New macro style with “master” objects

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The Goal

Single centralized management of “default” settings

- ✓ Geometry definitions
- ✓ Task list
- ✓ Parameter settings
- ✓ Flags, name style, field settings, diagnostic, …

Problems which are going to be solved:

- ✧ A lot of qa macros to modify each time something changes
- ✧ Developers/users never updating their macros, using obsolete settings (and realizing when too late)

- ➢ Backward compatible
- ➢ Easy to implement “dedicated” settings for developers

Standard simulation macro

```
sim_complete(Int_t nEvents = 100, TString  SimEngine ="TGeant3", Float_t mom = 6.231552)
{
  //-----User Settings:-----------------------------------------------
  TString  OutputFile     ="sim_complete.root";
  TString  ParOutputfile  ="simparams.root";
  TString  MediaFile      ="media_pnd.geo";
  gDebug                  = 0;
  TString digiFile        = "all.par"; //The emc run the hit producer directly
                            // choose your event generator
  Bool_t UseEvtGenDirect      =kTRUE;
  Bool_t UseDpm                =kFALSE;
  Bool_t UseFtf                =kFALSE;
  Bool_t UseBoxGenerator      =kFALSE;

  Double_t BeamMomentum = 0.; // beam momentum ONLY for the scaling of the dipole field.
  if (UseBoxGenerator)
  {
    BeamMomentum   =15.0; // ** change HERE if you run Box generator
  }
  else
  {
    BeamMomentum = mom;  // for DPM/EvtGen BeamMomentum is always = mom
  }
  //-----------------------------------------------------------------
  TLorentzVector flni(0, 0, mom, sqrt(mom*mom+9.3827203e-01*9.3827203e-01)+9.3827203e-01);
  TDatabasePDG::Instance()->AddParticle("pbarpSystem","pbarpSystem",flni.M(),kFALSE,0.1,0, "",88888);
  //-----------------------------------------------------------------
  TStopwatch timer;
  timer.Start();
  gRandom->SetSeed();

  // Create the Simulation run manager----------------------------------
  FairRunSim *fRun = new FairRunSim();
  fRun->SetName(SimEngine.Data() );
  fRun->SetOutputFile(OutputFile.Data());
  fRun->SetGenerateRunInfo(kFALSE);
  fRun->SetBeamMom(BeamMomentum);
  fRun->SetMaterials(MediaFile.Data());
  fRun->SetUseFairLinks(kTRUE);
  FairRuntimeDb *rtdb=fRun->GetRuntimeDb();

  // Set the parameters
  //--------------------------------
  TString allDigiFile = gSystem->Getenv("VMCWORKDIR");
  allDigiFile += "/macro/params/";
  allDigiFile += digiFile;


  //-------Set the parameter output --------------------
  FairParAsciiFileIo* parIo1 = new FairParAsciiFileIo();
  parIo1->open(allDigiFile.Data(),"in");
  rtdb->setFirstInput(parIo1);

  //---------------------Set Parameter output      ----------
  Bool_t kParameterMerged=kTRUE;
  FairParRootFileIo* output=new FairParRootFileIo(kParameterMerged);
  output->open(ParOutputfile.Data());
  rtdb->setOutput(output);

  // Create and add detectors

  //-------------------------  CAVE      ----------------
  FairModule *Cave= new PndCave("CAVE");
  Cave->SetGeometryFileName("pndcave.geo");
  fRun->AddModule(Cave);
  //-------------------------  Magnet   ----------------
  //FairModule *Magnet= new PndMagnet("MAGNET");
  //Magnet->SetGeometryFileName("FullSolenoid_V842.root");
  //Magnet->SetGeometryFileName("FullSuperconductingSolenoid_v831.root");
  //fRun->AddModule(Magnet);
  FairModule *Dipole= new PndMagnet("MAGNET");
  Dipole->SetGeometryFileName("dipole.geo");
  fRun->AddModule(Dipole);
  //-------------------------  Pipe     ----------------
  FairModule *Pipe= new PndPipe("PIPE");
  Pipe->SetGeometryFileName("beampipe_201309.root");
  fRun->AddModule(Pipe);
  //-------------------------  STT      ----------------
  FairDetector *Stt= new PndStt("STT", kTRUE);
  Stt->SetGeometryFileName("straws_skewed_blocks_35cm_pipe.geo");
  fRun->AddModule(Stt);
  //-------------------------  MVD      ----------------
  FairDetector *Mvd = new PndMvdDetector("MVD", kTRUE);
  Mvd->SetGeometryFileName("Mvd-2.1_FullVersion.root");
