Study of
Single-W process

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 —> Current status & progress of my study

Status

- I analysed single-W process events(actually these also include W-pair process and etc.) with fully simulated DBD samples.

  - /group/ilc/soft/samples/mc-dbd/ild/dst-merged/250-TDR_ws/4f_singleW_semileptonic/ILD_o1_v05/v01-16-p10_250/

  - Beam condition is 80% for left-handed electrons, 30% for right-handed positrons.

- I made some plots :

  - mass of W->qq' vs 2-jet recoil mass

  - Some plots of information about 2-jets & isolated leptons separately for charge of found isolated lepton.
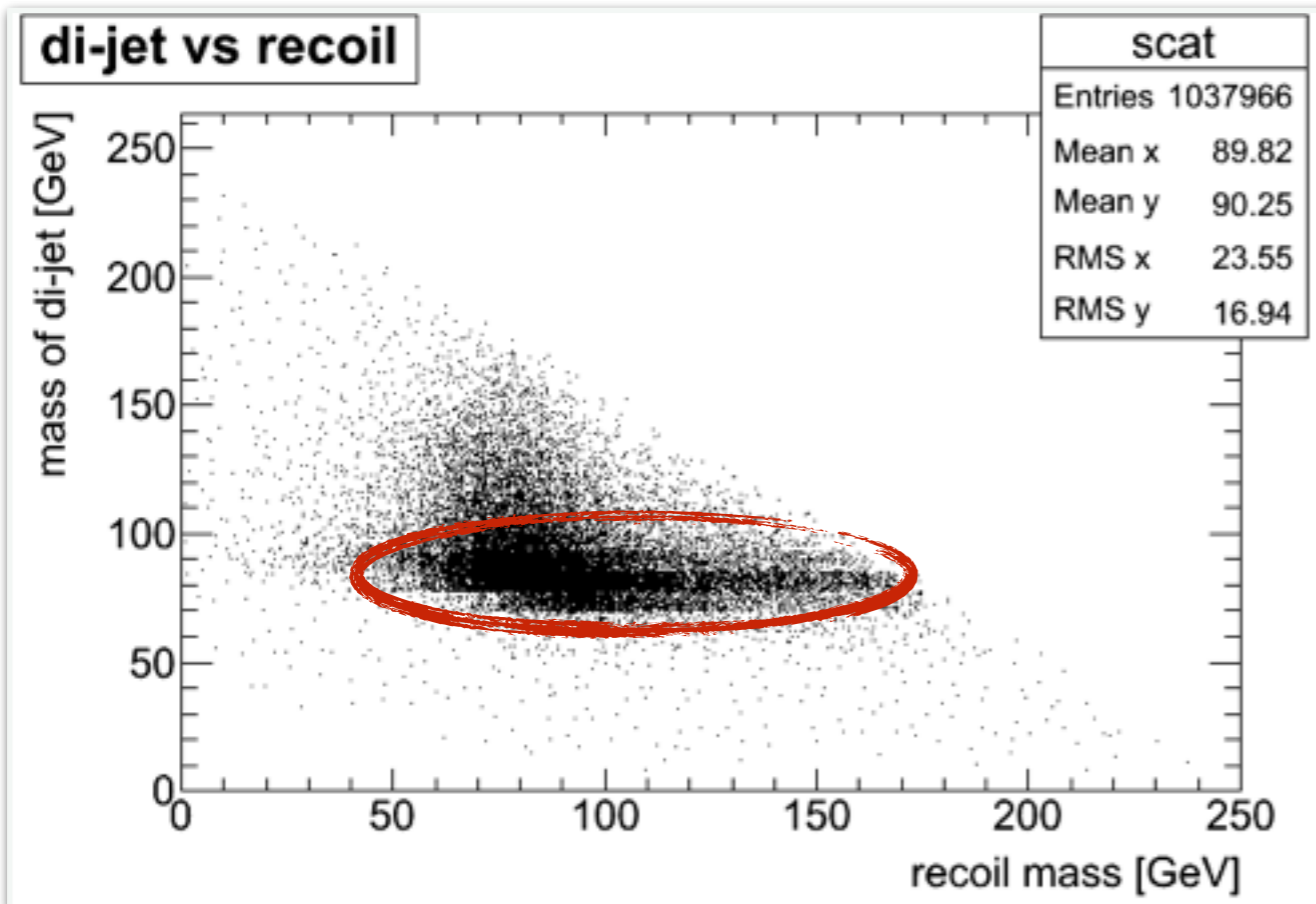
