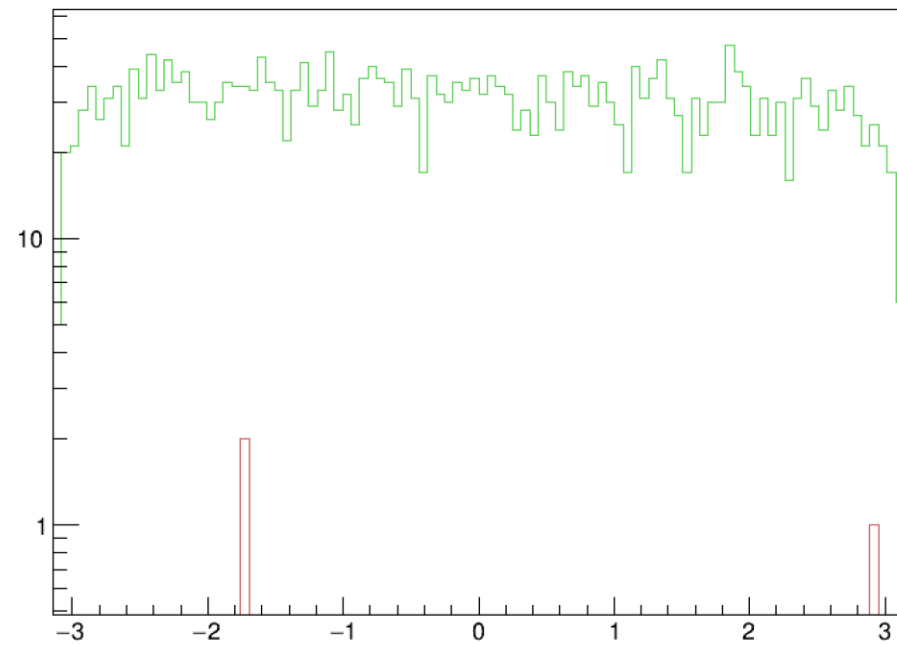


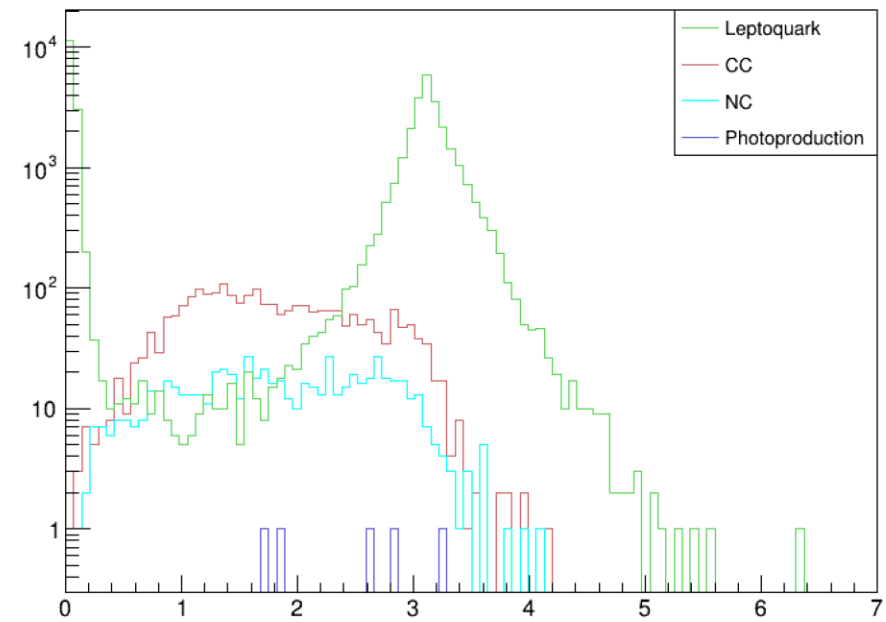
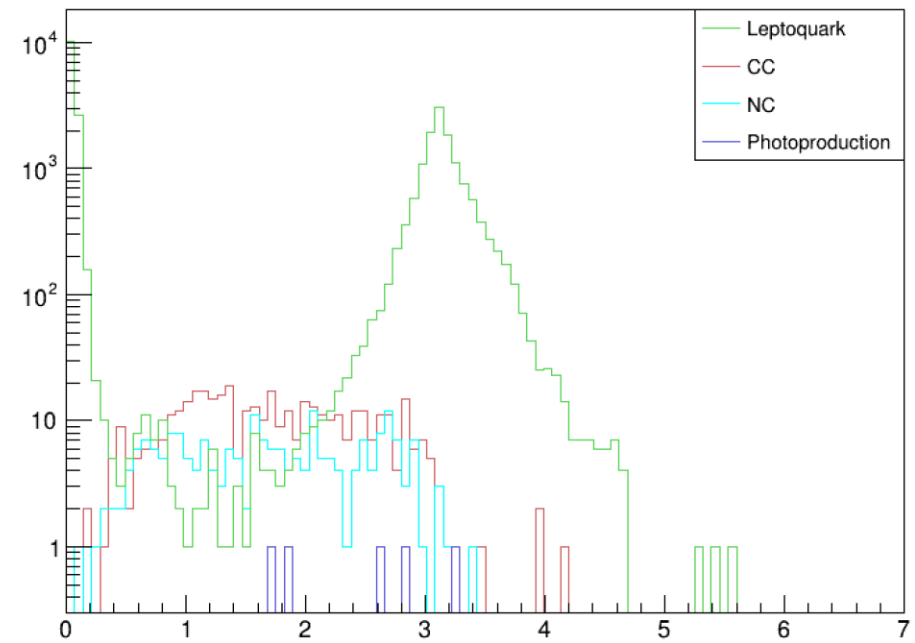