  fRun->AddModule(Mvd);
  //-------------------------  GEM      ----------------
  FairDetector *Gem = new PndGemDetector("GEM", kTRUE);
  Gem->SetGeometryFileName("gem_3Stations_Tube.root");
  fRun->AddModule(Gem);
  //-------------------------  EMC      ----------------
  PndEmc *Emc = new PndEmc("EMC",kTRUE);
  Emc->SetGeometryVersion(1);
  Emc->SetStorageOfData(kFALSE);
  fRun->AddModule(Emc);
  //-------------------------  SCITIL   ----------------
  FairDetector *SciT = new PndSciT("SCIT",kTRUE);
  SciT->SetGeometryFileName("SciTil_201504.root");
  fRun->AddModule(SciT);
  //-------------------------  DRC      ----------------
  PndDrc *Drc = new PndDrc("DIRC", kTRUE);
  Drc->SetGeometryFileName("dirc_l0_p0_updated.root");
  Drc->SetRunCherenkov(kFALSE);
  fRun->AddModule(Drc);
  //-------------------------  DISC     ----------------
  PndDsk* Dsk = new PndDsk("DSK", kTRUE);
  Dsk->SetStoreCerenkovs(kFALSE);
  Dsk->SetStoreTrackPoints(kFALSE);
  fRun->AddModule(Dsk);
  //-------------------------  MDT      ----------------
  PndMdt *Muo = new PndMdt("MDT",kTRUE);
  Muo->SetBarrel("fast");
  Muo->SetEndcap("fast");
  Muo->SetMuonFilter("fast");
  Muo->SetForward("fast");
  Muo->SetMdtMagnet(kTRUE);
  Muo->SetMdtCoil(kTRUE);
  Muo->SetMdtMFIron(kTRUE);
  fRun->AddModule(Muo);
  //-------------------------  FTS      ----------------
  FairDetector *Fts= new PndFts("FTS", kTRUE);
  Fts->SetGeometryFileName("fts.geo");
  fRun->AddModule(Fts);
  //-------------------------  FTOF     ----------------
  FairDetector *FTof = new PndFtof("FTOF",kTRUE);
  FTof->SetGeometryFileName("ftofwall.root");
  fRun->AddModule(FTof);
  //-------------------------  RICH     ----------------
  FairDetector *Rich= new PndRich("RICH",kFALSE);
  Rich->SetGeometryFileName("rich_v2_shift.geo");
  fRun->AddModule(Rich);

  //Create and Set Event Generator
  //-------------------------------
  FairPrimaryGenerator* primGen = new FairPrimaryGenerator();
  fRun->SetGenerator(primGen);

  if(UseBoxGenerator){      // Box Generator
    FairBoxGenerator* boxGen = new FairBoxGenerator(22, 5); // 13 = muon; 1 = multipl.
    boxGen->SetPRange(mom,mom); // GeV/c
    boxGen->SetPhiRange(0., 360.); // Azimuth angle range [degree]
    boxGen->SetThetaRange(0., 90.); // Polar angle in lab system range [degree]
    boxGen->SetXYZ(0., 0., 0.); // cm
    primGen->AddGenerator(boxGen);
  }
  if(UseDpm){
    PndDpmDirect *Dpm= new PndDpmDirect(mom,1);
    primGen->AddGenerator(Dpm);
  }
  if(UseFtf){
    //        TString macfile = gSystem->Getenv("VMCWORKDIR");
    //                          macfile += "/pgenerators/FtfEvtGen/PbarP.mac";
    //                          PndFtfDirect *Ftf = new PndFtfDirect(macfile.Data());
    PndFtfDirect *Ftf = new PndFtfDirect("anti_proton", "G4_H", 1, "ftfp", mom, 123456);
    primGen->AddGenerator(Ftf);
  }
  if(UseEvtGenDirect){
    TString  EvtInput =gSystem->Getenv("VMCWORKDIR");
    EvtInput+="/macro/run/psi2s_Jpsi2pi_Jpsi_mumu.dec";
    PndEvtGenDirect *EvtGen = new PndEvtGenDirect("pbarpSystem", EvtInput.Data(), mom);
    EvtGen->SetStoreTree(kTRUE);
    primGen->AddGenerator(EvtGen);
  }

  //---------------------Create and Set the Field(s)----------
  PndMultiField *fField= new PndMultiField("AUTO");
  fRun->SetField(fField);

  // EMC Hit producer
  //-----------------------------
  PndEmcHitProducer* emcHitProd = new PndEmcHitProducer();
  fRun->AddTask(emcHitProd);

  //-------------------------  Initialize the RUN  ----------------
  fRun->Init();
  //-------------------------  Run the Simulation  ----------------
  fRun->Run(nEvents);
  //-------------------------  Save the parameters ----------------
  rtdb->saveOutput();
  //------------------------Print some info and exit---------------
  timer.Stop();
  Double_t rtime = timer.RealTime();
  Double_t ctime = timer.CpuTime();
  printf("RealTime=%f seconds, CpuTime=%f seconds\n",rtime,ctime);

  cout << " Test passed" << endl;
  cout << " All ok " << endl;

  //exit(0);
```

