SRC Run Conditions Check

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For each run, checked:

- ❏ Detector HV from Logbook start of run entry (showed in previous meeting)

- ❏ Scaler rates from the slow scaler readout (root tree TSLeft and TSRight)

- ❏ Cherenkov PMT pedestal and single photon peak from fitting the raw signal (e.g. L.cer.a[i])

- ❏ Beam on current and charge, live time
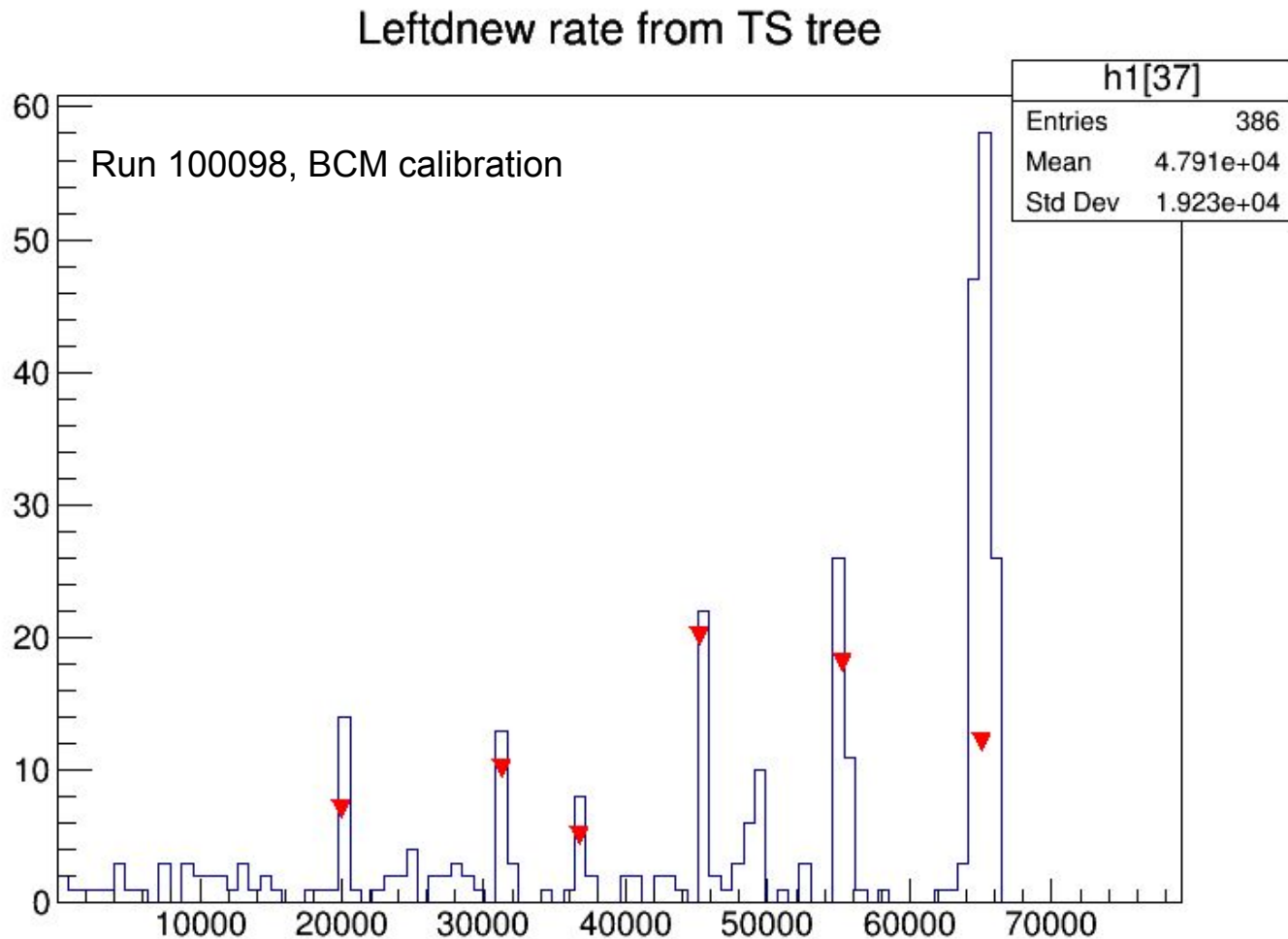
Scaler Variables Check:

