Belle meeting
2000.03.27
Y.Sakai

Trigger / background

- follow-up after last BGM -

Trigger crisis(?)
[Event Processing]

↓

Tight trigger proposal

↓

Now

↓

Plan (to summer)

Suggested by the Data Processing Task force

(tight condition aiming <100Hz @L=10^33)

```
// T#40: ffso_E(>1GeV)_clst3_t1              \ Hadrons
// T#12: Etot > 3GeV & !csi_bb               /
// T#24: cdcop & KLM                         - .ge.2trk with mu
// T#17: csi_bb_p [prescaled by 8]           \ Bhabhas [PS]
// T#18: csi_bb [prescaled by 8]             /
// T#1 :  ff_o_t2_c1 [prescaled by 10]       \ 2trk [PS]
// T#15: fs_o_E(>0.5GeV) [prescaled by 10]   /
```

Situation at Last BGM:

LER/HER = 300/250 mA, Lpeak = 3 x10^32 Av.Trig. Rate = 150 Hz

High Lum. (expected)

1000/400 mA, 10 --> 450 Hz !

Required by DST < 100 Hz

==> Proposal of (very) Tight trigger conditions

What happened so far

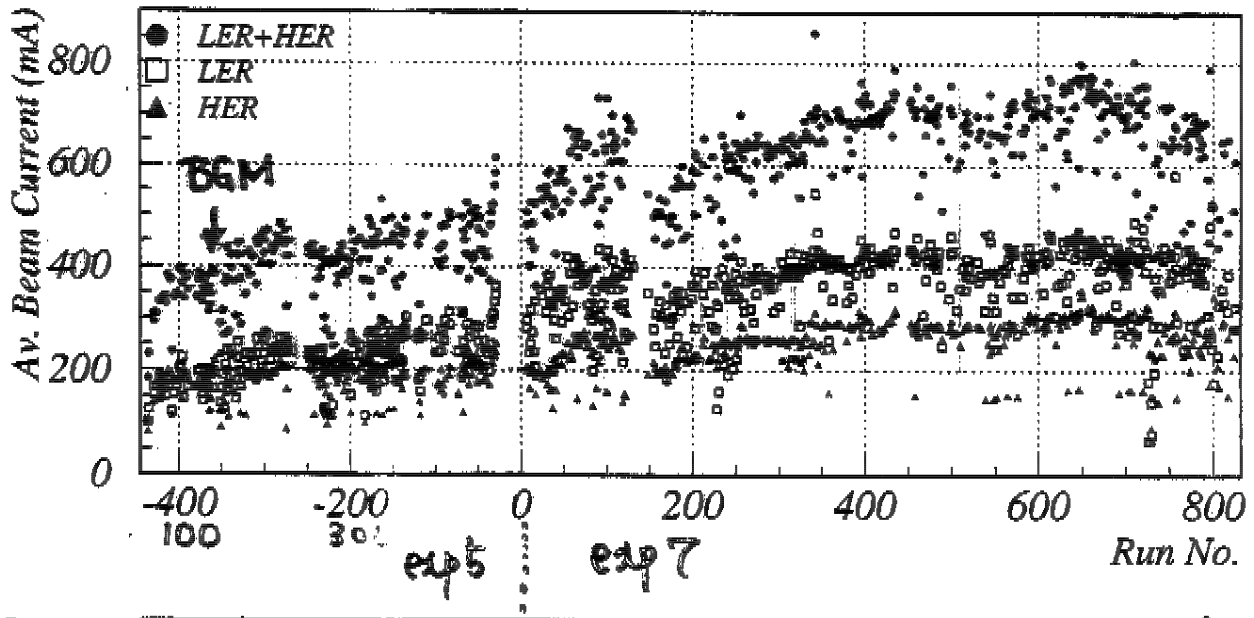
LER/HER = 620/400 mA, Lpeak =12 x10^32 Av.Trig. Rate = 150-200 Hz

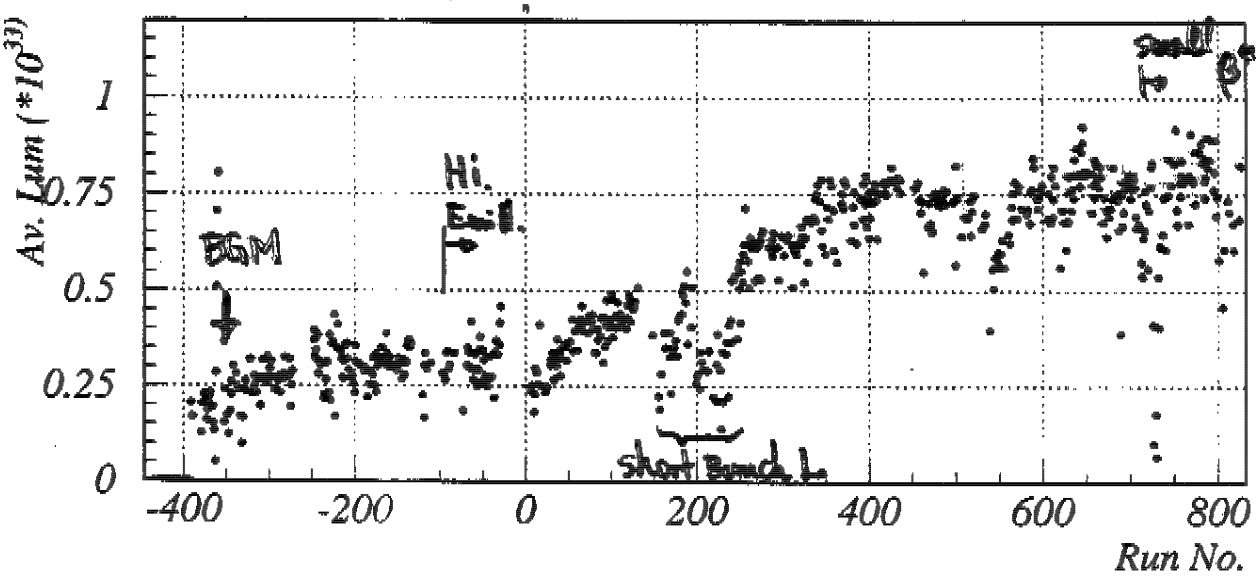
Essencially, No trigger condition change was made !

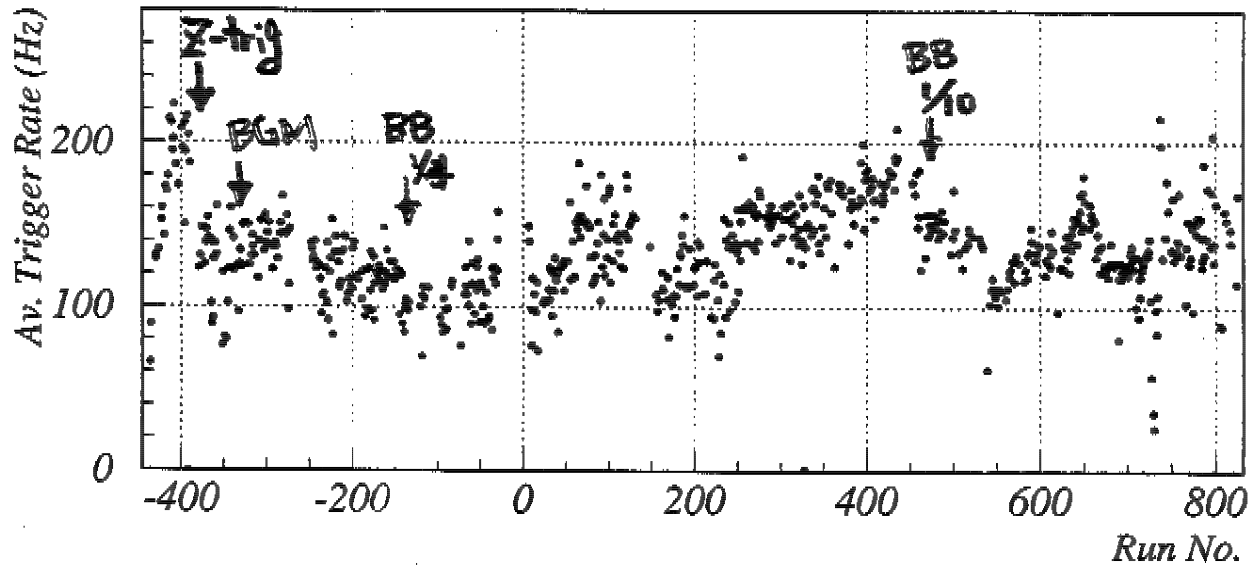
except : Bhabha Prescaling & Veto.

and minor mods.

