

# fiTQun Seeding Values

- We want to study the impact of seeding values on fiTQun analyses like 1R-Fit etc.
- E.g. how does performance change if the seeding method changes?
- Idea: Extract seed and store it in a new Branch in the .root file. Later analyse fit results and how they compare to seed.
- Here: New Branch "**fitqun1r\_.fq1rseed**" contains eight entries per event.

# fitqunoutC.h

```
150 struct fitqunlr_common {
151     int    fqanse;
152     int    fqitwnd[MAXNPEAK];
153     int    fqipeak[MAXNPEAK];
154     int    fqnhitpmt[MAXNPEAK];
155     float  fqtotq[MAXNPEAK];
156     float  fq0rtotmu[MAXNPEAK];
157     float  fq0rnll[MAXNPEAK];
158     int    fq50[MAXNPEAK];
159     float  fqq50[MAXNPEAK];
160     int    fq1rpcflg[MAXNPEAK][MAXPX];
161     float  fq1rmom[MAXNPEAK][MAXPX];
162     float  fq1rt0[MAXNPEAK][MAXPX];
163     float  fq1rtotmu[MAXNPEAK][MAXPX];
164     float  fq1rnll[MAXNPEAK][MAXPX];
165     float  fq1rpos[MAXNPEAK][MAXPX][3];
166     float  fq1rdir[MAXNPEAK][MAXPX][3];
167     float  fq1rdconv[MAXNPEAK][MAXPX];
168     float  fq1reloss[MAXNPEAK][MAXPX];
169     double fq1rseed[MAXNPEAK][MAXPX][8];
```

# FQROOTOut.cc

```
99 void FQROOTOut::InitTree(){
135
136     trout->Branch("fqanse", &fitqunlr_.fqanse, "fqanse/I");
137     trout->Branch("fqitwnd", fitqunlr_.fqitwnd, "fqitwnd[fqanse]/I");
138     trout->Branch("fqipeak", fitqunlr_.fqipeak, "fqipeak[fqanse]/I");
139     trout->Branch("fqnhitpmt", fitqunlr_.fqnhitpmt, "fqnhitpmt[fqanse]/I");
140     trout->Branch("fqtotq", fitqunlr_.fqtotq, "fqtotq[fqanse]/F");
141     trout->Branch("fq0rtotmu", fitqunlr_.fq0rtotmu, "fq0rtotmu[fqanse]/F");
142     trout->Branch("fq0rnll", fitqunlr_.fq0rnll, "fq0rnll[fqanse]/F");
143     trout->Branch("fq50", fitqunlr_.fq50, "fq50[fqanse]/I");
144     trout->Branch("fqq50", fitqunlr_.fqq50, "fqq50[fqanse]/F");
145     trout->Branch("fq1rpcflg", fitqunlr_.fq1rpcflg, Form("fq1rpcflg[fqanse][%d]/I",MAXPX));
146     trout->Branch("fq1rseed", fitqunlr_.fq1rseed, Form("fq1rseed[fqanse][%d][8]/F",MAXPX));
147     trout->Branch("fq1rmom", fitqunlr_.fq1rmom, Form("fq1rmom[fqanse][%d]/F",MAXPX));
```

# fiTQun\_shared.cc

```
1008 void fiTQun_shared::SaveTestSnglTrkFit(double* fitparams, int istage, int itwnd, int iPID, double totmu, double nll, int PCflg){
1009     if (fitqunlrtest_.fqtestn1r >= FQTESTMAX1R) {
1010         std::cout << "In fiTQun_shared::SaveTestSnglTrkFit: cannot save more than " << FQTESTMAX1R << " test 1 ring fits." << std::endl;
1011         std::cout << "      ---> This test fit will not be saved (itwnd, iPID, totmu, nll) = (" << itwnd << ", " << iPID << ", " << totmu << ", " << nll << ")." << std::endl;
1012         return;
1013     }
1014
1015     fitqunlrtest_.fqtestl1stage[fitqunlrtest_.fqtestn1r] = istage;
1016     fitqunlrtest_.fqtestl1rse [fitqunlrtest_.fqtestn1r] = itwnd;
1017     fitqunlrtest_.fqtestl1rpid [fitqunlrtest_.fqtestn1r] = iPID;
1018     for (int i=0; i<fiTQun_shared::nSnglTrkParams; i++) {
1019         fitqunlr_.fq1rseed[0][iPID][i]=fitparams[i];
1020     }
1021     // fitqunlrtest_.fqtestl1rpos [fitqunlrtest_.fqtestn1r][0] = fitparams[0];
1022     // fitqunlrtest_.fqtestl1rpos [fitqunlrtest_.fqtestn1r][1] = fitparams[1];
1023     // fitqunlrtest_.fqtestl1rpos [fitqunlrtest_.fqtestn1r][2] = fitparams[2];
```