1. Get TS scaler tree branches

List of LHRS scaler variables as defined in DB/<date>/db_LeftScalevt.dat

T1	LHRS T1 trigger	**S2mL_1...16**	
T2	LHRS T2 trigger	**S2mR_1...16**	
T3	LHRS T3 trigger	**Cher_1...10**	
		Cher_sum	CherSum
ADC_gate	LHRS s0||s2	**Sh_sum**	shower sum
L1A	L1A LHRS	**S0A**	S0A
L1A_R	L1A remote from RHRS	**S0B**	S0B
		S0AandB	S0A & S0B
unew	new bcm upstream count	**S2LandR**	S2L & S2R
dnew	new bcm downstream count	**Ls0ors2**	LHRS s0||s2
unser	unser counts	**s2L**	LHRS s2l signal
u1	bcm x1 upstream count	**s2R**	LHRS s2r signal
d1	bcm x1 downstream count	**Rs0ors2**	RHRS s0||s2
d3	bcm x3 downstream count		
d10	bcm x10 downstream count		

Leftdnew rate from TS tree

Run 100098, BCM calibration

h1[37]	
Entries	386
Mean	4.791e+04
Std Dev	1.923e+04

Scaler Variables Check:

3. Check the quality of peak values:
- If reasonable: write value into SQL database;;
- If didn't find peaks or peak values way off:
  - write '-1' into database,
  - Save rate distribution plots for manual check.

```
mysql> select * from L_Scaler where run_number = 100685 and name not like "%_r";
+-------------+---------------+-----------+
| run_number  | name          | value     |
+-------------+---------------+-----------+
|     100685  | LeftADC_gate  |   1025.46 |
|     100685  | LeftCher_1    |   3799.16 |
|     100685  | LeftCher_10   |   2823.68 |
|     100685  | LeftCher_2    |   3608.74 |
|     100685  | LeftCher_3    |        -1 |
|     100685  | LeftCher_4    |   3682.14 |
|     100685  | LeftCher_5    |   3751.33 |
|     100685  | LeftCher_6    |        -1 |
|     100685  | LeftCher_7    |   3184.02 |
|     100685  | LeftCher_8    |   3078.08 |
|     100685  | LeftCher_9    |   3119.43 |
|     100685  | LeftCher_sum  |   13045.6 |
```
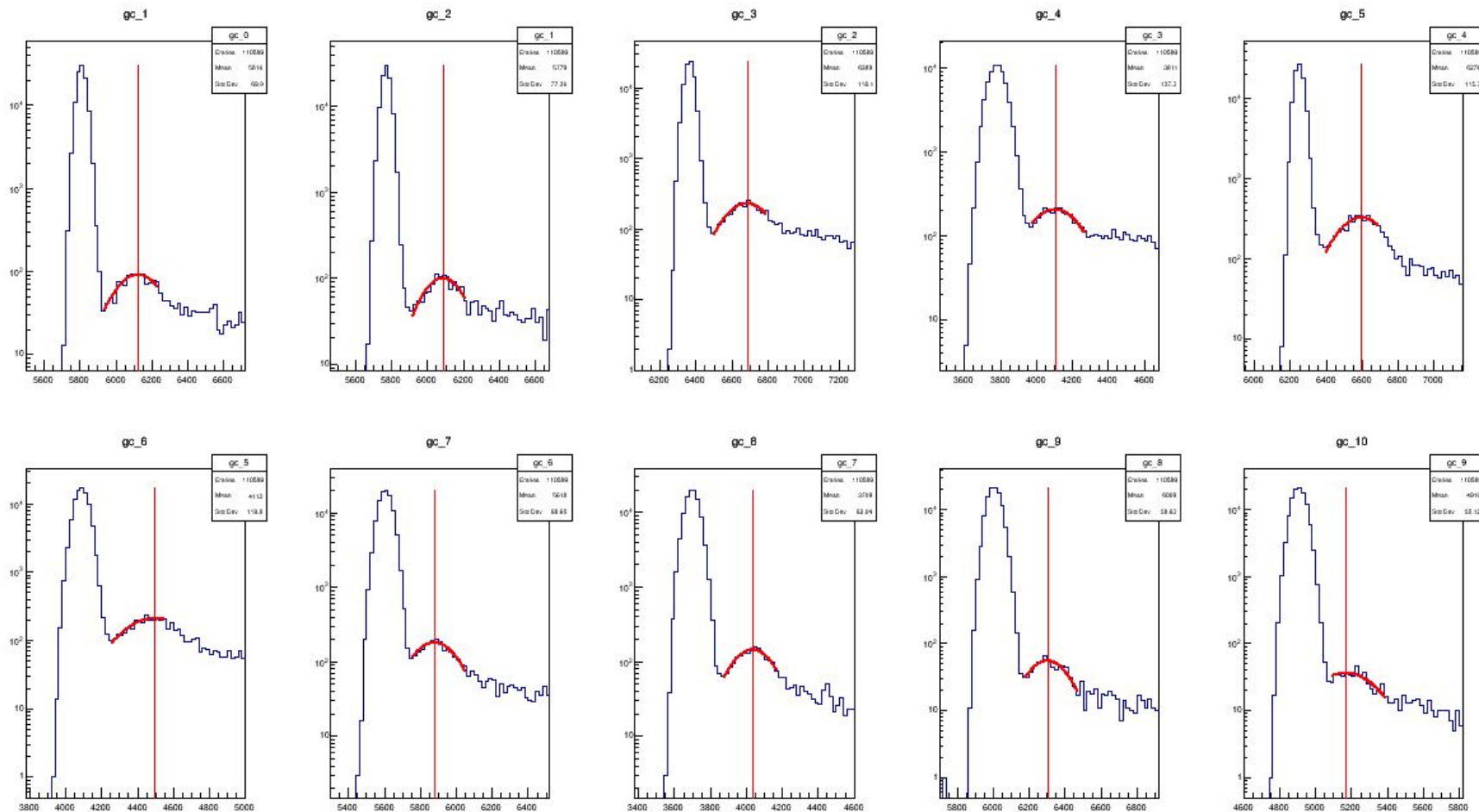
Scaler Variables Check Results:
Possible bad cable/DIS channel when sending RHRS s0||S2 signal to LHRS