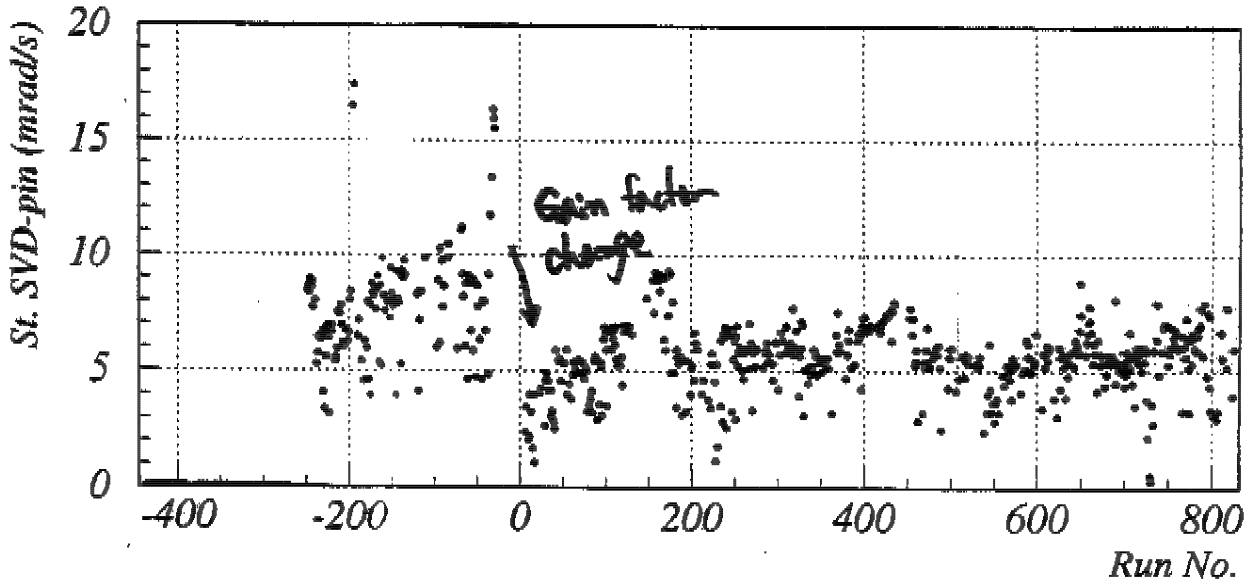
Trigger Rate vs Run (e5r60-e7r827)

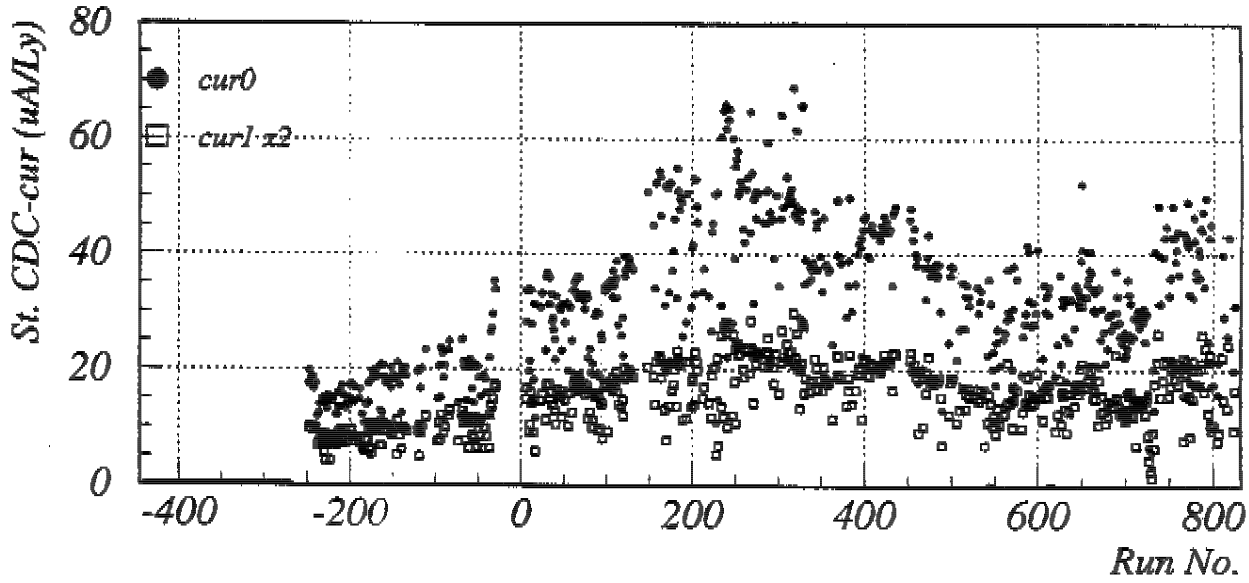


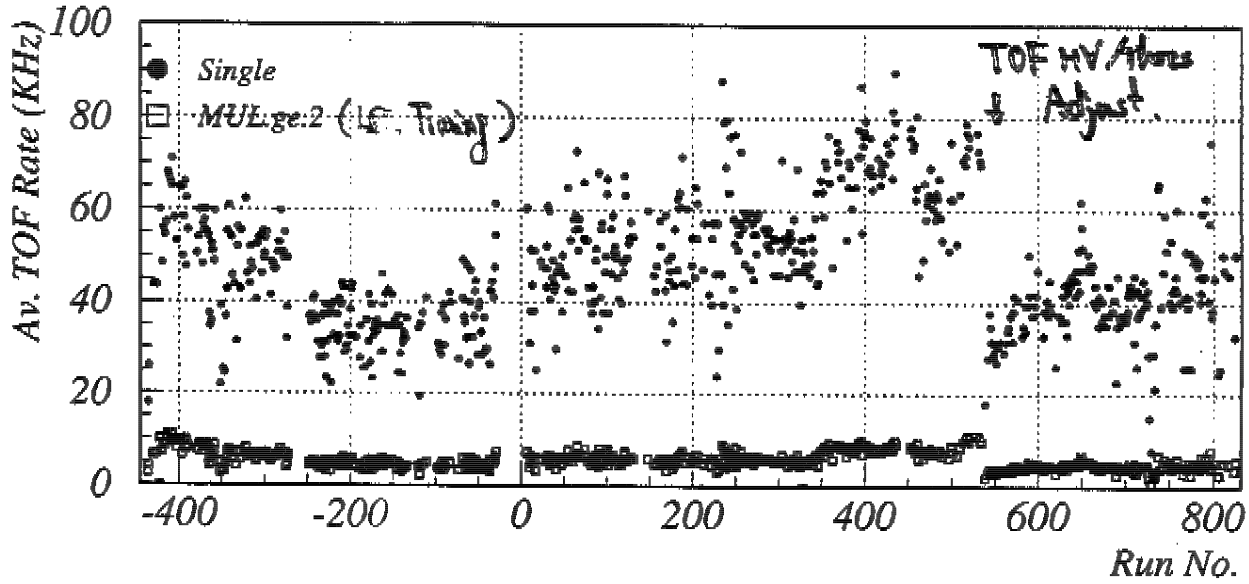




Background vs Run (e5r60-e7r827)





