Parameter handling

Wednesday, July 29
2

- Plugin database parameter containers into time calibration task

Level 1

- R3BTofTCalPar

- Contains time calibration parameters for one physical detector module — array with channel to time mapping

- Relevant public accessors:
  - ➡ GetBarId(); SetBarId(id)
  - ➡ GetBinUpAt(i_bin); GetBinLowAt(i_bin); GetTimeAt(i_bin)
  - ➡ SetBinUpAt(ch, i_bin), SetBinLowAt(ch, i_bin); SetTimeAt(time, i_bin)

Level 2

- R3BTofCalPar

- Contains array(s) of calibration parameters for all detector modules

➡ AddTCalPar(R3BTofTCalPar *tmodule) // add calibrated module to array

➡ GetNumTCalPar() // get number of modules

➡ GetTCalParAt(index) // get specific module

Level 3

- R3BDBTofContFact

- Factory for parameter container — responsible for creating / accessing the parameters in Runtime Database

- r3broot/r3bdb/tofdb
- open r3broot/r3bdb/CMakeLists.txt

- add_subdirectory (tofdb)

- cd BUILD_DIR
- . ./config.sh
- make -j4

Filling parameters

- r3broot/tof
- R3BTofFillTcal task from previous tutorial

- Header file

- Forward declaration

```
class R3BTofCalPar;
```

- Data member

```
private:
R3BTofCalPar* fCal_Par;
```

- Implementation file

```
#include "R3BTofCalPar.h"
#include "R3BTofTCalPar.h"
```

- Constructors (data member initialisation block)

```
fCal_Par(NULL)
```

Init

- #include “FairRuntimeDb.h”

- Task initialization R3BTofFillTcal::Init()

```
fCal_Par = (R3BTofCalPar*)FairRuntimeDb::instance()->getContainer("TofCalPar");
fCal_Par->setChanged();
```