199 code lines

https://subversion.gsi.de/trac/fairroot/browser/pandaroot/trunk/macro/run/sim_complete.C

Standard digitization macro

```
void digi_complete()
{
  // Macro created 20/09/2006 by S.Spataro
  // It loads a simulation file and digitize hits

  // Verbosity level (0=quiet, 1=event level, 2=track level, 3=debug)
  Int_t iVerbose = 0; // just forget about it, for the moment

  // Input file (MC events)
  TString inFile = "sim_complete.root";

  // Parameter file
  TString parFile = "simparams.root"; // at the moment you do not need it

  // Digitisation file (ascii)
  TString digiFile = "all.par";

  // Output file
  TString outFile = "digi_complete.root";

  // -----   Timer   --------------------------------------------------
  TStopwatch timer;

  // -----   Reconstruction run   -------------------------------------
  FairRunAna *fRun= new FairRunAna();
  fRun->SetInputFile(inFile);
  fRun->SetOutputFile(outFile);
  fRun->SetGenerateRunInfo(kFALSE);
  fRun->SetUseFairLinks(kTRUE);
  // -----  Parameter database   --------------------------------------
  TString allDigiFile = gSystem->Getenv("VMCWORKDIR");
  allDigiFile += "/macro/params/";
  allDigiFile += digiFile;

  FairRuntimeDb* rtdb = fRun->GetRuntimeDb();
  FairParRootFileIo* parInput1 = new FairParRootFileIo();
  parInput1->open(parFile.Data());

  FairParAsciiFileIo* parIo1 = new FairParAsciiFileIo();
  parIo1->open(allDigiFile.Data(),"in");

  rtdb->setFirstInput(parInput1);
  rtdb->setSecondInput(parIo1);

  // -----   STT digi producers   --------------------------------
  PndSttHitProducerRealFast* sttHitProducer = new PndSttHitProducerRealFast();
  fRun->AddTask(sttHitProducer);

  // -----   MDV digi producers   --------------------------------
  PndMvdDigiTask* mvddigi = new PndMvdDigiTask();
  mvddigi->SetVerbose(iVerbose);
  fRun->AddTask(mvddigi);

  PndMvdClusterTask* mvdmccls = new PndMvdClusterTask();
  mvdmccls->SetVerbose(iVerbose);
  fRun->AddTask(mvdmccls);

  // -----   EMC hit producers   --------------------------------
  PndEmcHitsToWaveform* emcHitsToWaveform= new PndEmcHitsToWaveform(iVerbose);
  PndEmcWaveformToDigi* emcWaveformToDigi=new PndEmcWaveformToDigi(iVerbose);
  emcHitsToWaveform->SetStorageOfData(kFALSE);
  //emcWaveformToDigi->SetStorageOfData(kFALSE);
  fRun->AddTask(emcHitsToWaveform);  // full digitization
  fRun->AddTask(emcWaveformToDigi);  // full digitization

  PndEmcMakeCluster* emcMakeCluster= new PndEmcMakeCluster(iVerbose);
  fRun->AddTask(emcMakeCluster);

  PndEmcMakeBump* emcMakeBump= new PndEmcMakeBump();
  fRun->AddTask(emcMakeBump);

  //PndEmcHdrFiller* emcHdrFiller = new PndEmcHdrFiller();
  //fRun->AddTask(emcHdrFiller); // ECM header

  // -----   SciT hit producers   ------------------------
  PndSciTHitProducerIdeal* tofhit = new PndSciTHitProducerIdeal();
  tofhit->SetVerbose(iVerbose);
  fRun->AddTask(tofhit);

  // -----   MDT hit producers   --------------------------------
  PndMdtHitProducerIdeal* mdtHitProd = new PndMdtHitProducerIdeal();
  mdtHitProd->SetPositionSmearing(.3); // position smearing [cm]
  fRun->AddTask(mdtHitProd);

  PndMdtTrkProducer* mdtTrkProd = new PndMdtTrkProducer();
  fRun->AddTask(mdtTrkProd);

  // -----   DRC hit producers   --------------------------------
  PndDrcHitProducerReal* drchit = new PndDrcHitProducerReal();
  drchit->SetVerbose(iVerbose);
  fRun->AddTask(drchit);

  // -----   GEM hit producers   --------------------------------
  Int_t verboseLevel = 0;
  PndGemDigitize* gemDigitize = new PndGemDigitize("GEM Digitizer", verboseLevel);
  fRun->AddTask(gemDigitize);
  PndGemFindHits* gemFindHits = new PndGemFindHits("GEM Hit
  fRun->AddTask(gemFindHits);

  // -----   FTS hit producers   --------------------------------
  PndFtsHitProducerRealFast* ftsHitProducer = new PndFtsHitProdu
  fRun->AddTask(ftsHitProducer);

  // -----   Ftof hit producers   -------------------------
  PndFtofHitProducerIdeal* ftofhit = new PndFtofHitProducerIdeal();
  ftofhit->SetVerbose(iVerbose);
  fRun->AddTask(ftofhit);
  // -----   Intialise and run   --------------------------------------------
  fRun->Init();

  timer.Start();
  fRun->Run();
  // -----   Finish   -------------------------------------------------------
  timer.Stop();
  Double_t rtime = timer.RealTime();
  Double_t ctime = timer.CpuTime();
  cout << endl << endl;
  cout << "Macro finished successfully." << endl;
  cout << "Output file is "    << outFile << endl;
  cout << "Parameter file is " << parFile << endl;
  cout << "Real time " << rtime << " s, CPU time " << ctime << " s" <
  cout << endl;
  // ------------------------------------------------------------------------
  cout << " Test passed" << endl;
  cout << " All ok " << endl;
                                                                    exit(0);
}
```