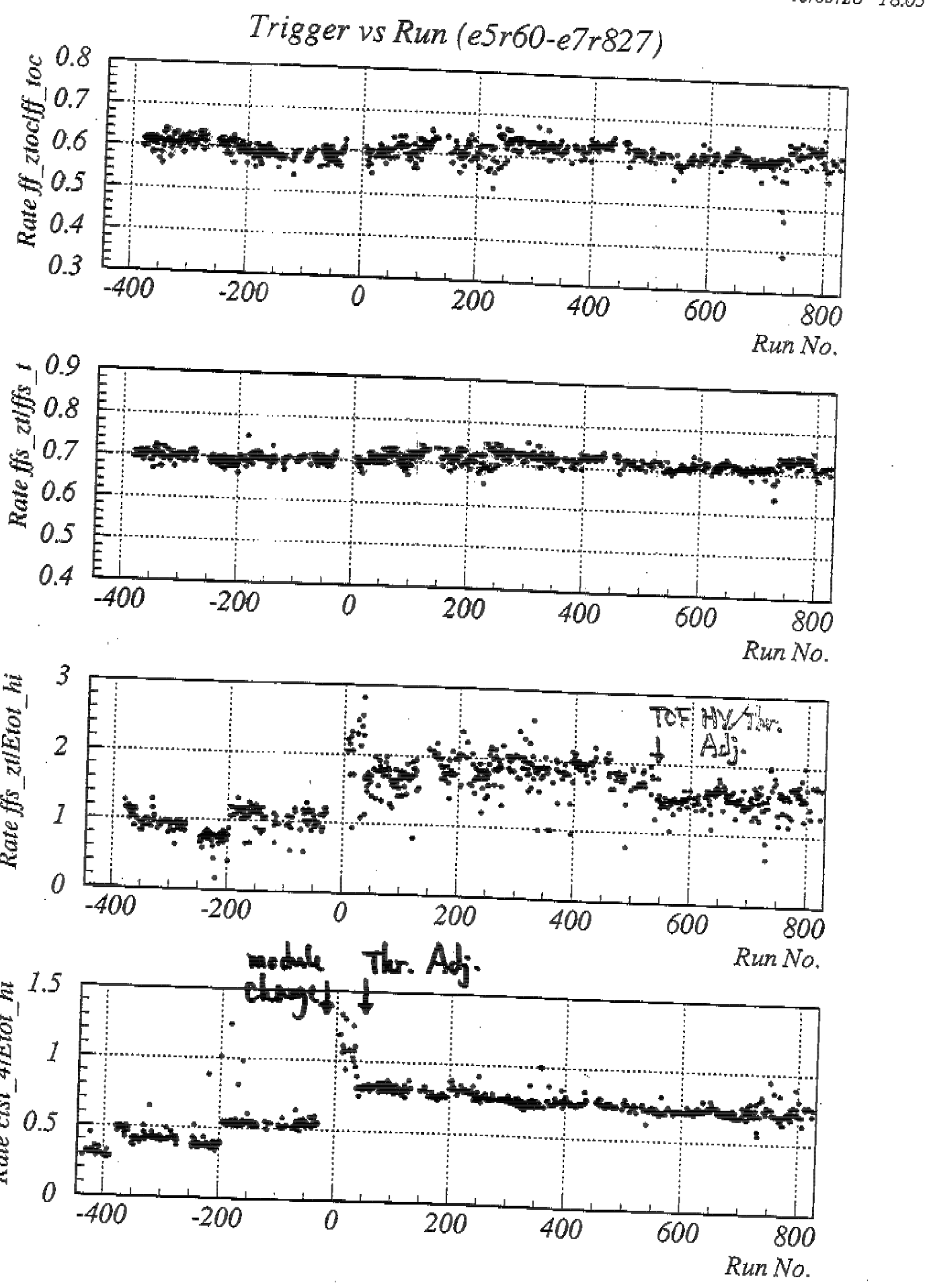


No trigger condition change, but

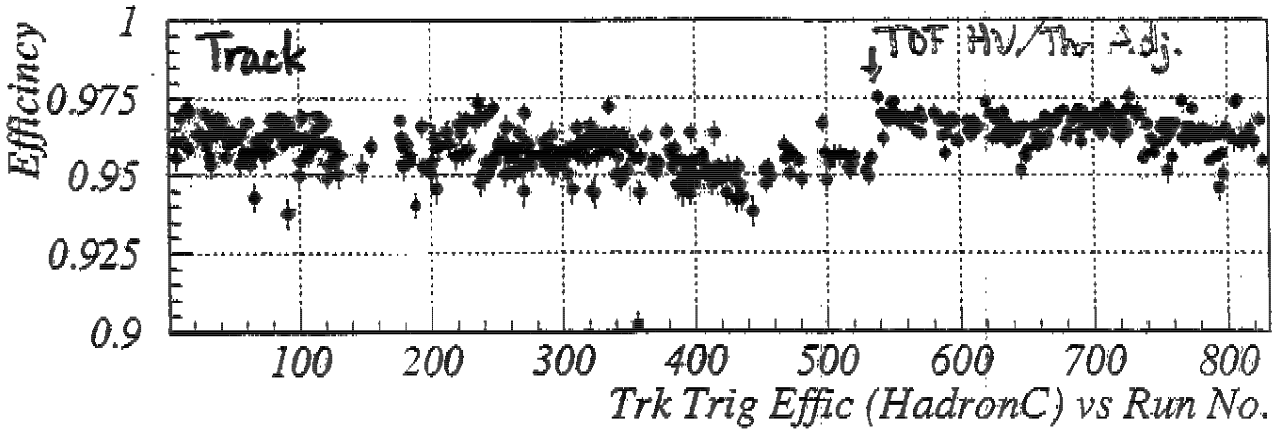
- L4 trig. implemented --> relaxed DST req. (< 200 Hz)
- Bhabha Prescale (& Veto)
  PS factor 4 (e5r358-) --> 10 (e7r453-)

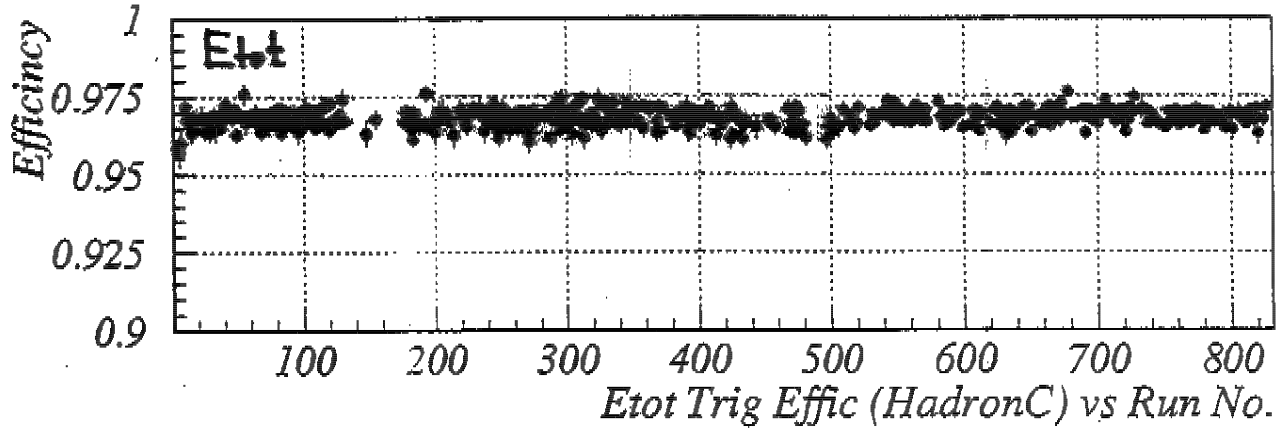
- No rapid change in KEKB (~ adiabatic)
- Trigger crisis <-- preceded by KEKB(/Bkg) crisis/limitation
  --> improvement of KEKB/Bkg --> ~const. Trig. rate