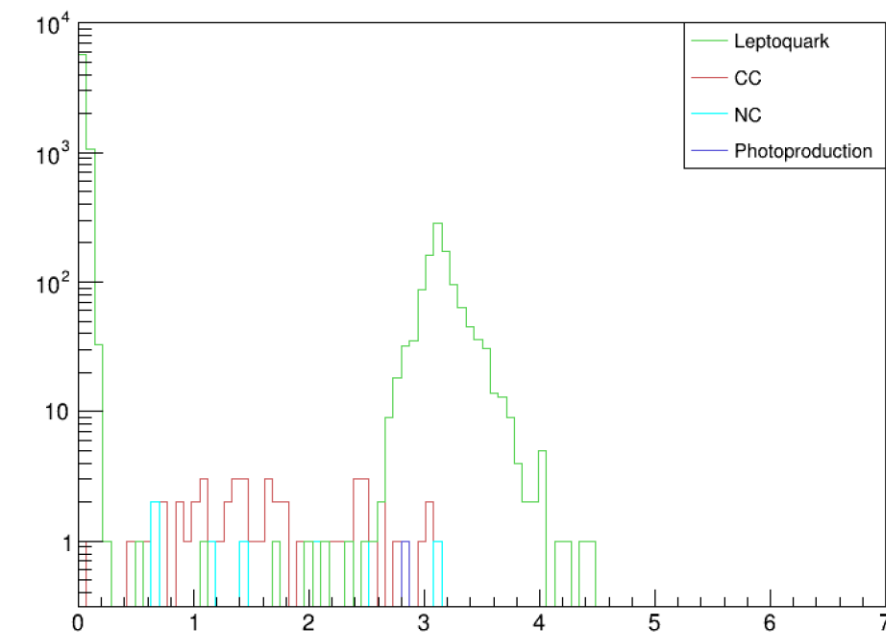
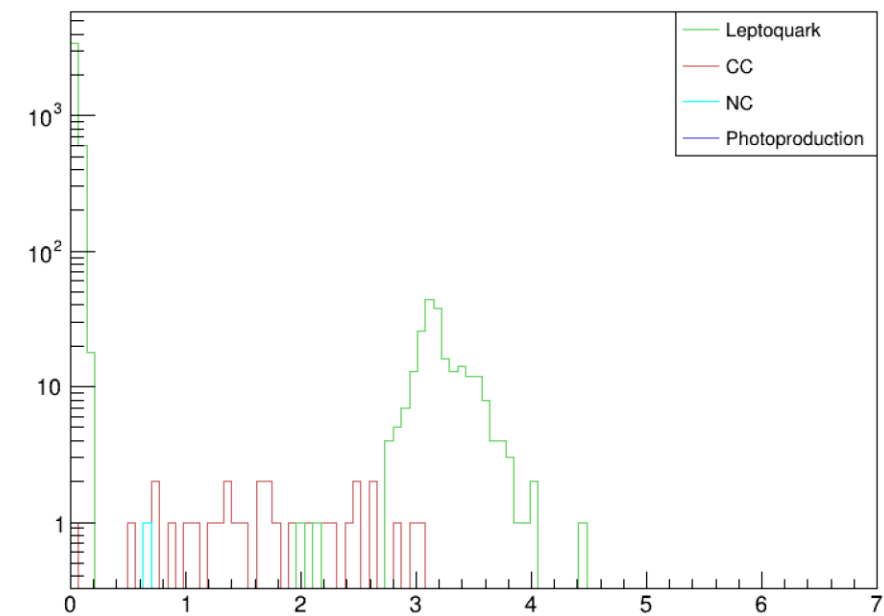
Phi: τ vs. 3π