131 code lines

https://subversion.gsi.de/trac/fairroot/browser/pandaroot/trunk/macro/run/digi_complete.C

Standard macros

Simulation macro/run/sim_complete.C 199 code lines	Changes in geometry Need to set EvtGen params, DPM flags, box parameters, proper field
Digitization macro/run/digi_complete.C 131 code lines	Almost untouched Very rare changes in digitization tasks
Reconstruction (tracking) macro/run/reco_complete.C 143 code lines	Sometimes changes in the reconstruction flags
Reconstruction (PID) macro/run/pid_complete.C 115 code lines	Sometimes new PID algorithm is added

The Idea

FairRunSim
FairRunAna

PndMasterRunSim : public FairRunSim
PndMasterRunAna : public FairRunAna

They derive all the FairRun functionalities

AND

They add new functionalities

- ✓ standard filename style definition
- ✓ handling of common settings
- ✓ creation of standard geometry volumes
- ✓ inclusion of standard tasks
- ✓ finalize and provide diagnostics for dashboard

New simulation macro

```
sim_complete(Int_t nEvents = 100, TString  SimEngine ="TGeant3", Double_t BeamMomentum = 6.231552)
{
  //-----User Settings:-----------------------------------------------------
  TString  parAsciiFile   = "all.par";
  // TString inputGenerator =
  // EvtGen -> "xxxxxxxx.dec"
  // DPM    -> "dpm_xxxxx"
  // FTF    -> "ftf_xxxxx"
  TString  inputGenerator = "psi2s_Jpsi2pi_Jpsi_mumu.dec";
  //----------------------------------------------------------------------
  // -----   Create the Simulation run manager ----------------------------
  PndMasterRunSim *fRun = new PndMasterRunSim();
  fRun->SetInput(inputGenerator);
  fRun->SetName(SimEngine);
  fRun->SetParamAsciiFile(parAsciiFile);
  fRun->SetNumberOfEvents(nEvents);
  fRun->SetBeamMom(BeamMomentum);
  // -----   Initialization   ---------------------------------------------
  fRun->Setup();
  // -----   Geometry   ---------------------------------------------------
  fRun->CreateGeometry();
  // -----   Event generator   --------------------------------------------
  fRun->SetGenerator();
  // -----   Add tasks   --------------------------------------------------
  fRun->AddSimTasks();
  // -----   Intialise and run   ------------------------------------------
  fRun->Init();
  fRun->Run(nEvents);
  fRun->Finish();
};
```

User settings

I-do-whatever-you-need functions

39 code lines

https://subversion.gsi.de/trac/fairroot/browser/pandaroot/trunk/macro/master/sim_complete.C

PndMasterRunSim:Setup()

```
// -----   Setup   ----------------------------------------------------------
Bool_t PndMasterRunSim::Setup()
{

  TString inputName = fInput;
  inputName.ToLower();
  if (inputName.EndsWith(".dec")) inputName.Remove(inputName.Length()-4,4);

  PndFileNameCreator creator(inputName.Data());
  SetOutputFile(creator.GetSimFileName().data());
  fOutFile = creator.GetSimFileName().data();
  SetParamRootFile(creator.GetParFileName().data());
  SetMaterials("media_pnd.geo");
  SetGenerateRunInfo(kFALSE);
  SetUseFairLinks(kTRUE);

  // -----  Parameter database   --------------------------------------------
  TString allDigiFile = gSystem->Getenv("VMCWORKDIR");
  allDigiFile += "/macro/params/";
  allDigiFile += fParamAsciiFile;

  fRtdb = this->GetRuntimeDb();
  Bool_t kParameterMerged=kFALSE; // No use until now
  FairParRootFileIo* parOutput = new FairParRootFileIo(kParameterMerged);
  parOutput->open(fParamRootFile,"RECREATE");

  FairParAsciiFileIo* parIo1 = new FairParAsciiFileIo();
  parIo1->open(allDigiFile.Data(),"in");

  fRtdb->setFirstInput(parIo1);
  fRtdb->setOutput(parOutput);

  // -----  Create and Set the Field(s) ---------------------------------------
  PndMultiField *field= new PndMultiField("AUTO");
  SetField(field);

  // ---- Defining PANDA particles ------------------------------------------
  Double_t mom = GetBeamMom();
  TLorentzVector fIni(0, 0, mom, sqrt(mom*mom+9.3827203e-01*9.3827203e-01)+9.3827203e-01);
  TDatabasePDG::Instance()->AddParticle("pbarpSystem" ,"pbarpSystem",  fIni.M(), kFALSE, 0.1, 0, "", 88888);
  TDatabasePDG::Instance()->AddParticle("pbarpSystem0","pbarpSystem0", fIni.M(), kFALSE, 0.1, 0, "", 88880);
  TDatabasePDG::Instance()->AddParticle("pbarpSystem1","pbarpSystem1", fIni.M(), kFALSE, 0.1, 0, "", 88881);
  TDatabasePDG::Instance()->AddParticle("pbarpSystem2","pbarpSystem2", fIni.M(), kFALSE, 0.1, 0, "", 88882);

  return kTRUE;
}
```