qq'-mass vs recoil-mass
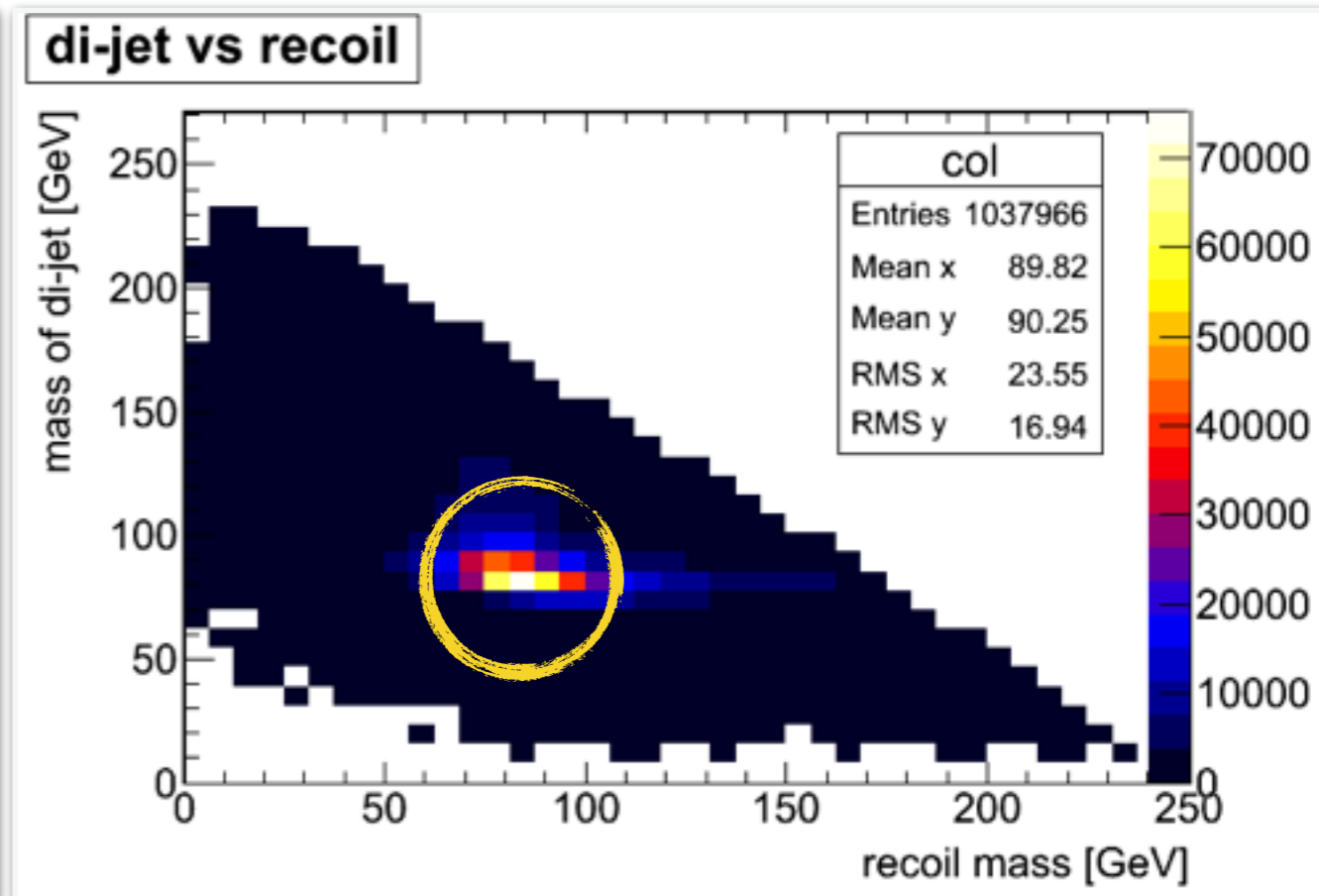
scatter plot   colored plot
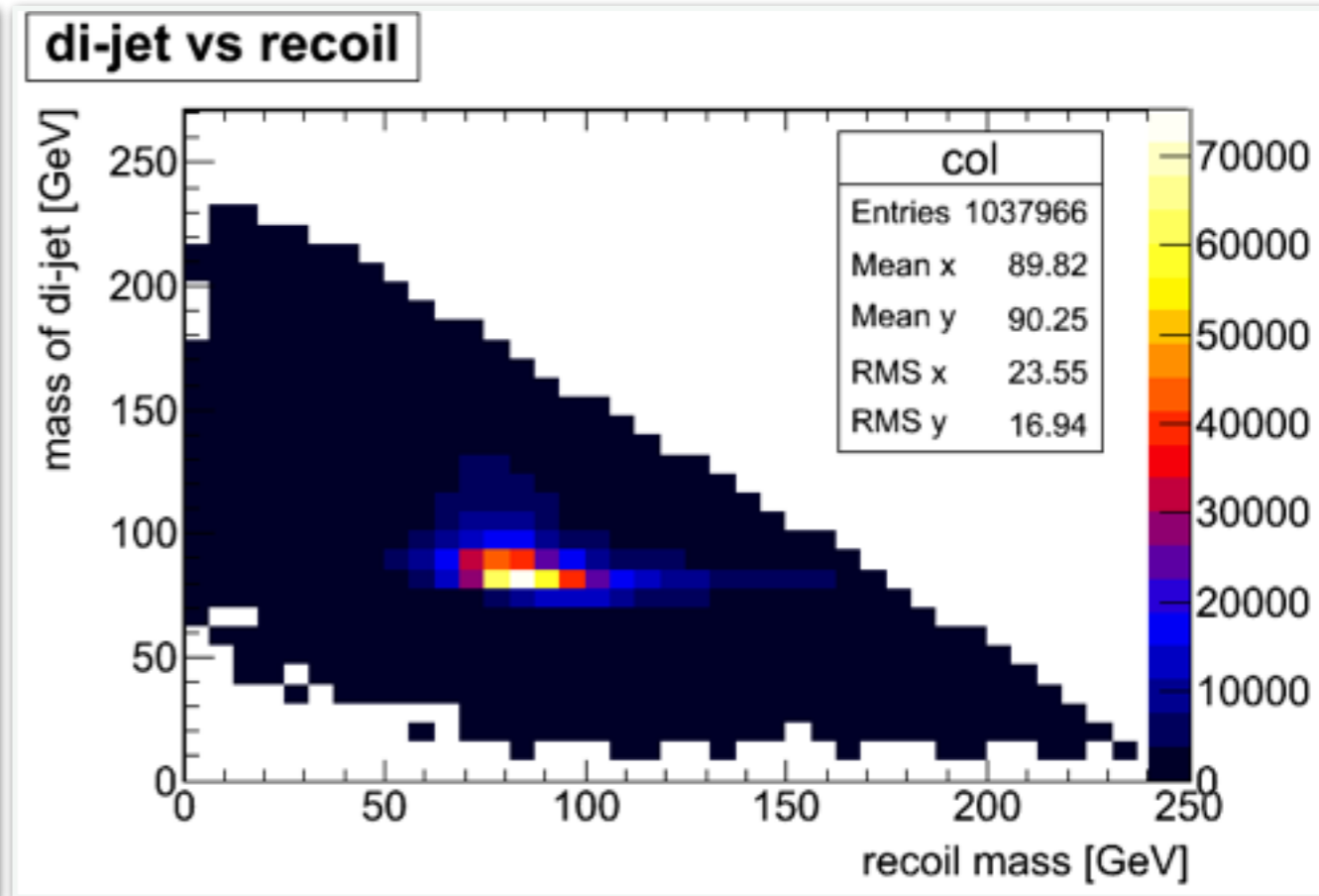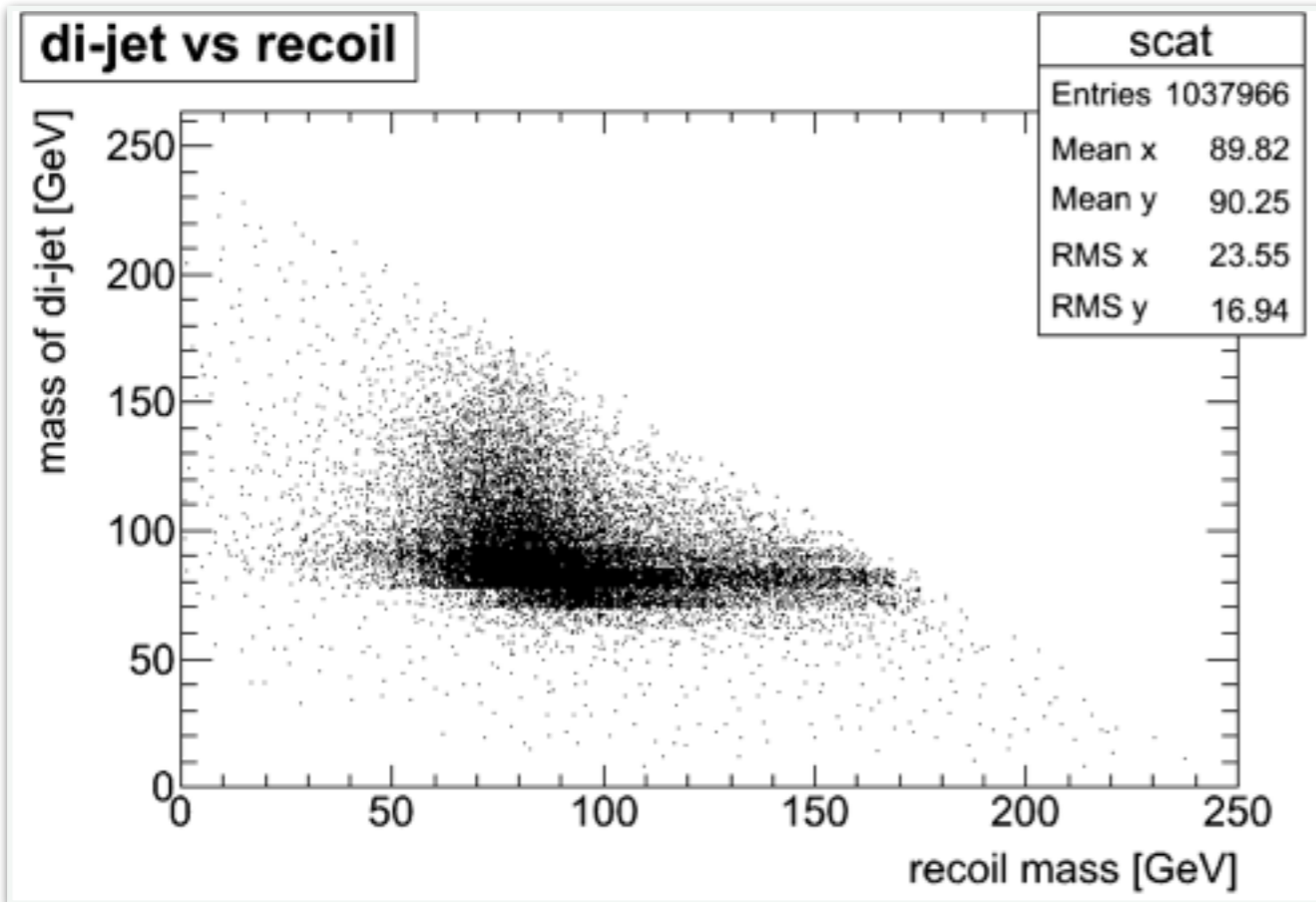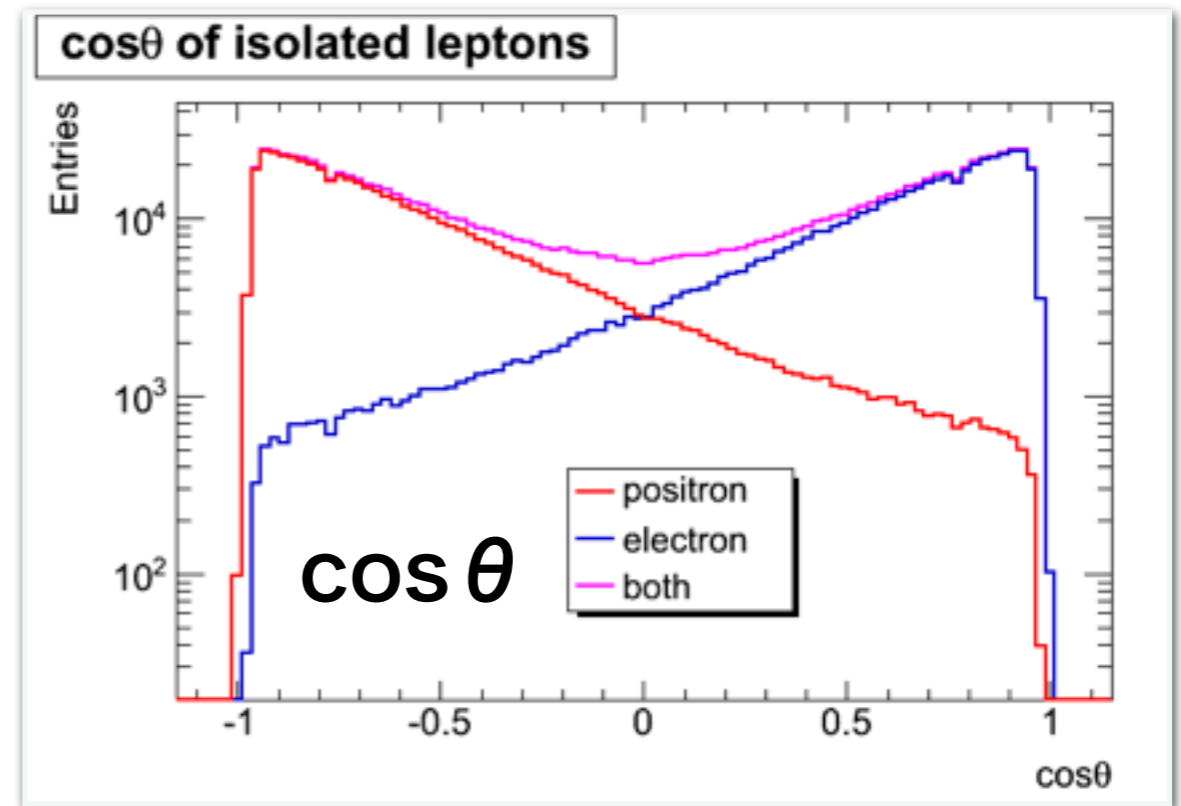
qq-mass vs recoil-mass

