

Campaign Manager

Master File

Files

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Configuration file for BM

Calibration file for ST

Local Reco executable

Conclusions

Master File

• Structure: ./cammaps/FOOT_cam.map

```
// List of Campaigns
CamNumber: 0
CamName: "STD"
CamDataMC: 1
CamDate: ""
CamSum: "Test using standard input files"

CamNumber: 1
CamName: "12C_200"
CamDataMC: 1
CamDate: ""
CamSum: "Simulation data for 12C on 12C (5mm target) @ 200MeV/u"

CamNumber: 2
CamName: "160_200"
CamDataMC: 1
CamDate: ""
CamSum: "Simulation data for 160 on 12C (run 6) or C2H4 (run
1-5) for 5mm target thickness @ 200MeV/u"

CamNumber: 3
CamName: "GSI"
CamDataMC: 0
CamDate: "5-8 April 2019"
CamSum: "Test experiment with ST+BM+VTX+TW..."

CamNumber: 4
CamName: "HE_MC"
CamDataMC: 1
CamDate: "5-8 January 2020"
CamSum: "MC data for HE reaction produced by FLUKA"
```

- Campaign name with associated id
- MC data flag
- Date of data taking or production
- Summary of the campaign

➔ e.g.: load campaign file in ./cammaps/GSI.cam when option: `-exp GSI`

File (i)

• Real data structure: ./cammaps/GSI.cam

```
// Campaign file
CamName: "GSI"
RunNumber: 2187-2261
NumberDevices: 6

DetectorName: "FOOT"
NumberFiles: 1
"./geomaps/GSI/FOOT.geo": 2210; 2239

DetectorName: "ST"
NumberFiles: 4
"./geomaps/GSI/TASTdetector.geo": -1
"./config/GSI/TASTdetector.cfg": -1
"./config/GSI/WDChannelMap.map": -1
"./calib/GSI/WDTimeCalibration/tcalib.dat": 2187;
2190; 2191; 2192; 2193; 2200; 2202; 2203; 2204;
2205; 2206; 2208; 2209; 2210; 2211; 2212; 2213;
2214; 2216; 2217; 2218; 2219; 2220; 2221; 2222;
2223; 2224; 2225; 2226; 2227; 2228; 2229; 2230;
2231; 2232; 2233; 2234; 2235; 2236; 2237; 2238;
2239; 2240; 2241; 2242; 2243; 2244; 2245; 2246;
2247; 2248; 2249; 2250; 2251; 2252; 2253; 2254;
2255; 2256; 2257; 2258; 2259; 2260; 2261; 2262;
2263; 2264; 2270; 2271; 2272;

DetectorName: "BM"
NumberFiles: 4
"./geomaps/GSI/TABMdetector.geo": -1
"./config/GSI/TABMdetector.cfg": -1
"./config/GSI/TABMdetector.map": -1
"./calib/GSI/TABM_T0_Calibration.cal": 2210; 2239

DetectorName: "TG"
NumberFiles: 1
"./geomaps/GSI/TAGdetector.geo": 2187; 2210
```

```
DetectorName: "VT"
NumberFiles: 3
"./geomaps/GSI/TAVTdetector.map": -1
"./config/GSI/TAVTdetector.geo": -1
"./config/GSI/TAVTdetector.map": -1

DetectorName: "TW"
NumberFiles: 7
"./geomaps/GSI/TATWdetector.geo": -1
"./config/GSI/TATW_BBparameters.cfg": 2187; 2210
"./config/GSI/TATWChannelMapXML.map": -1
"./config/GSI/TATWbarsMapStatus.map": -1
"./calib/GSI/TATW_Energy_Calibration.cal": -1
"./calib/GSI/TATW_Tof_Calibration.cal": -1
"./calib/GSI/TATWEnergyTuning.cal": -1
```

- Campaign name with associated run
- Detector name with associated file number and name
- Name following with the corresponding run number validity (-1 no dependence)

File (ia)

• Run dependency: (as example)

```
// Campaign file
CamName: "GSI"
RunNumber: 2187-2261
NumberDevices: 6

. . .

DetectorName: "BM"
NumberFiles: 4
"./geomaps/GSI/TABMdetector.geo": -1
"./config/GSI/TABMdetector.cfg": -1
"./config/GSI/TABMdetector.map": -1
"./calib/GSI/TABM_T0_Calibration.cal": 2210; 2239
. . .
```