For each run, fit to find pedestal and single photon peak, write results into database
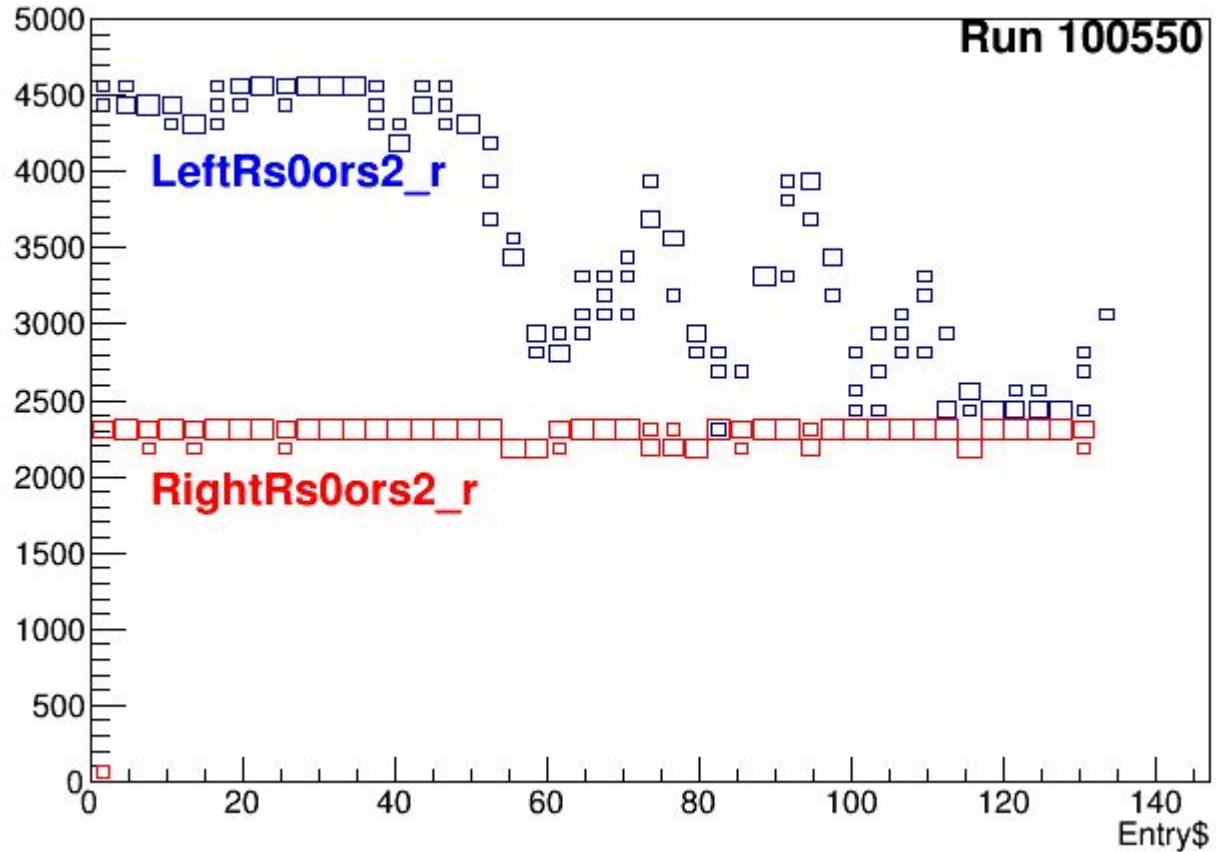
Cherenkov PMTs Gain Check Results:

```
mysql> select * from L_Cherenkov where run_number=3142;
+------------+-----------+----+-----------+----------+---------+
| run_number | detector  | id | hv        | pedestal | SPE     |
+------------+-----------+----+-----------+----------+---------+
|       3142 | Cherenkov | 1  | -1152.000 |     5790 | 6088.45 |
|       3142 | Cherenkov | 10 | -1156.000 |     4890 | 5174.08 |
|       3142 | Cherenkov | 2  | -1002.000 |     5750 | 6063.5  |
