

## Evtcls for tau pair events

99/12/16 K.Inami(Nagoya-u)

- In order to reduce
  - the amount of data
  - beam background rejection
  - 2photon, radiative bhabha rejection
- note
  - Selected tau events are shared with HardonA.
  - (When tau sample is classified as HadronA in same time, the data is not written in the skimmed file.)
- new selection criteria
  - good charged track
    - $P_t \geq 0.1 \text{ GeV}/c$
    - Helix  $|dr| < 1\text{cm}$ ,  $|dz| < 5\text{cm}$
    - (This selection criteria is depend on evtcls default criteria and track quality.)
  - good ECL cluster
    - $E(\text{ECL cluster}) > 0.1 \text{ GeV}$
  - good Gamma
    - $E_{\text{gamma}} > 0.1 \text{ GeV}$
  - $P_{\text{miss}} = P_{\text{beam}} - \Sigma P_{\text{good\_charged}} - \Sigma P_{\text{good\_gamma}}$
  - $E_{\text{rec}} = \Sigma P_{\text{CM\_good\_charged}} + \Sigma E_{\text{CM\_gamma}}$
  - $P_{t_{\text{max}}} : \text{maximum } P_{t_{\text{good\_charged}}}$
  - $E_{\text{tot}} = E_{\text{rec}} + |P_{\text{miss\_CM}}|$

- tau pair selection criteria

1.  $2 \leq \text{No. of good charged track} \leq 8$
2.  $\Sigma P_{\text{CM}} < 10 \text{ GeV}/c$
3.  $\Sigma E(\text{good ECL cluster}) < 10 \text{ GeV}$
4.  $P_{\text{tmax}} > 0.5 \text{ GeV}/c$
5. Primary event vertex  $|r| < 0.5 \text{ cm}$   $|z| < 3 \text{ cm}$
6. for 2 track event
  - 6-1.  $\Sigma P_{\text{CM}} < 9 \text{ GeV}/c$
  - 6-2.  $\Sigma E(\text{ECL}) < 9 \text{ GeV}$
  - 6-3.  $5 < \theta(P_{\text{miss}}) < 175 \text{ degree}$   
for 2photon rejection
7.  $E_{\text{rec}} > 3 \text{ GeV}$  .or.  $P_{\text{tmax}} > 0.8 \text{ GeV}/c$   
for beam background, 2photon
8.  $E_{\text{tot}} < 9 \text{ GeV}$  for 2-4 charged track case  
for radiative bhabha
9.  $|\text{charge sum}| \leq 2$

- change

$P_{\text{miss}}$  : include  $P_{\text{gamma}}$  effect  
 $E_{\text{rec}}$ ,  $E_{\text{tot}}$ , charge sum cuts

- Pre-selection efficiencies (MC)

	efficiency	generated cross-section	observed cross-section
tau pair	57.8%	0.91nb	0.526nb
mu pair	0.033	0.94	0.0003
bhabha	0.116	1249	1.449
eeee	0.464	40.88	0.190
eemumu	1.157	18.80	0.218
(bb	66.1	1.05	0.694)
(cont.	69.9	3.39	2.369)

- no other pre-selection(L1,L3,4) effect

- Reduction power (Exp3 data)

data set : exp3 run380-469  
TauPair skimmed files

	No of events,	-HadronA flag	→TauPair
before:	156,265	85,819	70,446
after:	64,188	47,564	16,624

No of events is reduced by ~40%.

The tau data is shared with HadonA

→ The amount of data is reduced by ~1/10.

Now, modified evtcls module is working.

- S/N (from evtvtx.z info.)

	before	after
signal	43,909	26,217 (60%)
background	37,710	7,830 (21%)