- Config file `./config/GSI/TABM_T0_Calibration_2210.cal` for BM is valid for runs 2210-2238
- Config file `./config/GSI/TABM_T0_Calibration_2239.cal` for BM is valid for runs 2239-2261

File (ii)

MC Structure: ./cammmap/12C_200.cam

```
// Campaign file
CamName: "12C_200"
RunNumber: 1
NumberDevices: 10

DetectorName: "FOOT"
NumberFiles: 1
"./geomaps/12C_200/FOOT.geo": -1

DetectorName: "DI"
NumberFiles: 1
"./geomaps/12C_200/TADIdetector.geo": -1

DetectorName: "ST"
NumberFiles: 3
"./geomaps/12C_200/TASTdetector.geo": -1
"./config/12C_200/TASTdetector.cfg": -1
"./config/12C_200/WDChannelMap.map": -1

DetectorName: "BM"
NumberFiles: 4
"./geomaps/12C_200/TABMdetector.geo": -1
"./config/12C_200/TABMdetector.cfg": -1
"./config/12C_200/TABMdetector.map": -1
"./calib/12C_200/TABM_T0_Calibration.cal": -1

DetectorName: "TG"
NumberFiles: 1
"./geomaps/12C_200/TAGdetector.geo": -1
```

```
DetectorName: "VT"
NumberFiles: 3
"./geomaps/12C_200/TAVTdetector.geo": -1
"./config/12C_200/TAVTdetector.cfg": -1
"./config/12C_200/TAVTdetector.map": -1

DetectorName: "IT"
NumberFiles: 3
"./geomaps/12C_200/TAITdetector.geo": -1
"./config/12C_200/TAITdetector.cfg": -1
"./config/12C_200/TAITdetector.map": -1

DetectorName: "MSD"
NumberFiles: 1
"./geomaps/12C_200/TAMSDdetector.geo": -1

DetectorName: "TW"
NumberFiles: 7
"./geomaps/12C_200/TATWdetector.geo": -1
"./config/12C_200/TATW_BBparameters.cfg": -1
"./config/12C_200/TATWChannelMapXML.map": -1
"./config/12C_200/TATWbarsMapStatus.map": -1
"./calib/12C_200/TATW_Energy_Calibration.cal": -1
"./calib/12C_200/TATW_Tof_Calibration.cal": -1

DetectorName: "CA"
NumberFiles: 1
"./geomaps/12C_200/TACAdetector.geo": -1
```

➔ Campaign manager will return the name of the parameter files with the right name with respect to campaign and run number for a given detector.

Implementation (i)

• TAGcampaignManager:

```
class TAGcampaign : public TAGparTools {
public:
    TAGcampaign();
    virtual ~TAGcampaign();

    Bool_t          FromFile(TString ifile = "");
    const Char_t*   GetName()      const { return fName.Data(); }
    const TArrayI&  GetRunArray()  const { return fRunArray; }
    Int_t           GetDevicesN()  const { return fDevicesN; }

    const Char_t*   GetGeoFile(const TString& detName, Int_t runNumber);
    const Char_t*   GetConfFile(const TString& detName, Int_t runNumber, TString bName = "",
                                Int_t bEnergy = -1);
    const Char_t*   GetMapFile(const TString& detName, Int_t runNumber, Int_t item = 0);
    const Char_t*   GetCalFile(const TString& detName, Int_t runNumber, Bool_t isTofCalib = false,
                                Bool_t isTofBarCalib = false, Bool_t elossTuning = false);

    Bool_t          IsDetectorOn(const TString& detName);
    void            Print(Option_t* opt = "") const;

    const vector<TString>& GetDetVector() const { return fDetectorVec; }
};
```

- ➔ Handles all campaigns and gives back information about the current campaign set by “exp” argument
- ➔ Special flag for TW (more than one calibration and mapping files)

Implementation (ii)