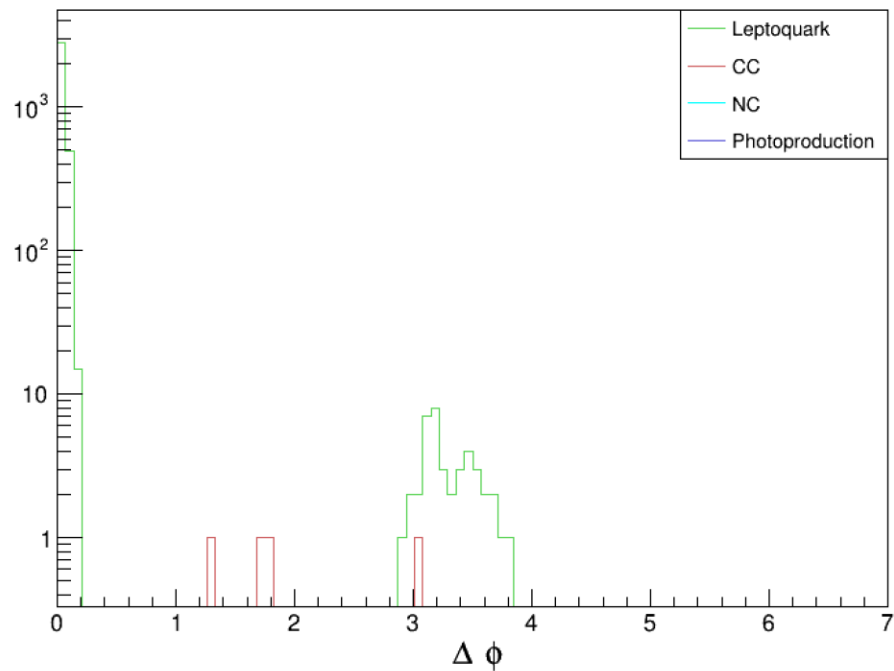


ϕ : τ vs. 3π



final: $3\pi \rho_T$ final: $3\pi \phi$ 

$\Delta rR(\tau-3\pi)$  $\Delta rR(\tau-3\pi)$  $\Delta rR(\tau-3\pi)$  $\Delta rR(\tau-3\pi)$ 

$\Delta rR(\tau-3\pi)$  $\Delta rR(\tau-3\pi)$ 