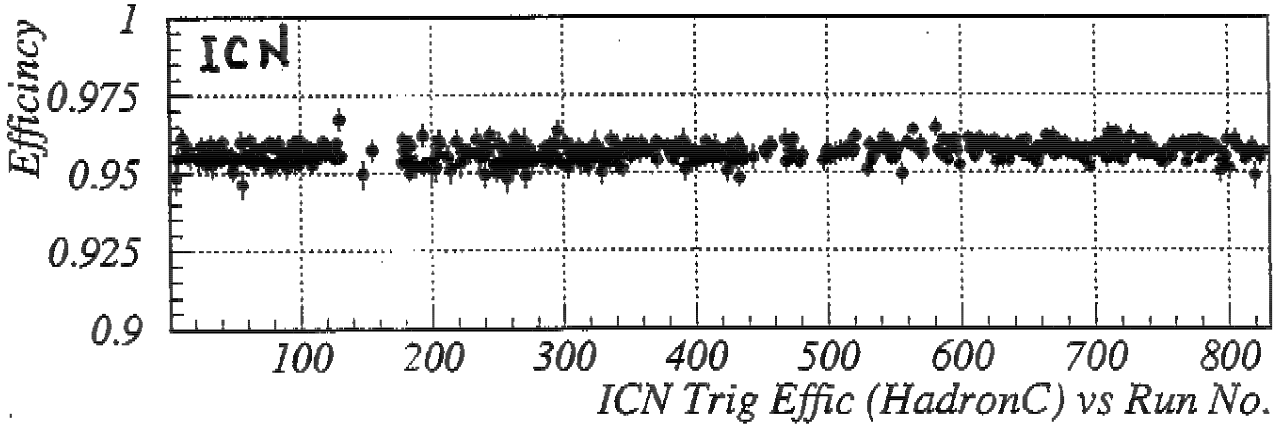
* with small beta optics
  - Trig. rate and CDC-cur: sensitive to beam condition / Mask

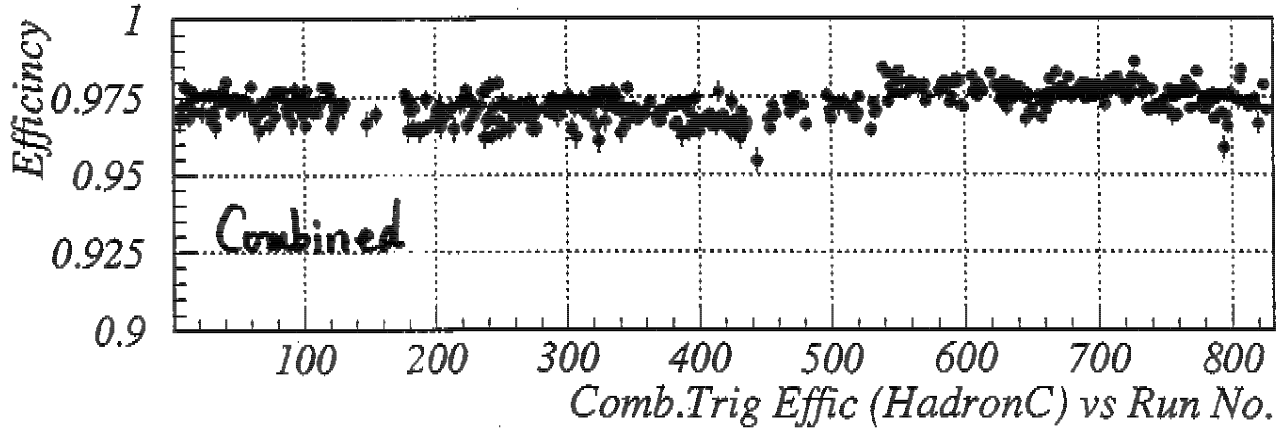

Trigger vs Run (e5r60-e7r827)
Rate fff_ztoc/fff_toc
Run No.
Rate ffs_zt/ffs_t
Run No.
Rate ffs_zt/Etot_hi
TOF HV/Thr. Adj.
Run No.
Rate clst_4/Etot_hi
module change
Thr. Adj.
Run No.

Trigger Efficincy Monitor (QAM) (exp7)









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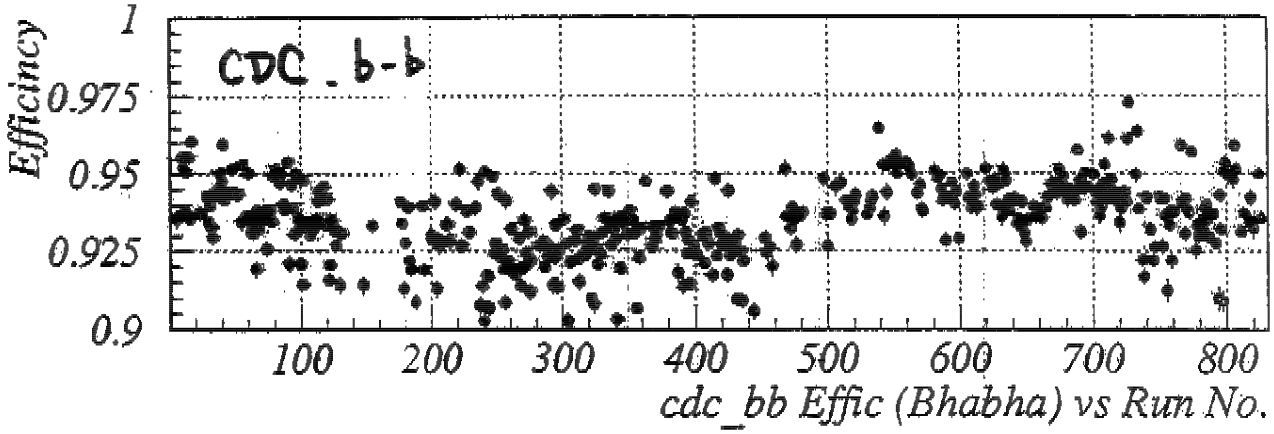