• TAGcampaign:

```
class TAGcampaign : public TAGparTools {  
    .  
    .  
public:  
    TAGcampaignManager(const TString exp = "");  
    virtual ~TAGcampaignManager();  
  
    Bool_t         FromFile(TString ifile = "");  
  
    Int_t           GetCampaignsN()          { return fCampaignsN;          }  
    Int_t           GetCurrentCamNumber() const { return fCurCampaignNumber; }  
    CamParameter_t& GetCampaignPar(Int_t idx) { return fCamParameter[idx]; }  
    const TAGcampaign* GetCurCampaign()     { return fCurCampaign;     }  
  
    const TArrayI&  GetCurRunArray() const;  
    const Char_t*   GetCurGeoFile(const TString& detName, Int_t runNumber = -1);  
    const Char_t*   GetCurConfFile(const TString& detName, Int_t runNumber = -1,  
                                   TString bName = "", Int_t bEnergy = -1);  
    const Char_t*   GetCurMapFile(const TString& detName, Int_t runNumber = -1, Int_t item = 0);  
    const Char_t*   GetCurCalFile(const TString& detName, Int_t runNumber = -1,  
                                   Bool_t isTofCalib = false, Bool_t isTofBarCalib = false,  
                                   Bool_t elossTuning = false);  
    Bool_t          IsDetectorOn(const TString& detName);  
  
    void           Print(Option_t* opt = "") const;  
    .  
    .  
    ClassDef(TAGcampaign,1);  
};
```

- ➔ Campaign class, stores names of the parameter file for a given detector name and run number

Implementation (iv)

Printouts: masterfile (i)

```
Number of campaigns: 5
Campaign number: 0
Campaign name: STD
MC data flag: 1
Campaign period:
Campaign summary: Test using standard input files

Campaign number: 1
Campaign name: 12C_200
MC data flag: 1
Campaign period:
Campaign summary: Simulation data for 12C on 12C (5mm target) @ 200MeV/u

Campaign number: 2
Campaign name: 160_200
MC data flag: 1
Campaign period:
Campaign summary: Simulation data for 160 on 12C (run 6) or C2H4 (run 1-5) for 5mm target thickness
@ 200MeV/u

Campaign number: 3
Campaign name: GSI
MC data flag: 0
Campaign period: 5-8 April 2019
Campaign summary: Test experiment with ST+BM+VTX+TW...

Campaign number: 4
Campaign name: HE_MC
MC data flag: 1
Campaign period: 5-8 January 2020
Campaign summary: Simulation data for 4He on 12C (5mm target) @ 700MeV/u
```


Implementation (v)

Printouts: GSI (ii)

```
Geometry files for GSI:
  Device name: BM with file: ./geomaps/GSI/TABMdetector.geo
  Device name: FOOT with file: ./geomaps/GSI/FOOT.geo
  Device name: ST with file: ./geomaps/GSI/TASTdetector.geo
  Device name: TG with file: ./geomaps/GSI/TAGdetector.geo
  Device name: TW with file: ./geomaps/GSI/TATWdetector.geo
Configuration files for GSI:
  Device name: BM with file: ./config/GSI/TABMdetector.cfg
  Device name: ST with file: ./config/GSI/TASTdetector.cfg
  Device name: TW with file: ./config/GSI/TATW_BBparameters.cfg
Mapping files for GSI:
  Device name: BM with file: ./config/GSI/TABMdetector.map
  Device name: ST with file: ./config/GSI/WDChannelMap.map
  Device name: TW with file: ./config/GSI/TATWChannelMapXML.map
  Device name: TW with file: ./config/GSI/TATWbarsMapStatus.map
  Device name: VT with file: ./config/GSI/TAVTdetector.map
Calibration files for GSI:
  Device name: BM with file: ./calib/GSI/TABM_T0_Calibration.cal
  Device name: ST with file: ./calib/GSI/WDTimeCalibration/tcalib.dat
  Device name: TW with file: ./calib/GSI/TATW_Energy_Calibration.cal
  Device name: TW with file: ./calib/GSI/TATW_Tof_Calibration.cal
  Device name: TW with file: ./calib/GSI/TATWEnergyTuning.cal
```

➔ printout option “all”: gives all files with the valid run numbers (-1 no dependency)

Reconstruction (i)

BaseReco (i):

```
class BaseReco : public TNamed // using TNamed for the in/out files
{
    . . .
protected:
    TAGcampaignManager* fCampManager;
    Int_t                fRunNumber;
    . . .
};
```

```
//
void BaseReco::ReadParFiles()
{
    . . .
if (GlobalPar::GetPar()->IncludeTG()) {
    fpParGeoG = new TAGparaDsc(TAGparGeo::GetDefParaName(), new TAGparGeo());
    TAGparGeo* parGeo = (TAGparGeo*)fpParGeoG->Object();

    TString parFileName = fCampManager->GetCurGeoFile(TAGparGeo::GetBaseName(), fRunNumber);
    parGeo->FromFile(parFileName.Data());
}
. . .
```

- ➔ Campaign manager from detector name and the run number will compose the name of the different cfg, map, cal, geo files.
- ➔ Campaign manager implemented but not used for parameter file loading.