It does all the boring things
which you don't need to take care

Yes I know
pbard is missing (still)

PndMasterRunSim:CreateGeometry()

```
void PndMasterRunSim::CreateGeometry()
{
  //------------------------  CAVE      -----------------
  FairModule *Cave= new PndCave("CAVE");
  Cave->SetGeometryFileName("pndcave.geo");
  AddModule(Cave);
  //------------------------  Magnet   -----------------
  //FairModule *Magnet= new PndMagnet("MAGNET");
  //Magnet->SetGeometryFileName("FullSolenoid_V842.root");
  //Magnet->SetGeometryFileName("FullSuperconductingSolenoid_v831.root");
  //AddModule(Magnet);
  FairModule *Dipole= new PndMagnet("MAGNET");
  Dipole->SetGeometryFileName("dipole.geo");
  AddModule(Dipole);
  //------------------------  Pipe     -----------------
  FairModule *Pipe= new PndPipe("PIPE");
  Pipe->SetGeometryFileName("beampipe_201309.root");
  AddModule(Pipe);
  //------------------------  STT       -----------------
  FairDetector *Stt= new PndStt("STT", kTRUE);
  Stt->SetGeometryFileName("straws_skewed_blocks_35cm_pipe.geo");
  AddModule(Stt);
  //------------------------  MVD       -----------------
  FairDetector *Mvd = new PndMvdDetector("MVD", kTRUE);
  Mvd->SetGeometryFileName("Mvd-2.1_FullVersion.root");
  AddModule(Mvd);
  //------------------------  GEM       -----------------
  FairDetector *Gem = new PndGemDetector("GEM", kTRUE);
  Gem->SetGeometryFileName("gem_3Stations_Tube.root");
  AddModule(Gem);
  //------------------------  EMC       -----------------
  PndEmc *Emc = new PndEmc("EMC",kTRUE);
  Emc->SetGeometryVersion(1);
  Emc->SetStorageOfData(kFALSE);
  AddModule(Emc);
  //------------------------  SCITIL    -----------------
  FairDetector *SciT = new PndSciT("SCIT",kTRUE);
  SciT->SetGeometryFileName("SciTil_201504.root");
  AddModule(SciT);
  //------------------------  DRC       -----------------
  PndDrc *Drc = new PndDrc("DIRC", kTRUE);
  Drc->SetGeometryFileName("dirc_l0_p0_updated.root");
  Drc->SetRunCherenkov(kFALSE);
  AddModule(Drc);
  //------------------------  DISC      -----------------
  PndDsk* Dsk = new PndDsk("DSK", kTRUE);
  Dsk->SetStoreCerenkovs(kFALSE);
  Dsk->SetStoreTrackPoints(kFALSE);
  AddModule(Dsk);
  //------------------------  MDT       -----------------
  PndMdt *Muo = new PndMdt("MDT",kTRUE);
  Muo->SetBarrel("fast");
  Muo->SetEndcap("fast");
  Muo->SetMuonFilter("fast");
  Muo->SetForward("fast");
  Muo->SetMdtMagnet(kTRUE);
  Muo->SetMdtCoil(kTRUE);
  Muo->SetMdtMFIron(kTRUE);
  AddModule(Muo);
  //------------------------  FTS       -----------------
  FairDetector *Fts= new PndFts("FTS", kTRUE);
  Fts->SetGeometryFileName("fts.geo");
  AddModule(Fts);
  //------------------------  FTOF      -----------------
  FairDetector *FTof = new PndFtof("FTOF",kTRUE);
  FTof->SetGeometryFileName("ftofwall.root");
  AddModule(FTof);
  //------------------------  RICH      ----------------
  FairDetector *Rich= new PndRich("RICH",kFALSE);
  Rich->SetGeometryFileName("rich_v2_shift.geo");
  AddModule(Rich);
}
```

Centralized geometry definition

Setting the input

```
//-----User Settings:-----------------------------------------------------
  TString  parAsciiFile   = "all.par";
  // TString inputGenerator =
  // EvtGen -> "xxxxxxxx.dec"
  // DPM    -> "dpm_xxxxx"
  // FTF    -> "ftf_xxxxx"
  TString  inputGenerator = "psi2s_Jpsi2pi_Jpsi_mumu.dec";
  …
  fRun->SetGenerator();
  …
```

If inputGenerator contains:

“.dec” -> EvtGen

“dpm” -> DPM

“ftf” -> FTF

not case-sensitive

Output files:

- XXX_sim.root (simulation)
- XXX_par.root (parameters)