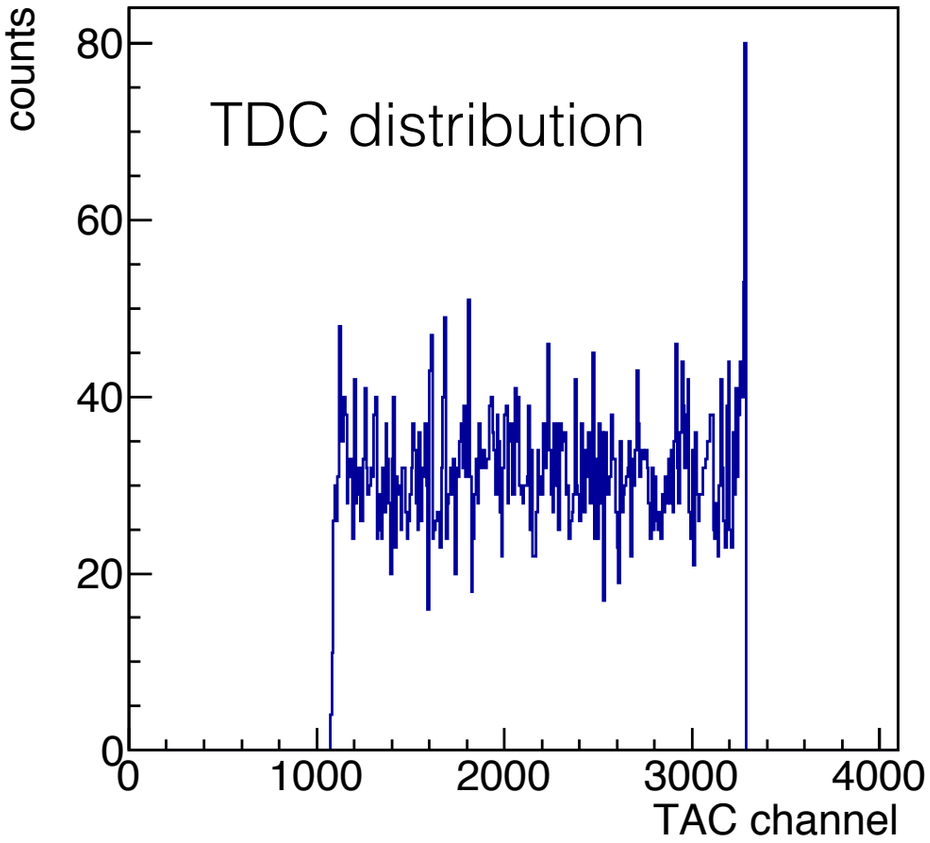
Event loop

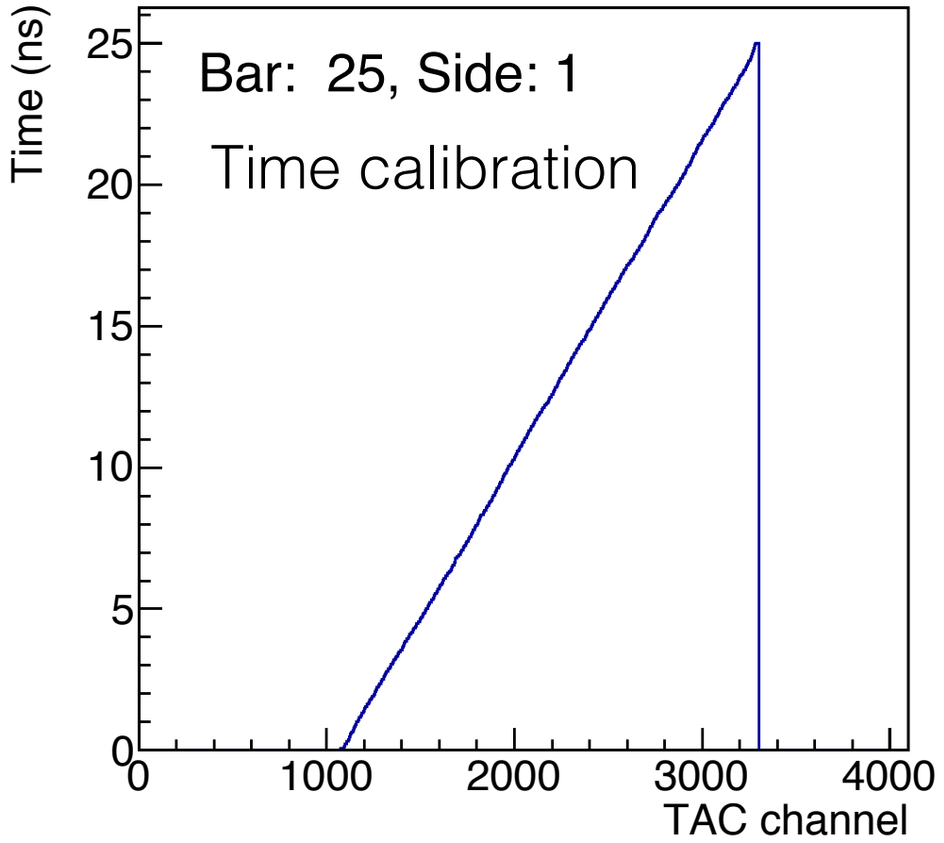
- In the event loop R3BTofFillTcal::Exec(……)

- Loop over input array with raw items and fill histogram with TDC values (for each module)

- After event loop R3BTofFillTcal::FinishTask() — analyse histograms with TDC distribution —> calculate calibration parameters

Example of time calibration





- Calibration for 1 module
- Array of bins with linear approximation
- Width corresponds to clock frequency (25 ns)

- After event loop R3BTofFillTcal::FinishTask() — analyse histograms with TDC distribution —> calculate calibration parameters

- // Inside of loop over detector modules

- for(Int_t iModule = 0; iModule < 16; iModule++) {

```
    // Create container and set the module ID
    R3BTofTCalPar* pTCal = new R3BTofTCalPar();
    pTCal->SetBarId(iModule);

    // Set calibration values (inside of loop over time channels)
    // index - current number of linear segments (bins)
      pTCal->SetBinLowAt(1024, 0);
      pTCal->SetBinUpAt(1024 + 50 - 1, 0);
      pTCal->SetTimeAt(15, 0);
      pTCal->IncrementNofChannels();

    // Add to set of parameters
    fCal_Par->AddTCalPar(pTCal);
}
fCal_Par->setChanged();
```

CMakeLists.txt

- r3broot/tof/
- Add ${R3BROOT_SOURCE_DIR}/r3bdb/tofdb to set(INCLUDE_DIRECTORIES
- Add R3BTofDB to Set(DEPENDENCIES
- Recompile

- Save parameters in the steering macro
- Execute event loop and save parameter containers

```
run->Run(nev, 0);
rtdb->saveOutput();
```