Reconstruction (ii)

BaseReco (ii):

```
//  
void BaseReco::CampaignChecks()  
{  
    // check detector include in FootGlobal.par vs current campaign  
    vector<TString> list = GlobalPar::GetPar()->DectIncluded();  
    for (vector<TString>::const_iterator it = list.begin(); it != list.end(); ++it) {  
        TString str = *it;  
  
        if (!fCampManager->IsDetectorOn(str)) {  
            Error("CampaignChecks()", "the detector %s is NOT referenced in campaign file", str.Data());  
            exit(0);  
        }  
    }  
    TArrayI runArray = fCampManager->GetCurRunArray();  
    Bool_t runOk = false;  
  
    for (Int_t i = 0; i < runArray.GetSize(); ++i) {  
        if (fRunNumber == runArray[i])  
            runOk = true;  
    }  
    if (!runOk) {  
        Error("CampaignChecks()", "run %d is NOT referenced in campaign file", fRunNumber);  
        exit(0);  
    }  
}
```

- ➔ Check the campaign name and run number vs database
- ➔ Check if detector in Global par is in list of the campaign

Reconstruction (ii)

BaseReco (iii):

```
//  
void BaseReco::ReadParFiles()  
{  
    . . .  
    if (parFileName.IsNull() && fFlagMC) {  
        fFlagZtrueMC = true;  
        Warning("ReadParFiles()",  
            "BB parametrization file does not exist for %d%s at %d MeV switch to true MC Z\n", A_beam,  
            ion_name.Data(), (int)(kinE_beam*TAGgeoTrafo::GevToMev()));  
    } else  
        parCal->FromFileZID(parFileName.Data(),Z_beam);  
    . . .  
}
```

- ➔ Special case for TW when no BB parametrization file present, take true Z_{MC}
Put under condition calling of BB function in TATWactNtuMC class

Configuration file for BM

TABMparCon:

```
212     ft0Choice= "<<ft0Choice<<endl;
213     for(Int_t i=0;i<36;i++)
214         outfile<<"cellid= "<<i<<"  T0_time=
215             "<<ft0Vec[i]<<endl;
216     outfile.close();
217     return;
218 }
219 Bool_t TABMparCon::loadT0s(TString filename) {
220     ifstream infile;
221
222     Info("loadT0s", "Loading BM T0 calibration from
223         file: %s\n", filename.Data());
224
225     gSystem->ExpandPathName(filename);
226     infile.open(filename,ios::in);
227     if(infile.is_open()==kFALSE){
228         cout<<"TABMparCon::ERROR: Cannot open T0 file:
229             "<<filename<<endl;
230         return kTRUE;
231     }
232     char tmp_char[200];
233     vector<Float_t> fileT0(36,-10000.);
234     vector<Int_t> fileT0Int(36,-1);
```

```
218
219 Bool_t TABMparCon::loadT0s(TString filename) {
220     ifstream infile;
221     if(gTAGroot->CurrentRunNumber()==2210 ||
222        gTAGroot->CurrentRunNumber()==2211 ||
223        gTAGroot->CurrentRunNumber()==2212)
224         filename.Insert(filename.Last('.'),"_7April");
225     else if(gTAGroot->CurrentRunNumber()==2239 ||
226            gTAGroot->CurrentRunNumber()==2240 ||
227            gTAGroot->CurrentRunNumber()==2241 ||
228            gTAGroot->CurrentRunNumber()==2242 ||
229            gTAGroot->CurrentRunNumber()==2251)
230         filename.Insert(filename.Last('.'),"_8April");
231
232     gSystem->ExpandPathName(filename);
233     infile.open(filename,ios::in);
234     if(infile.is_open()==kFALSE){
235         cout<<"TABMparCon::ERROR: Cannot open T0 file:
236             "<<filename<<endl;
237         return kTRUE;
238     }
239     char tmp_char[200];
240     vector<Float_t> fileT0(36,-10000.);
241     Int_t tmp_int=-1, status=0;
```