Klaus is implementing prefix to add

EvtGen: initial state particle automatically found from .dec file

Box generator?

```
sim_box(Int_t nEvents = 100, TString  SimEngine ="TGeant3", Double_t BeamMomentum = 6.231552)
{
  //-----User Settings:-----------------------------------------------------
  TString  parAsciiFile   = "all.par";
  TString  inputGenerator = "box_1pi_1GeV_theta10-120";
  //--------------------------------------------------------------------------
  // -----   Create the Simulation run manager ----------------------------
  PndMasterRunSim *fRun = new PndMasterRunSim();
  fRun->SetInput(inputGenerator);
  fRun->SetName(SimEngine);
  fRun->SetParamAsciiFile(parAsciiFile);
  fRun->SetNumberOfEvents(nEvents);
  fRun->SetBeamMom(BeamMomentum);
  // -----   Initialization   ---------------------------------------------
  fRun->Setup();
  // -----   Geometry   ---------------------------------------------------
  fRun->CreateGeometry();
  // -----   Event generator   --------------------------------------------
  FairBoxGenerator* boxGen = new FairBoxGenerator(13, 1); // 13 = muon; 1 = multipl.
  boxGen->SetPRange(1.,1.); // GeV/c
  boxGen->SetPhiRange(0., 360.); // Azimuth angle range [degree]
  boxGen->SetThetaRange(10., 120.); // Polar angle in lab system range [degree]
  boxGen->SetXYZ(0., 0., 0.); // cm
  fRun->SetGenerator(boxGen);
  // -----   Add tasks   --------------------------------------------------
  fRun->AddSimTasks();
  // -----   Intialise and run   ------------------------------------------
  fRun->Init();
  fRun->Run(nEvents);
  fRun->Finish();
};
```

Klaus is implementing a single line parser

https://subversion.gsi.de/trac/fairroot/browser/pandaroot/trunk/macro/master/sim_box.C

New digitization macro

```
void digi_complete(Int_t nEvents = 0)
{
  //-----User Settings:-----------------------------------------------------
  TString  parAsciiFile   = "all.par";
  TString  input          = "psi2s_Jpsi2pi_Jpsi_mumu.dec";
  TString  output         = "digi";
  TString  friend1        = "";
  TString  friend2        = "";
  TString  friend3        = "";
  TString  friend4        = "";

  // -----   Initial Settings   ----------------------------------------
  PndMasterRunAna *fRun= new PndMasterRunAna();
  fRun->SetInput(input);
  fRun->SetOutput(output);
  fRun->SetFriend1(friend1);
  fRun->SetFriend2(friend2);
  fRun->SetFriend3(friend3);
  fRun->SetFriend4(friend4);
  fRun->SetParamAsciiFile(parAsciiFile);
  fRun->Setup();

  // -----   Add tasks   -----------------------------------------------
  fRun->AddDigiTasks();

  // -----   Intialise and run   ---------------------------------------
  fRun->Init();
  fRun->Run(0, nEvents);
  fRun->Finish();
  exit(0);
}
```

Fixed style name

Input -> original inputGenerator

Output -> only suffix

Complete list of digi tasks

https://subversion.gsi.de/trac/fairroot/browser/pandaroot/trunk/macro/master/digi_complete.C

New reconstruction macro

```
void reco_complete(Int_t nEvents = 0)
{
  //-----User Settings:-----------------------------------------------------
  TString  parAsciiFile   = "all.par";
  TString  input          = "psi2s_Jpsi2pi_Jpsi_mumu.dec";
  TString  output         = "reco";
  TString  friend1        = "digi";
  TString  friend2        = "";
  TString  friend3        = "";
  TString  friend4        = ""
  // -----   Initial Settings   ----------------------------------------
  PndMasterRunAna *fRun= new PndMasterRunAna();
  fRun->SetInput(input);
  fRun->SetOutput(output);
  fRun->SetFriend1(friend1);
  fRun->SetFriend2(friend2);
  fRun->SetFriend3(friend3);
  fRun->SetFriend4(friend4);
  fRun->SetParamAsciiFile(parAsciiFile);
  fRun->Setup();

  // -----   Add tasks   -----------------------------------------------
  fRun->AddRecoTasks();

  // -----   Intialise and run   ---------------------------------------
  PndEmcMapper::Init(1);
  fRun->Init();
  fRun->Run(0, nEvents);
  fRun->Finish();
  exit(0);
}
```

Fixed style name

Input -> original inputGenerator

Output -> only suffix

Friends -> only suffix

Complete list of reco tasks

https://subversion.gsi.de/trac/fairroot/browser/pandaroot/trunk/macro/master/reco_complete.C

New pid macro

```
void pid_complete(Int_t nEvents = 0)
{
  //-----User Settings:-----------------------------------------------------
  TString  parAsciiFile   = "all.par";
  TString  input          = "psi2s_Jpsi2pi_Jpsi_mumu.dec";
  TString  output         = "pid";
  TString  friend1        = "digi";
  TString  friend2        = "reco";
  TString  friend3        = "";
  TString  friend4        = "";
  // -----   Initial Settings   ----------------------------------------
  PndMasterRunAna *fRun= new PndMasterRunAna();
  fRun->SetInput(input);
  fRun->SetOutput(output);
  fRun->SetFriend1(friend1);
  fRun->SetFriend2(friend2);
  fRun->SetFriend3(friend3);
  fRun->SetFriend4(friend4);
  fRun->SetParamAsciiFile(parAsciiFile);
  fRun->Setup();

  // -----   Add tasks   -----------------------------------------------
  fRun->AddPidTasks();

  // -----   Intialise and run   ---------------------------------------
  PndEmcMapper::Init(1);
  fRun->Init();
  fRun->Run(0, nEvents);
  fRun->Finish();
  exit(0);
}
```