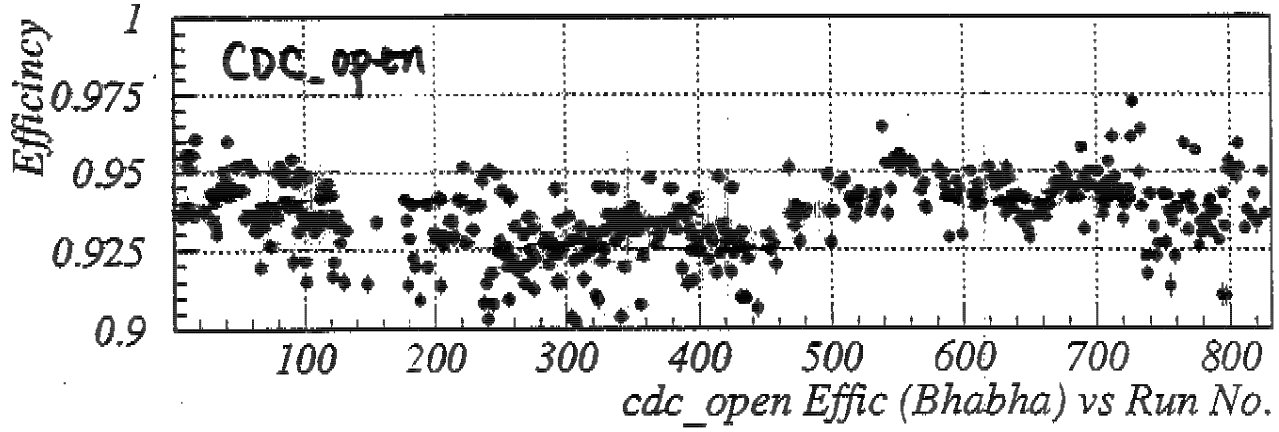

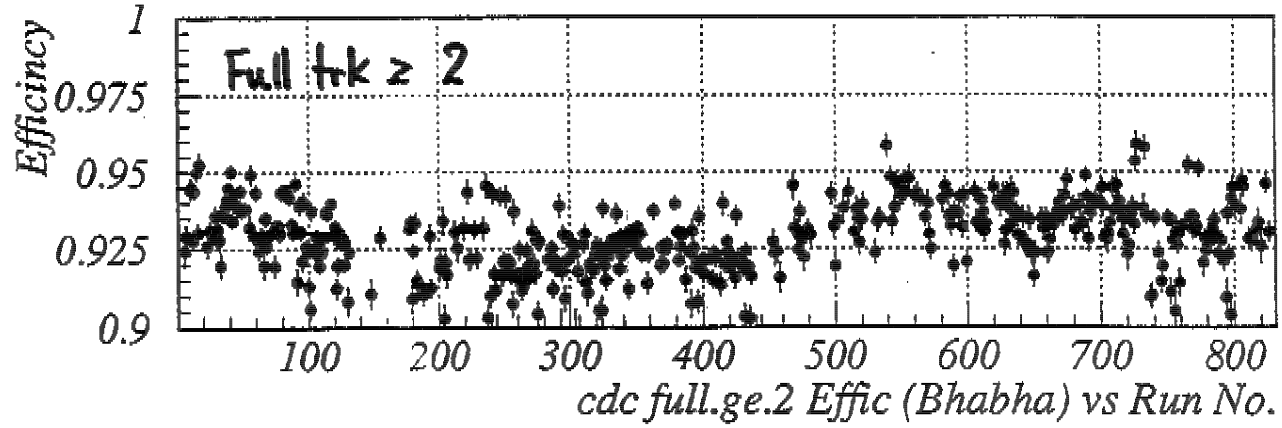

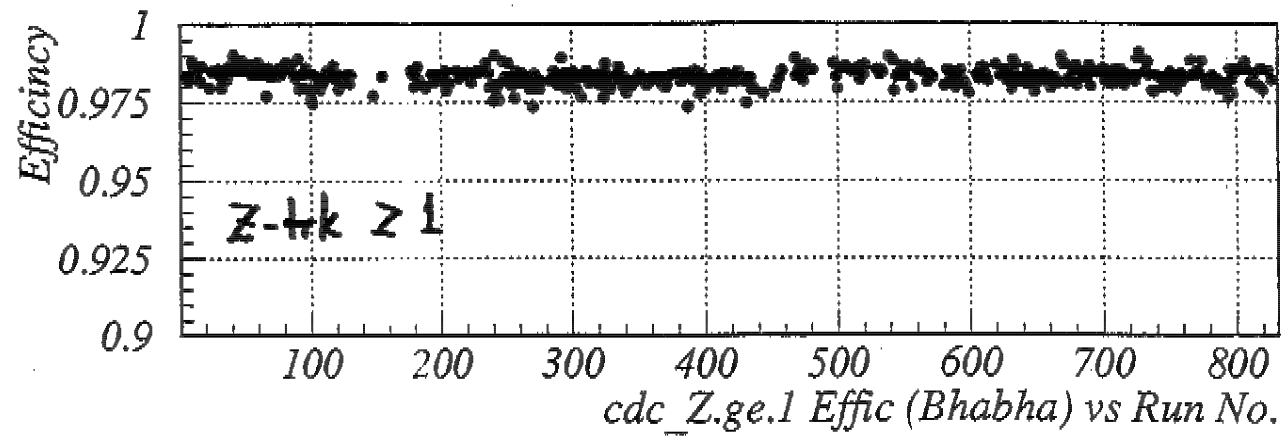

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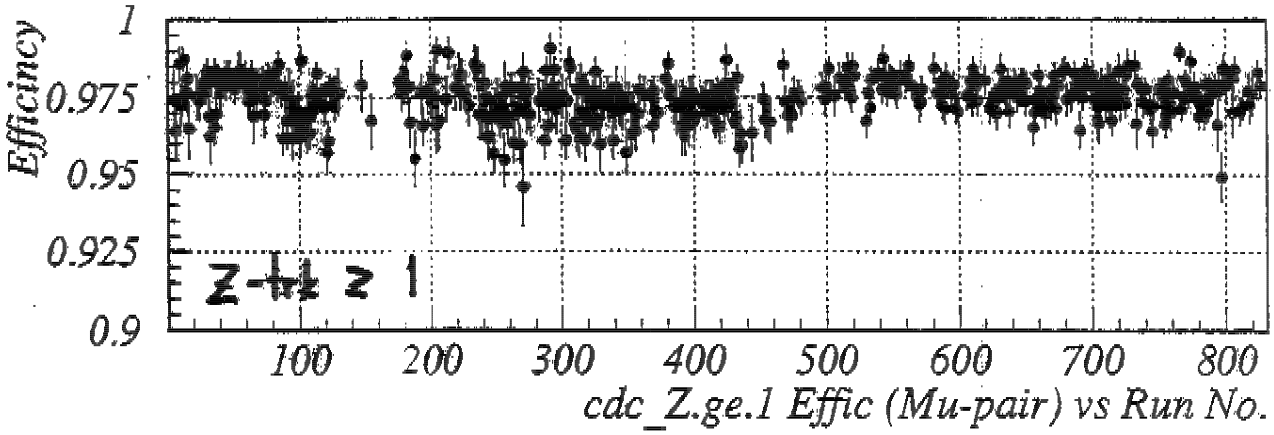
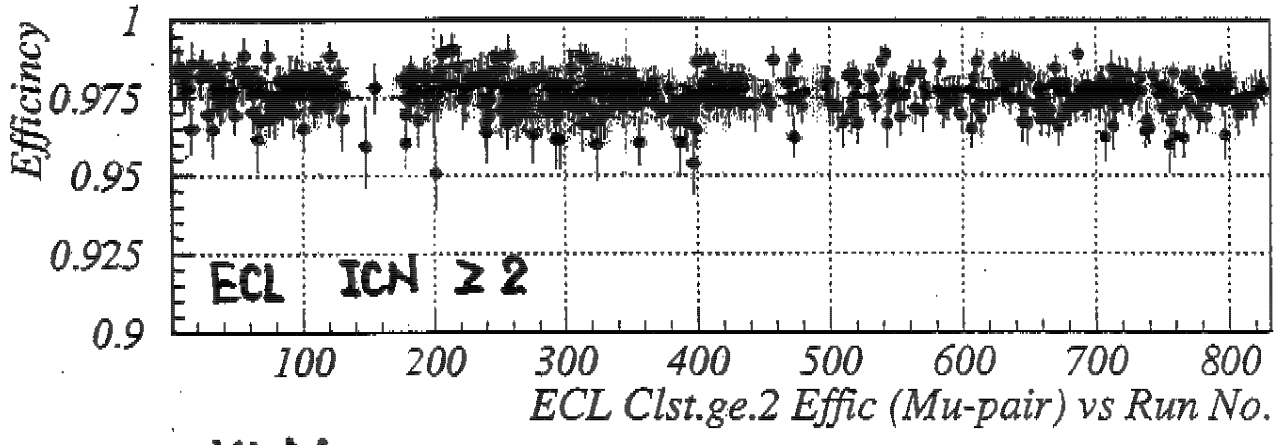
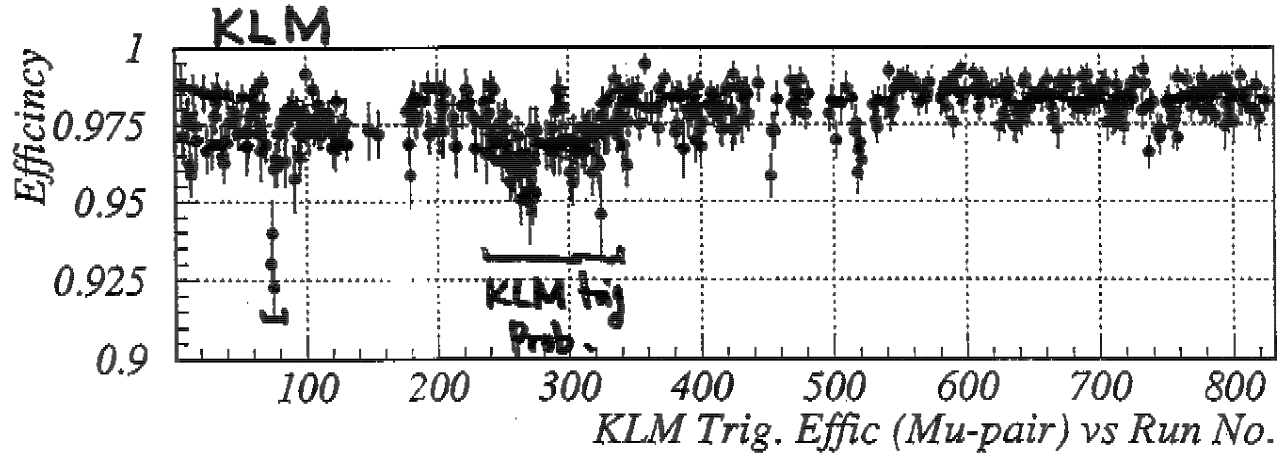