➔ Remove hard coded run number using campaign manager

➔ Change the T0 calibration files accordingly

./config/GSI/T0_beammonitor_7April.cfg to ./calib/GSI/TABM_T0_Calibration_2210.cal

./config/GSI/T0_beammonitor_8April.cfg to ./calib/GSI/TABM_T0_Calibration_2239.cal

Calibration file for ST

• TAGbaseWDparTime:

```
31 TAGbaseWDparTime::TAGbaseWDparTime()
32 {
33     InitMap();
34 }
35
36 //-----+
37 //! Destructor.
38
39 TAGbaseWDparTime::~TAGbaseWDparTime()
40 {
41 }
42
43 //-----+
44 bool TAGbaseWDparTime::FromFile(TString
45     tcal_filename)
46 {
47     FILE *stream = fopen(tcal_filename.Data(), "r");
48
49     if(stream==NULL){
50         printf("\n\n WARNING:: ST WD time calibration
51             file %s not found\n\n",
52             tcal_filename.Data());
53         return false;
54     }else{
55         // if (FootDebugLevel(1) > 1)
56         Info("FromFile()", "Loading ST WD time
57             calibration from file::%s \n",
58             tcal_filename.Data());
59     }
60
61     u_int word;
62
63     bool TAGbaseWDparTime::FromFile(string expName, int
64         iRunNumber){
65
66         string runnumber;
67
68         if (iRunNumber == 0)
69             runnumber = Form("%d",
70                 gTAGroot->CurrentRunNumber());
71         else
72             runnumber = Form("%d", iRunNumber);
73
74         string tcal_filename("");
75         if (expName != "")
76             expName += "/";
77
78         tcal_filename+=Form("
79             ./calib/%sWDTimeCalibration/tcalib",
80             expName.data());
81         tcal_filename+=runnumber;
82         tcal_filename+=" .dat";
83
84         FILE *stream = fopen(tcal_filename.c_str(), "r");
85
86         if(stream==NULL){
87             printf("\n\n WARNING:: ST WD time calibration
88                 file %s not found\n\n",
89                 tcal_filename.c_str());
90             return false;
91         }else{
92             // if (FootDebugLevel(1) > 1)
93             printf("\n\nLoading ST WD time calibration from
94                 file::%s \n\n", tcal_filename.c_str());
95         }
96     }
97 }
```

➔ Remove local versioning using campaign manager

➔ Change the time calibration files accordingly

./config/GSI/WDTimeCalibration/tcalib#run.dat to

./calib/GSI/WDTimeCalibration/tcalib_#run.dat

Local Reco executable

DecodeRaw(MC)

```
int main (int argc, char *argv[]) {  
    . . .  
    Int_t runNb = -1;  
    for (int i = 0; i < argc; i++){  
        . . .  
        if(strcmp(argv[i],"-run") == 0) { runNb = atoi(argv[++i]); } // Run Number  
    }  
    . . .  
    LocalReco* locRec = new LocalReco(exp, in, out);  
    . . .  
    if (runNb != -1)  
        locRec->BaseReco::SetRunNumber(runNb);  
    . . .  
}
```

➔ Add option for run number, if present, set it in local reco

Event display

• TAEDbaseInterface:

```
class TAEDbaseInterface : public TEveEventManager
{
    . . .
    virtual void ShowDisplay(const TString fileName, Int_t runNumber = -1);
    . . .
protected:
    TString          fExpName;
    Int_t            fType;
    Int_t            fRunNumber;
    . . .
};
```

➔ Add run number as member and in argument in ShowDisplay method

Conclusions (i)

- This structure allows to make the association btw configuration/geometry/calibration/mapping files with campaign name and run number
- Correct some bugs
- ➔ Need to have a coherent extension for all the files:
 - *.geo for geometry files in *geomaps* folder
 - *.map for mapping file in *config* folder
 - *.cfg for configuration files in *config* folder
 - *.cal for calibration files in *calib* folder
- ➔ File are now coherent naming and folder
- ➔ No more local versioning of file (with hard coded number)

Bool_t TABMparCon::loadT0s and TAGbaseWDparTime::FromFile()

Conclusions (ii)

- ➔ Most of the old files cleaned !
 - ➔ The campaign name is now **mandatory** to run reconstruction
-
- Will ease the readability of the code if we stick on some convention
 - Campaign Manager manages all present detectors, GlobalPar allows to switch off/on given detectors during reconstruction.
 - Many thanks to Marco for helping me with the TW files !