scatter plot

colored plot
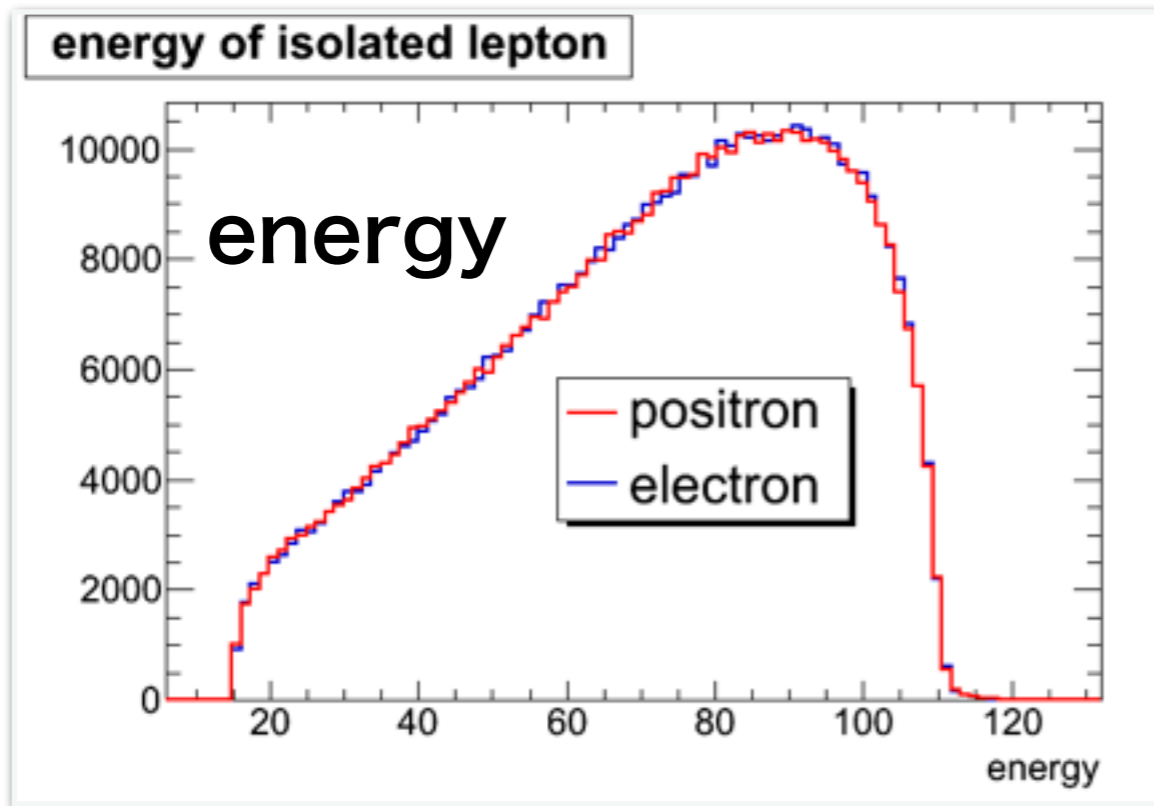

Do Single-W events exist in this area?

This peak may be due to W-pair events.

I have to study how to separate these events.