|       3142 | Cherenkov | 3  | -1126.000 |     6330 | 6650.05 |
|       3142 | Cherenkov | 4  |  -995.000 |     3730 | 4041.94 |
|       3142 | Cherenkov | 5  | -1025.000 |     6230 | 6574.79 |
|       3142 | Cherenkov | 6  | -1120.000 |     4050 | 4450.38 |
|       3142 | Cherenkov | 7  |  -936.000 |     5570 | 5860.66 |
|       3142 | Cherenkov | 8  |  -965.000 |     3690 | 4027.36 |
|       3142 | Cherenkov | 9  |  -986.000 |     5990 | 6290.79 |
+------------+-----------+----+-----------+----------+---------+
10 rows in set (0.00 sec)
```
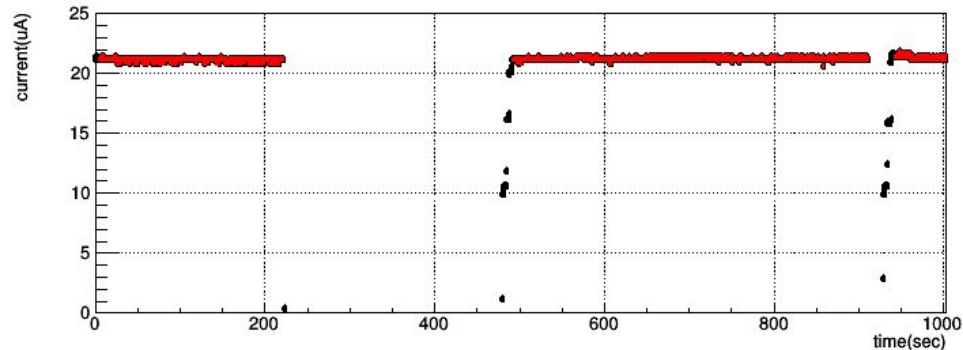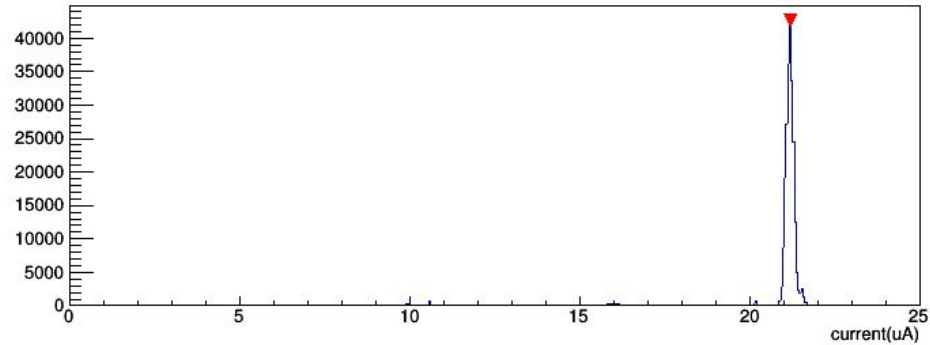

