Description of Super C-Tau detector

(Geometry)

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Contents

Directory layout (1)

```
DetectorDescription
├── VacuumChamber
├── Tracker
│   ├── TPC
│   ├── StrawTubes
│   ├── CylindricalGEM
│   ├── SiStrip
│   ├── Traditional DC (20k wires)
│   └── Dense DC (100-150k wires)
├── PID
│   ├── FARICH
│   ├── Threshold counters (ASHIPH)
│   ├── ToF
│   └── fDIRC
└── ...
```

Directory layout (2)

```
DetectorDescription
├── ...
├── Calorimeter
│   ├── pCsI
│   ├── CsI(Tl) + LYSO
│   ├── LXe
│   └── LKr
├── Magent
│   ├── ThinCoil
│   └── TraditionalCoil
├── Muon
│   ├── Plastic Scintillator
│   └── Gas Tubes
└── ...
```

Directory layout (3)

- `DetectorDescription`
  - ...
  - `Materials`
    - `CommonMaterials`
    - `<Subsystem>Materials`
  - `DetectorBase` ..... General definitions, overall dimensions, key parameters for all systems
  - `GeoModel` ..services to load and build geometry model in memory

Package structure

- `<PackageName>`
  - `<PackageName>` ..... C++ headers
  - `src` ..... C++ sources
  - `python` ..... python modules
  - `doc` ..... documentation
  - `data` ..... data files
  - `share` ..... data files, scripts, joboptions
  - `joboptions` ..... jobs configuration fragments
  - `scripts` ..... scripts
  - `xml` ..... xml files, Detector geometry for example
  - **CMakeLists.txt** ..... Package building rules description, required

CMakeLists.txt Example

```
#################################################################
# Package: FARICH
#################################################################
sctau_subdir(FARICH)

sctau_depends_on_subdirs(PUBLIC
                         External/DD4hep External/Geant4
                         External/ROOT)

sctau_add_dd4hep_component(FARICH
             src/*.cpp
             PUBLIC_HEADERS FARICH
             LINK_LIBRARIES GaudiKernel DD4hep ROOT Geant4)

sctau_install_joboptions(share)
sctau_install_xmls(xml)
```

cmake functions

- sctau_subdir — declare package, set its name,
  must be first in CMakeLists.txt
- sctau_depends_on_subdirs — specify dependencies
- sctau_add_library — declare package library (generic)
- sctau_add_component — package library plus generate joboptions configurables and Gaudi/Aurora components list,
  not linkable to other libraries
- sctau_add_dd4hep_component — package library plus generate DD4hep components list,
  not linkable to other libraries

python module

In the `python` subdir of package, provide a callable object (function) `xml_list` that returns a list of relative pathes to required XMLs in order they should be read.

List of parameter is an open question.

Coding recomendations

- **DO NOT** use `std::cout` for message output!

  Use Gaudi Message services:

```
#include "GaudiKernel/IMessageSvc.h"
#include "GaudiKernel/MsgStream.h"
#include "GaudiKernel/ServiceHandle.h"

  ServiceHandle<IMessageSvc> msgSvc("MessageSvc",
                                    "CaloConstruction");
  MsgStream lLog(&(*msgSvc), "CaloConstruction");

  lLog << MSG::DEBUG << "..." << _var << endmsg;
```

- **DO NOT** use numbers in XML geometry definitions

  Make them named constants, use constants in geometry defintions

Workdir setup

```
# Setup project, branch and build version
asetup SCTauSim,master,latest
```

Workdir management commands

```
# Create working branch
$ git checkout -b <DevBranch> upstream/master --no-track

# List local (in workdir) packages
git sctau list-pkg

# List all available packages
git sctau list-pkg --all

# Add some package to workdir
$ git sctau addpkg <PackageName>

# Remove package from workdir
$ git sctau rmpkg <PackageName>
```