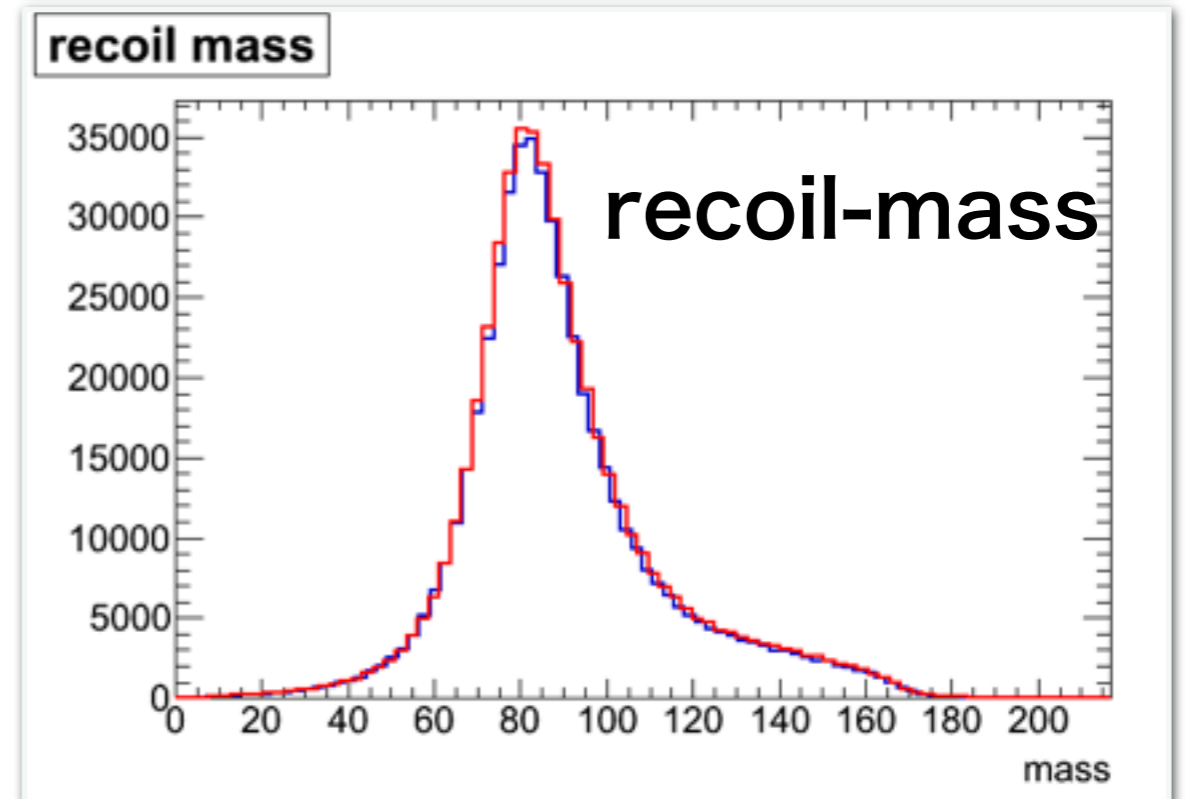# Positron / Electron plots

	e+	e-	total
Nevt	518677	519289	1037966

Positron / Electron plots 2

energy sum of 2 jets — positron / electron — energy sum of 2 jets

mass of di-jet — entries — mass [GeV] — 2-jet-mass