cdc_Z.ge.1 Effic (Mu-pair) vs Run No.



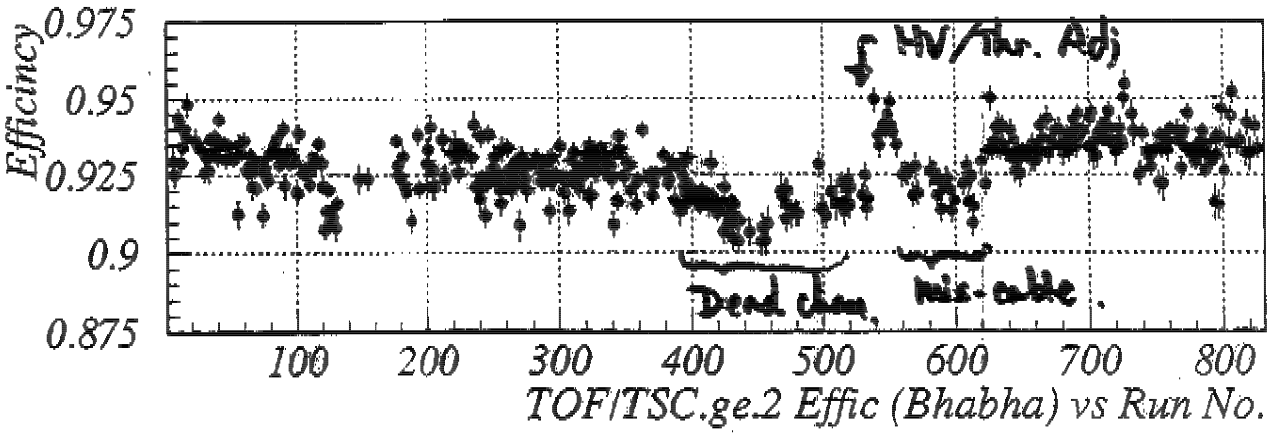
ECL Clst.ge.2 Effic (Mu-pair) vs Run No.

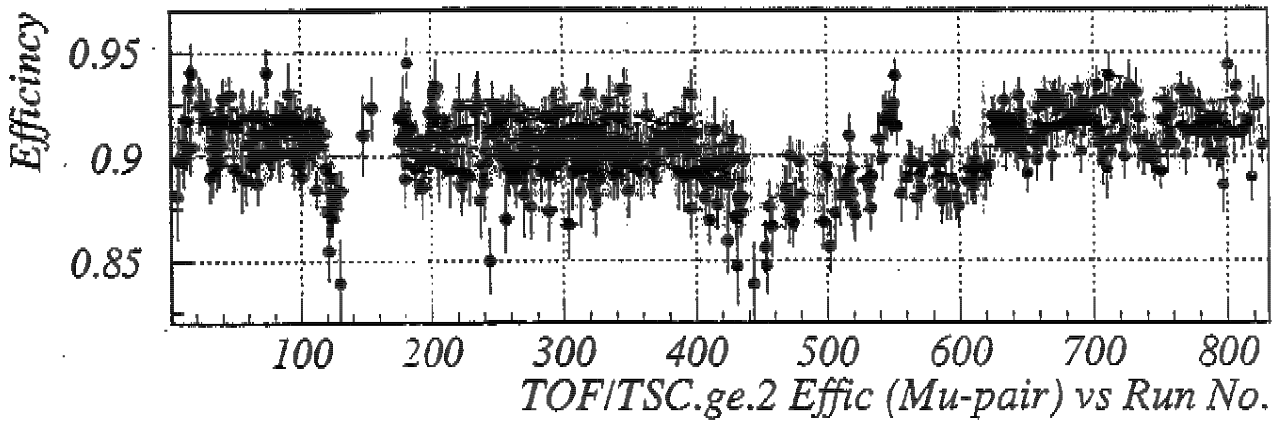


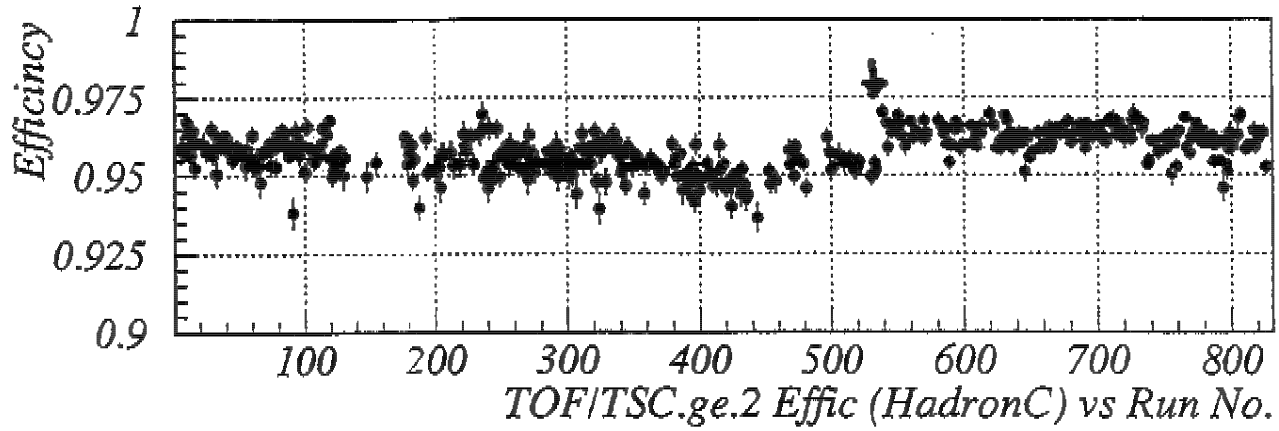
KLM Trig. Effic (Mu-pair) vs Run No.