LHRS Cer PMT #8
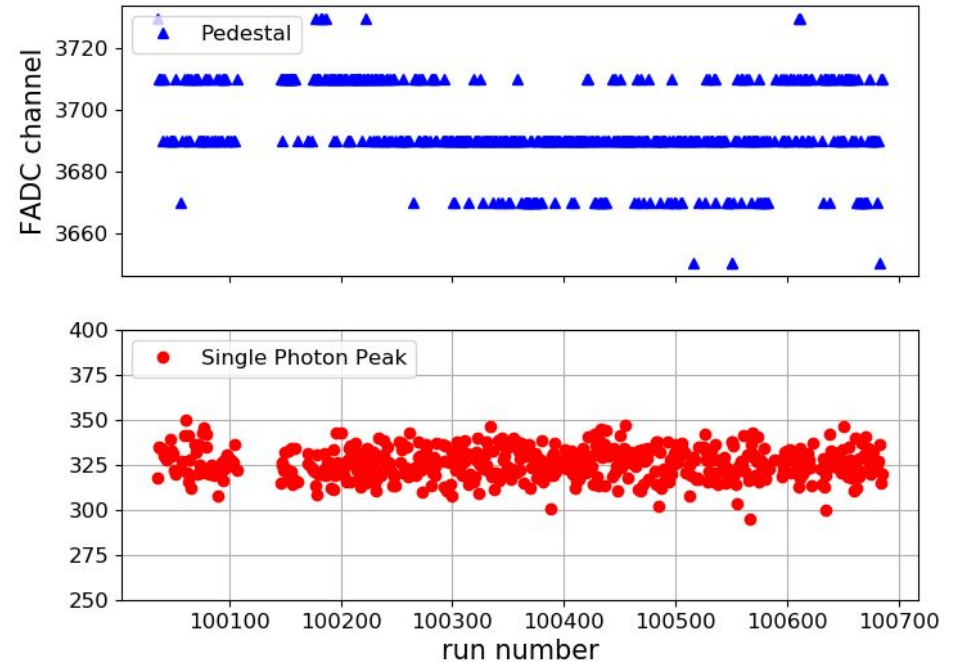
Beam Current and Charge, Livetime Check:

1. Find beam on currents, loop over fast scaler readout (evLeft/evRight) to find current associated with every TTree event.
2. For each stable beam current, find corresponding events (+- 1.5 uA), also discard events within the first 5 seconds of stable beam, accumulate charge and raw trigger signals, triggered events counts
3. Write event list of events passed beamtrip cut into rootfile, as well as charge, current, and livetime (also in database).

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```
mysql> select * from bcm;
+------------+------+-------+-----------+----------+----------+----------+-----------+
| date       | HRS  | name  | gain      | gain_err | offset   | offset_err | note    |
+------------+------+-------+-----------+----------+----------+----------+-----------+
| 2018-01-01 | LHRS | d3    | 0.0001072 | 7.89e-07 |    0.102 |  0.09595 | run 1555  |
| 2018-01-01 | LHRS | d10   | 3.74e-05  | 3.57e-07 | -0.04755 |    0.112 | run 1555  |
| 2018-01-01 | LHRS | dnew  | 0.0003358 | 2.74e-06 | -0.09753 |  0.09938 | run 1555  |
| 2018-01-01 | LHRS | unew  |    0.0003 | 2.43e-06 |  -0.1082 |  0.09935 | run 1555  |
| 2018-01-01 | RHRS | unew  | 0.0002996 |  2.6e-06 |  -0.1037 |   0.1014 | run 90882 |
| 2018-01-01 | RHRS | dnew  | 0.0003353 | 2.92e-06 |  0.09152 |   0.1013 | run 90882 |
| 2018-01-01 | RHRS | d10   | 3.74e-05  | 3.77e-07 | -0.03737 |   0.1143 | run 90882 |
| 2018-01-01 | RHRS | d3    | 0.000107  |  8.1e-07 |   0.1105 |  0.09688 | run 90882 |
+------------+------+-------+-----------+----------+----------+----------+-----------+
8 rows in set (0.00 sec)
```

```
mysql> select * from SRCanalysis where run_number>3170;
+------------+---------+---------+-----------+----------+---------------+----------------+--------------------------+
| run_number | current | charge  | trigger_id | livetime | trigger_counts | trigger_events | elist                   |
+------------+---------+---------+-----------+----------+---------------+----------------+--------------------------+
|       3171 |    21.2 | 6008.45 | DL.bit2   | 0.992662 |         54378 |          53979 | /work/halla/triton/nathaly/
|       3172 |    21.3 | 16284.9 | DL.bit2   | 0.987374 |        270879 |         267459 | /work/halla/triton/nathaly/
|       3173 |    21.3 | 18689.1 | DL.bit2   | 0.984227 |        383758 |         377705 | /work/halla/triton/nathaly/
|       3174 |    21.2 | 23597.3 | DL.bit2   |  0.98003 |        623473 |         611022 | /work/halla/triton/nathaly/
|       3175 |    21.4 | 11697.1 | DL.bit2   | 0.972783 |        436484 |         424604 | /work/halla/triton/nathaly/
|       3176 |    21.3 | 27558.3 | DL.bit2   |   0.9839 |        586449 |         577007 | /work/halla/triton/nathaly/
|       3177 |    21.3 | 13807.2 | DL.bit2   | 0.972746 |        523599 |         509329 | /work/halla/triton/nathaly/
|       3178 |    21.3 | 7273.27 | DL.bit2   | 0.990877 |         85831 |          85048 | /work/halla/triton/nathaly/
```

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```cpp
 // get the elist path from database
TSQLServer* Server1 =
TSQLServer::Connect("mysql://halladb/triton-work","triton-user","psword");
TString     query1  = Form("select  elist,current from EPanalysis where run_number=%d",
runnum);
TSQLResult* result1 = Server1->Query(query1.Data());
Server1->Close();// Always remember to CLOSE the connection!
if(result1->GetRowCount()==0){
    cout<<"Error: Can't find run "<<runnum<<" in the table EPanalysis"<<endl;
    exit(0);
  }
  TSQLRow *row1  =  result1->Next(); // load first row of results
  String  path   =  row1->GetField(0); // get the first requested column (elist)
  double  current=  atof(row1->GetField(1)); // get the second column (current)
```

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Always load the elist in the beginning of your analysis:

```
TFile* ff=TFile::Open(listname) ;
 TEventList* elist =
(TEventList*)ff->Get("elist");
  if(elist) elist->SetDirectory(0);
//otherwise the file destructor will
delete elist
  chain->SetEventList(elist);
  // TDraw will only use events on the
list
  chain->Draw(...);
  // if need to loop over TTree:
  For (int i;i<elist->GetN();i++){
    chain->GetEntry(elist->GetEntry(i));
    ...
  }
```

```
 // current, charge, livetime are saved
in the same rootfile as elist as
TVectors.
  TVectorD
*cc=(TVectorD*)ff->Get("current");
  TVectorD
*ch=(TVectorD*)ff->Get("charge");
  TVectorD
*dt=(TVectorD*)ff->Get("livetime");
  cout<<"current, charge, livetime =
"<<cc[0][0]<<","<<ch[0][0]<<","<<dt[0][0]
<<endl;
```

To Do:
- ❏ Check Epics info e.g. beam position, dipole momentum …
- ❏ Run-by-run efficiencies: tracking, trigger, PID …