di-jet vs recoil — di-jet mass — recoil mass — 2-jet-mass vs recoil-mass

recoil mass — mass — recoil-mass
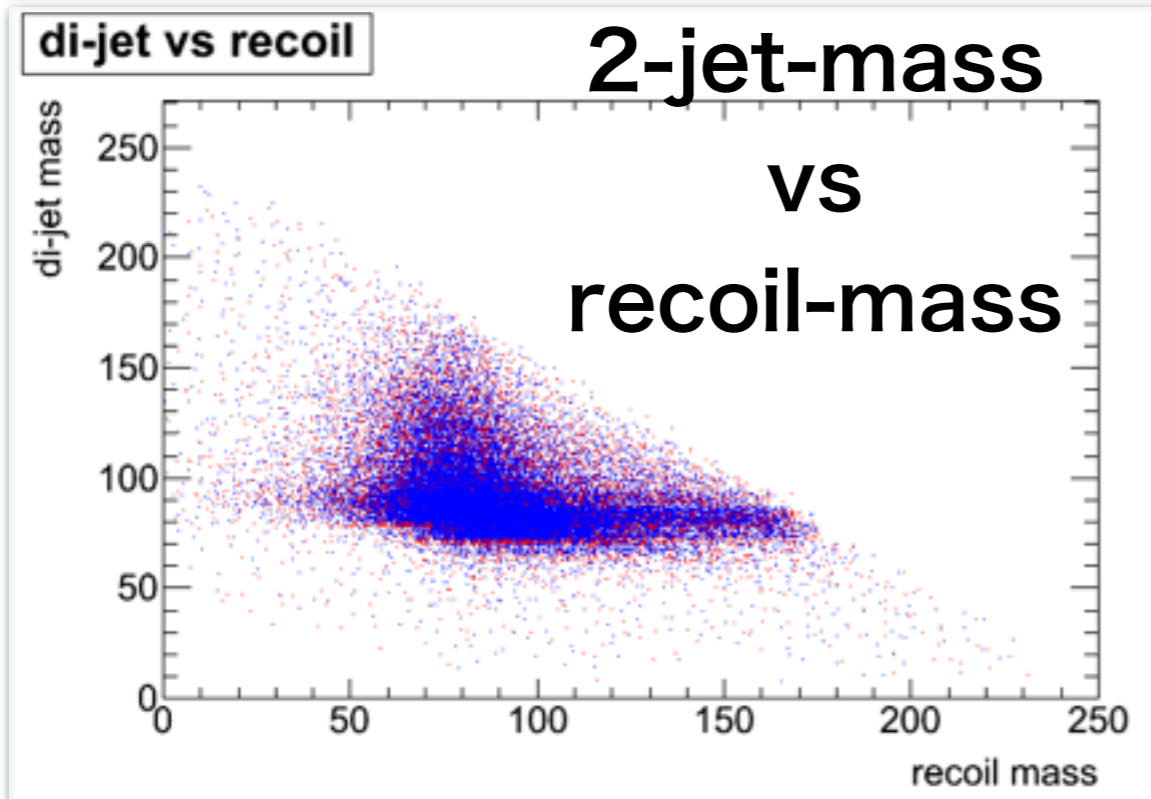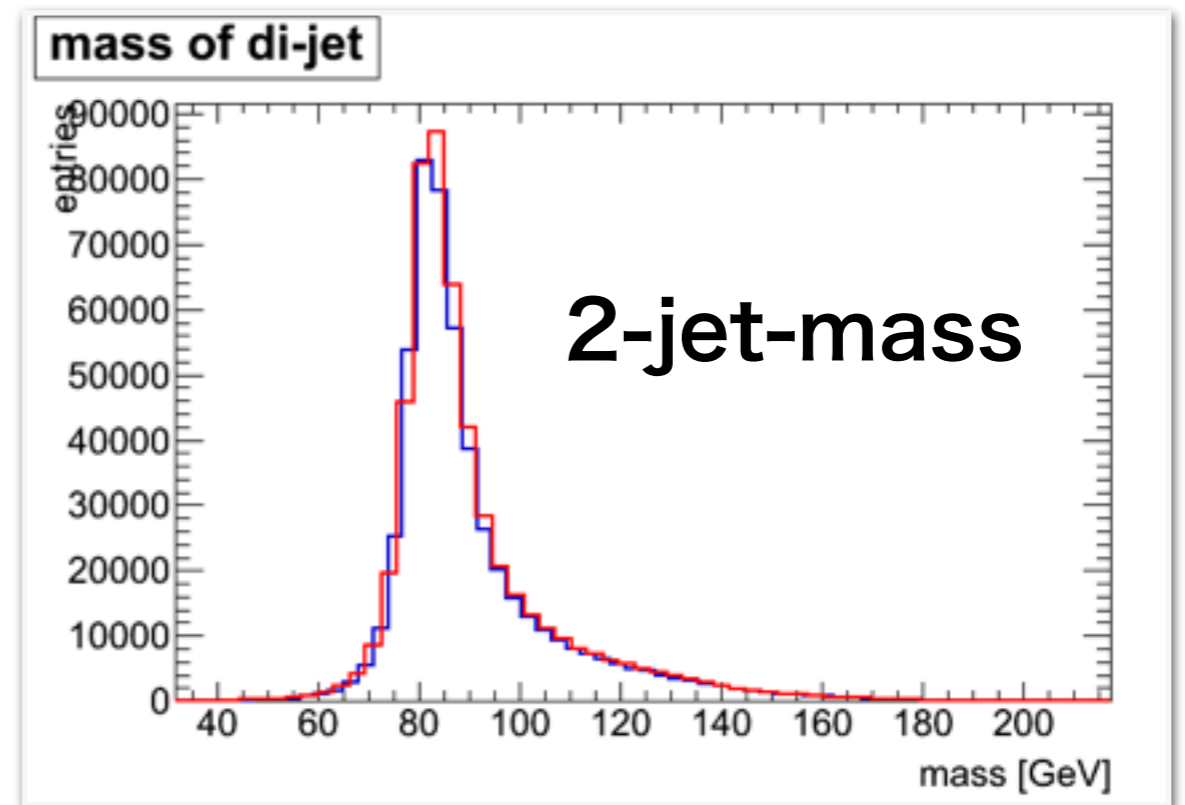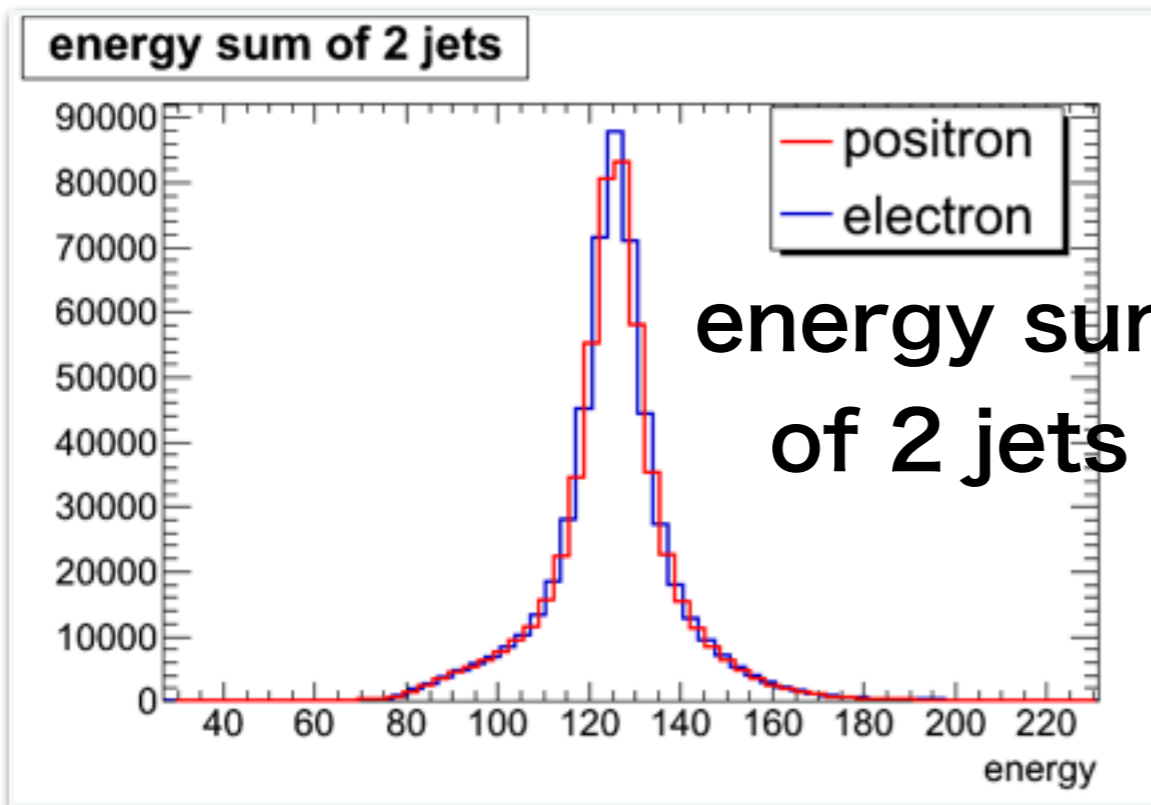
Summary & Next

- W-mass peak which I reconstructed from qq'-jet includes many W-pair events.