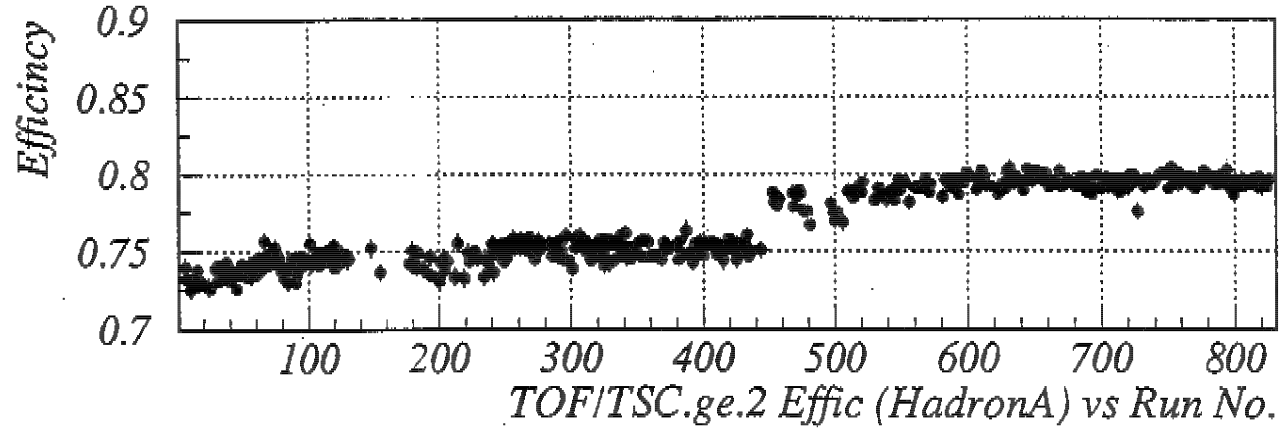
TOF/TSC (multi ≥ 2)

Trigger Efficincy Monitor (QAM) (exp7)









o Present situation(limitation) on Trig. Rate

- DAQ dead time: >230 Hz --> Dead time >20%
  [DAQ spec: <10% @500Hz]

  due to data flow at CDC EB node (< 3.5MB/sec)
  --> CDC TDC time window tightened: --> < 300Hz ?
  [increase CDC node to 2 in summer ?]

- DST rate: L4 rejection <-- L1 rate

- Raw Data Tape size: ? --> L3 trig.

Trigger Set: semi-tight tight

Hadron triggers

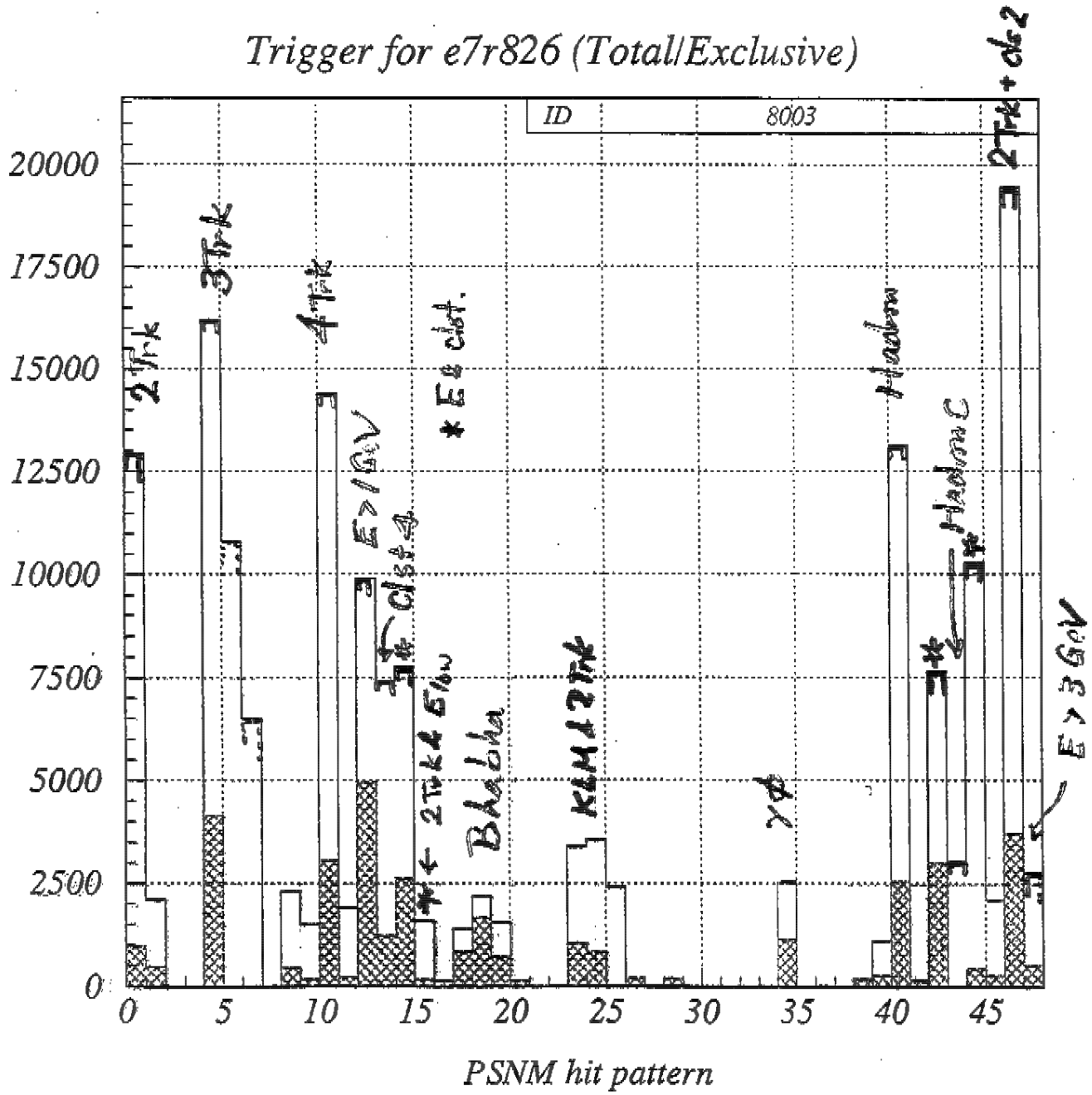
T#4 (ffs_zt2) -> T#5(ffso_zt2c1) -> T#6(fffo_zt2c2)
T#10(t4_fssso_zt1c1) >> PS

T#12(hie:>1GeV&!cos)[1.2?] -> T#47(e_had:>3GeV)[->2GeV?]
T#13(clst4&!cos) [-> clst5&!cos ?]
T#42(e_hi_clst4) >>PS? [-> e_hi_clst5 ?]