"fitparams" corresponds to the values of "snglTrkParams"  
at the point in fiTQun.cc where  
fiTQun\_shared::SaveTestSnglTrkFit gets called.

fiTQun\_shared::SaveTestSnglTrkFit only saves "test"  
variables which don't get read into the .root file. Perhaps  
problematic to save the seed using this function?

# fiTQun.cc

```
2500     std::cout << "#####Initial parameters: ";
2501     for (int i=0; i<fiTQun_shared::nSnglTrkParams; i++) {
2502         | std::cout << X[i] << ", ";
2503     }
2504     std::cout << "#####" << std::endl;
2505
2506     if (X0!=NULL) {
2507         for (int isd=0; isd<fiTQun_shared::nSnglTrkParams; isd++) {
2508             | X0[isd]=X[isd];
2509         }
2510     }
2511
2512     ln1val=GetOneRngnglogL(iPID,X,PCflg);
2513     totmu=GetTotmu();
2514     if (fqshared->GetFmskbkPMT()) fignrbkPMT=true;
2515     | fqshared->SaveTestSnglTrkFit(X,1,itwnd,iPID,totmu,ln1val,PCflg);
2516     if (fqshared->GetDrawflg()) DrawPreddist(Form("%d %d %d 1R%s 0",ievent,itwnd,ipeak,fiTQun_shared::PIDnames[iPID].Data()));
```

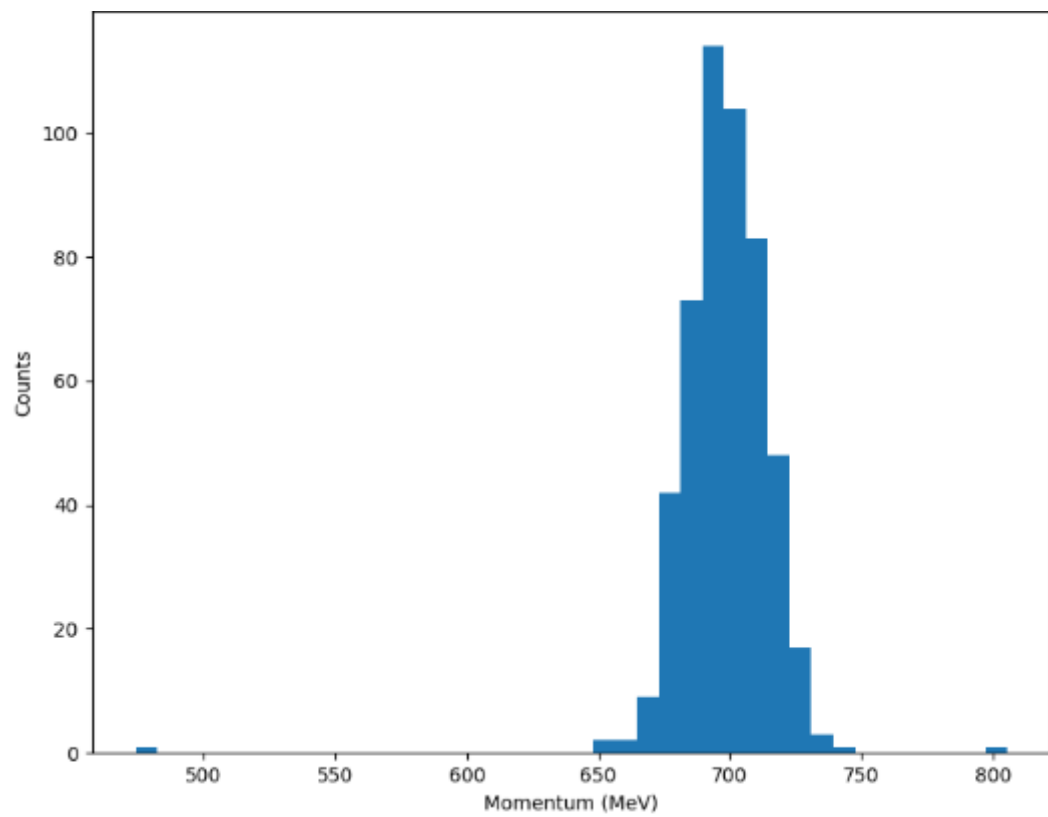
*SaveTestSnglTrkFit* gets called at the point where  $X[i]$  still corresponds to the seed, and afterwards assumes the values of the fit result.