Fixed style name

Input -> original inputGenerator

Output -> only suffix

Friends -> only suffix

Complete list of pid tasks

https://subversion.gsi.de/trac/fairroot/browser/pandaroot/trunk/macro/master/pid_complete.C

All-in-one macro

```
void full_complete(Int_t nEvents = 0)
{
  //-----User Settings:-----------------------------------------------------
  TString  parAsciiFile   = "all.par";
  TString  input          = "psi2s_Jpsi2pi_Jpsi_mumu.dec";
  TString  output         = "pid";
  TString  friend1        = "";
  TString  friend2        = "";
  TString  friend3        = "";
  TString  friend4        = "";
  // -----   Initial Settings   ----------------------------------------
  PndMasterRunAna *fRun= new PndMasterRunAna();
  fRun->SetInput(input);
  fRun->SetOutput(output);
  fRun->SetFriend1(friend1);
  fRun->SetFriend2(friend2);
  fRun->SetFriend3(friend3);
  fRun->SetFriend4(friend4);
  fRun->SetParamAsciiFile(parAsciiFile);
  fRun->Setup();
  // -----   Add tasks   -----------------------------------------------
  fRun->AddDigiTasks(kFALSE);
  fRun->AddRecoTasks(kFALSE);
  fRun->AddPidTasks();
  // -----   Intialise and run   ---------------------------------------
  fRun->Init();
  fRun->Run(0, nEvents);
  fRun->Finish();
  exit(0);
}
```

Complete list of digi+reco+pid tasks

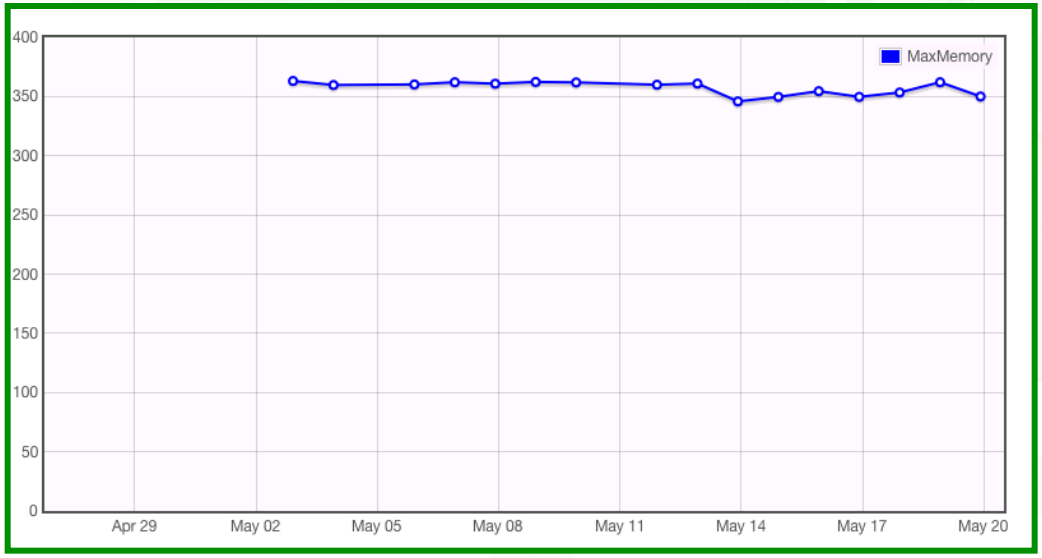
Persistency of digi+reco objects OFF

https://subversion.gsi.de/trac/fairroot/browser/pandaroot/trunk/macro/master/full_complete.C

PndMasterRunXxx:Finish()

```
<DartMeasurement name="MaxMemory" type="numeric/double">345.84</DartMeasurement>
<DartMeasurement name="CpuLoad" type="numeric/double">0.947874</DartMeasurement>

[INFO   ] Output file is                    psi2s_jpsi2pi_jpsi_mumu_pid.root
[INFO   ] Friend file is                    psi2s_jpsi2pi_jpsi_mumu_digi.root
[INFO   ] Friend file is                    psi2s_jpsi2pi_jpsi_mumu_reco.root
[INFO   ] Parameter ROOT file is            psi2s_jpsi2pi_jpsi_mumu_par.root
[INFO   ] Parameter ASCII file is           all.par
[INFO   ] Real time 24.3598 s, CPU time 23.09s
[INFO   ] CPU usage 94.7874%
[INFO   ] Max Memory 345.84 MB
[INFO   ] Macro finished successfully.
```