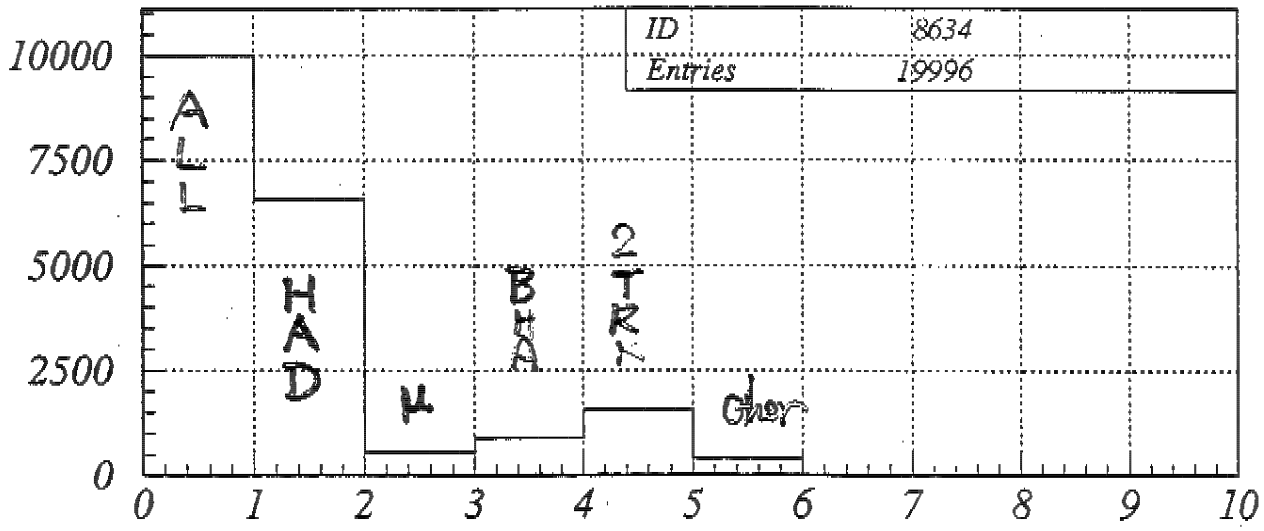
T#40(hadron:sss_Elo_t1c2) -> T#43(hadronc:ffso_Ehi_t1c3)

Two Track trigger

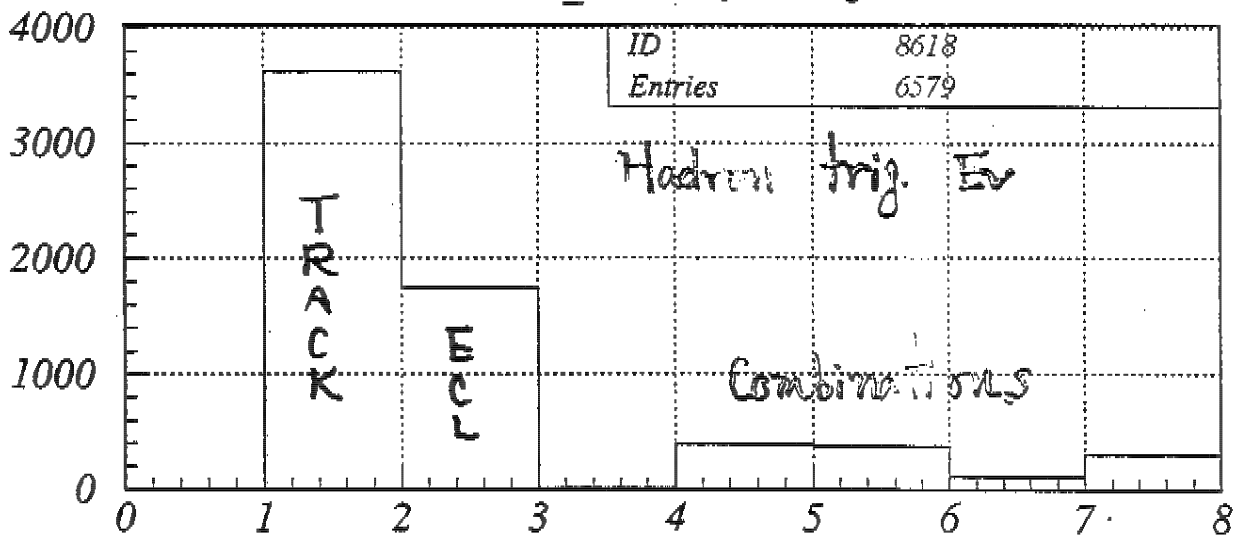
T#0 (ffo_zt2c1) [-> ffo_zt2c2] or PS
T#44(fso_z_Elo) >> PS
T#46(sso_zc2) >> PS


Trigger for e7r826 (Total/Exclusive)
ID 8003
20000
17500
15000
12500
10000
7500
5000
2500
0
0 5 10 15 20 25 30 35 40 45
PSNM hit pattern
2Trk
3Trk
4Trk
E>1GeV
dist.
E& dist.
2Trk + dr2
Hadron
Hadron C
Bhabha
KMU2Trk
γγ
E>3GeV

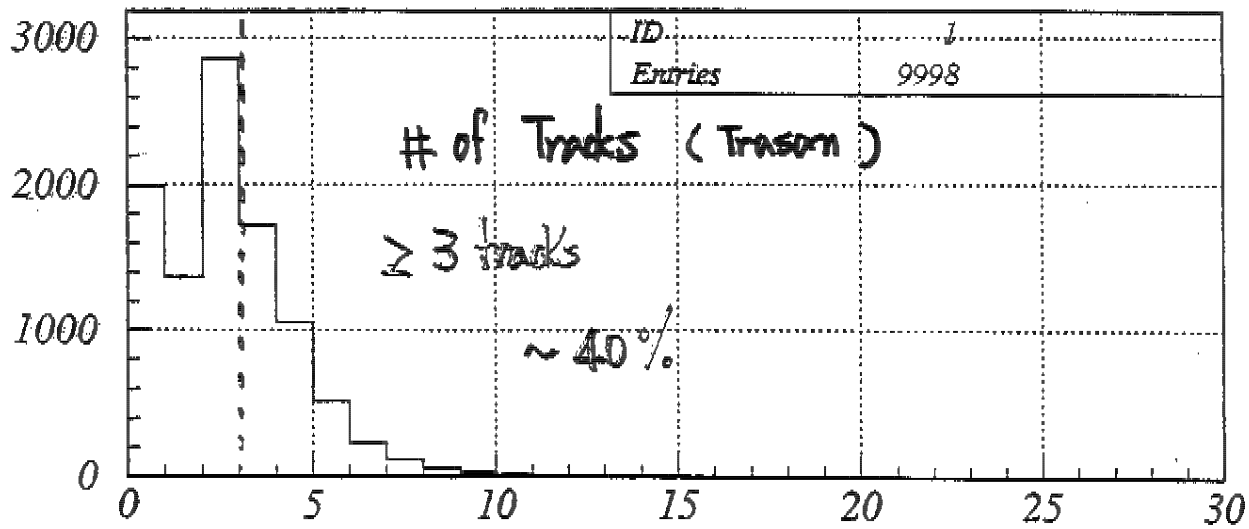
Trigger : e7r329(No_L4)



TRG_Summary: Categ



Had-TrType(Cm|Ec|Tr)



Expected Rate/Efficiency

	HadronC	HadronA	Rate
Semi-tight	~-0.3%	~-0.9%	~85%?
Tight	~ -8%	~ ??	< ~30%?

- Proposal on 24-Feb-2000: semi-tight condition
  --> no objection

Plan(Proposal)

- start with the same condition (after the break)[done so far]
- keep Av. Trig. rate < 200 Hz
- when trigger crisis comes,
  Semi-tight condition --> if not enough, Tight condition
- wait for L3 trigger: --> L1 limit by DAQ only
  (Max. 500Hz?, Av. ?? Hz)

Still x8(Lum), x4(LER curr) needed for design Goal

L3 Status

- Fast Tracker Improvement
  - Now Z trigger is available
  - Benchmark on farmsrv
    - ~2KHz/96CPU
    - Test will be done on the online farm after BGM
  - Efficiency (requiring at least 1track)
    - HadronC 96.3%
    - MuPair 90.1%
- L3 Monitoring
  - Started in March 2000 on DQM
  - Distributions of # of tracks, Pt, theta, phi etc.
  - Important step for "online physics monitor" (e.g. R2 monitor etc.)