    - This is an issue that how to separate single-W from whole events.

- All plots separately for positrons & electrons don't make much difference, except for $\cos\theta$.

- Next, I'm going to study with generated STDHEP files.

    - but I don't know how to analyze the files which have this format..

Back up slides

Trying m$_W$ measurement

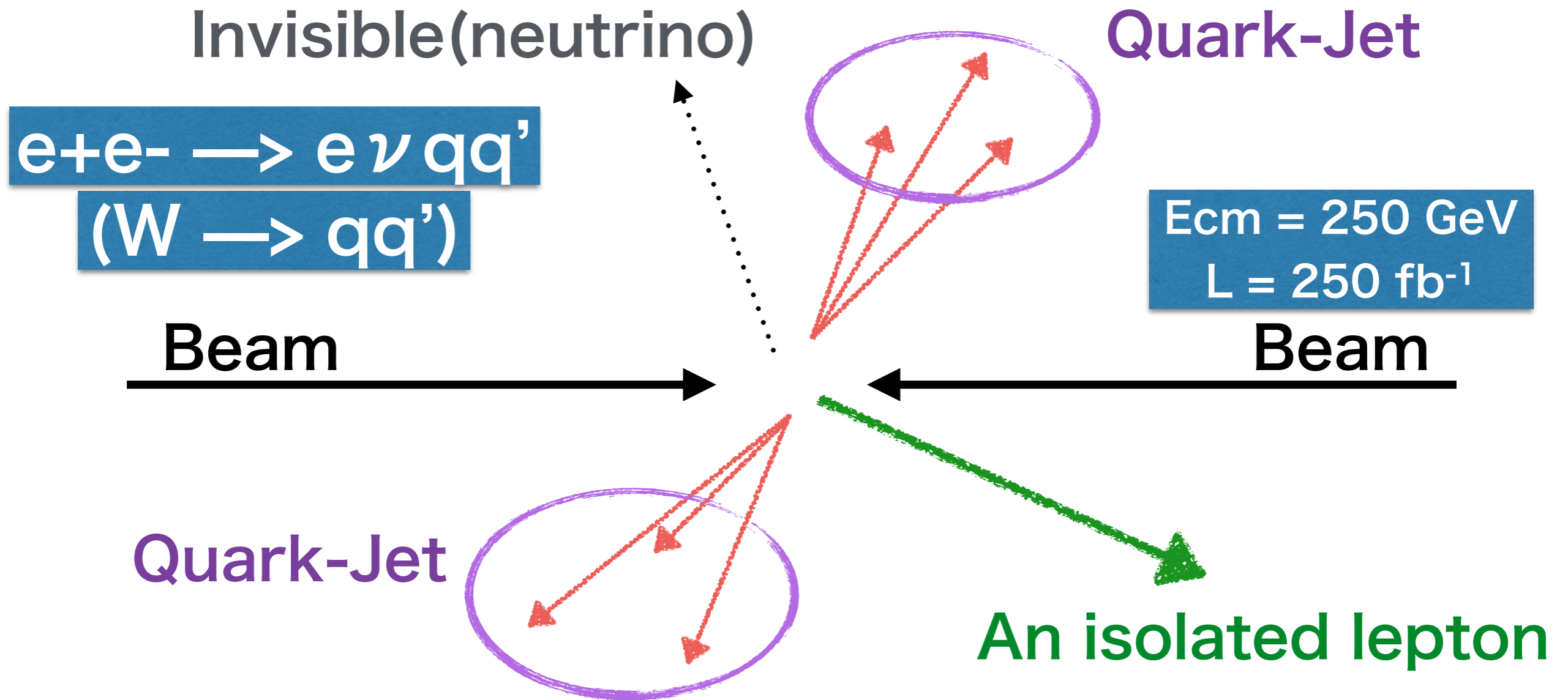Now I'm training and searching better analysis method.

Simulation condition

- √s = 250 GeV, Luminosity : 250 fb^{-1}
- Beam polarization : (e-, e+) = (-0.8, +0.3)
- No backgrounds so far
- Detector model : ILD_o1_v5
- ILC soft version : v01-17-05

Analysis method

All final states of this process are : e, ν, W

1. Require one isolated electron or positron by using lepton finder of MarlinReco
2. Force remainder of PFOs into 2 jets with Durham algorithm
3. Reconstruct the invariant mass of di-jet

Analysis flow

Invisible(neutrino)

Quark-Jet

$$e+e- \longrightarrow e\,\nu\,qq'$$
$$(W \longrightarrow qq')$$

Ecm = 250 GeV
L = 250 fb^{-1}

Beam

Beam

Quark-Jet

An isolated lepton

1. First, require only one isolated lepton(electron/positron)

2. Force remainder of PFOs into 2-jet with Durham algorithm.

3. Invariant mass of 2-jet should be equal to m_W.