The other relevant variables are saved using functions like *GetDefaultSnglTrkFit* or *SaveDefaultSnglTrkFit*, but they are called when  $X[i]$  is either already the previous fit result or the new fit result.

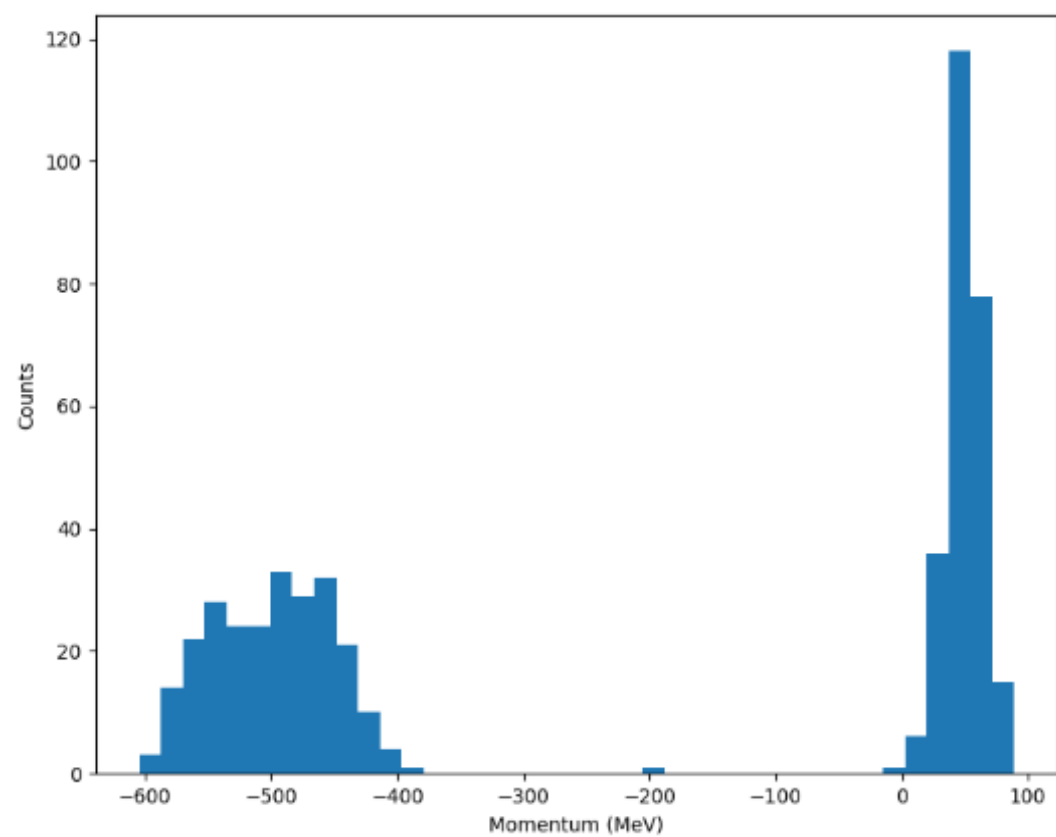
# fiTQun Seeding Values

- Recommendations/inputs?
- Right now used for testing purposes, but it would be useful for production. Do we want that?

Fit Result



Difference to Seed



Momentum difference vs. #Iterations