Dashboard

reco_complete3.C

Max Memory

Alternative tasks/geometry?

```
void recoqa_complete(Int_t nEvents = 0)
{
  //-----User Settings:---------------------------------------------------
  TString  parAsciiFile   = "all.par";
  TString  input          = "psi2s_Jpsi2pi_Jpsi_mumu.dec";
…
  // -----   Initial Settings   ---------------------------------------------
  PndMasterRunAna *fRun= new PndMasterRunAna();
  fRun->SetInput(input);
…
  fRun->SetParamAsciiFile(parAsciiFile);
  fRun->Setup();

  // -----   Add tasks   ----------------------------------------------------
  /// Ideal Track finder
  PndMCIdealTrackFinderNewLinks* idealTracking = new PndMCIdealTrackFinderNewLinks();
  idealTracking->AddBranchName("MVDHitsPixel");
  idealTracking->AddBranchName("MVDHitsStrip");
  idealTracking->AddBranchName("STTHit");
  idealTracking->AddBranchName("GEMHit");
  fRun->AddTask(idealTracking);

  /// QA task
  PndTrackingQualityTaskNewLinks* trackingQA = new PndTrackingQualityTaskNewLinks("SttMvdGemGenTrack", "IdealTrack");
  fRun->AddTask(trackingQA);

  // -----   Intialise and run   --------------------------------------------
  PndEmcMapper::Init(1);
  fRun->Init();
…
```

PndMasterRunXxx has all the FairRunXxx functionalities

Instead of fRun->AddXxxTasks()

https://subversion.gsi.de/trac/fairroot/browser/pandaroot/trunk/macro/qa/run3/recoqa_complete.C

PndMasterRunXxx::SetEventCountRate()

```
PndMasterRunAna *fRun= new PndMasterRunAna();
…
fRun->SetEventCountRate(xxx);
…
```

xxx = 100 by default

```
#####Mapper:filltubearray######
fGeoType=1
[INFO   ] Object FtofPoint describing the branch in the folder structure was found
-I- PndFtofHitProducerIdeal: Intialisation successfull
[INFO   ] FairRunAna::Run() After checking, the run will run from event 0 to 2000.
Event 100/2000 : time   15.9 sec, (   178 sec remaining)
Event 200/2000 : time   24.0 sec, (   157 sec remaining)
Event 300/2000 : time   33.6 sec, (   153 sec remaining)
Event 400/2000 : time   43.1 sec, (   146 sec remaining)
Event 500/2000 : time   54.2 sec, (   143 sec remaining)
Event 600/2000 : time   62.7 sec, (   131 sec remaining)
Event 700/2000 : time   71.7 sec, (   121 sec remaining)
Event 800/2000 : time   81.7 sec, (   113 sec remaining)
Event 900/2000 : time   90.2 sec, (   102 sec remaining)
Event 1000/2000 : time   98.5 sec, (    92 sec remaining)
Event 1100/2000 : time  107.4 sec, (    82 sec remaining)
Event 1200/2000 : time  116.3 sec, (    73 sec remaining)
Event 1300/2000 : time  126.7 sec, (    65 sec remaining)
Event 1400/2000 : time  135.9 sec, (    55 sec remaining)
Event 1500/2000 : time  147.6 sec, (    47 sec remaining)
Event 1600/2000 : time  158.1 sec, (    38 sec remaining)
Event 1700/2000 : time  167.2 sec, (    28 sec remaining)
Event 1800/2000 : time  175.1 sec, (    19 sec remaining)
Event 1900/2000 : time  183.3 sec, (     9 sec remaining)
Event 2000/2000 : time  192.6 sec, (     0 sec remaining)
================================================
```

PndEventCounterTask (Ralf)

Everything documented!

FairRoot/PandaRoot

Main Page | Related Pages | Modules | Namespaces | Classes | Files | Examples

Class List | Class Index | Class Hierarchy | Class Members

Public Member Functions | Private Attributes | List of all members

PndMasterRunSim Class Reference

Class for the master simulation chain. More...

```
#include <PndMasterRunSim.h>
```

Documentation in Doxygen

Public Member Functions

	PndMasterRunSim ()
	Default constructor.
Bool_t	**Setup** ()
	Initial setup.
void	**Finish** ()
	Final diagnostics.
void	**CreateGeometry** ()
	It creates all the standard geometry volumes.
void	**AddSimTasks** ()
	Add simulation tasks.
void	**SetGenerator** ()
	Set the event generator.
void	**SetGenerator** (FairBoxGenerator *boxGen)
	Set the event generator for FairBoxGenerator.
void	**SetGenerator** (**PndBoxGenerator** *boxGen)
	Set the event generator for **PndBoxGenerator**.
void	**SetDpmFlag** (Int_t Mode)
	Set the DPM flag.
void	**UseDpmGenerator** ()
	Use DPM as event generator.
void	**UseFtfGenerator** ()
	Use FTF as event generator.
void	**UseEvtGenGenerator** (**TString** fEvtGenFile)
	Use EvtGen as event generator.
void	**SetInput** (**TString par**)
	Input of the simulation This string can be: a) the name of the dec file for EvtGen, w/ or w/o .dec b) "dpm" if you want to use dpm c) "ftf" if you want to use ftf.
void	**SetInputDir** (**TString par**)
	Input directory of the simulation.

Summary

New style for simulation, digitization and reconstruction macros
Enhancement of FairRun -> PndMasterRun
Compatible with “old style”

Centralized initialization – less error prone
Centralized geometry definition – always updated
Centralized task list – always updated

Check of max memory and CPU usage, also in dashboard

Examples: macro/master and tutorial!!
QA: run3, run4, dpm3, dpm4, ftf3, ca already modified
Please update detector macros!!!