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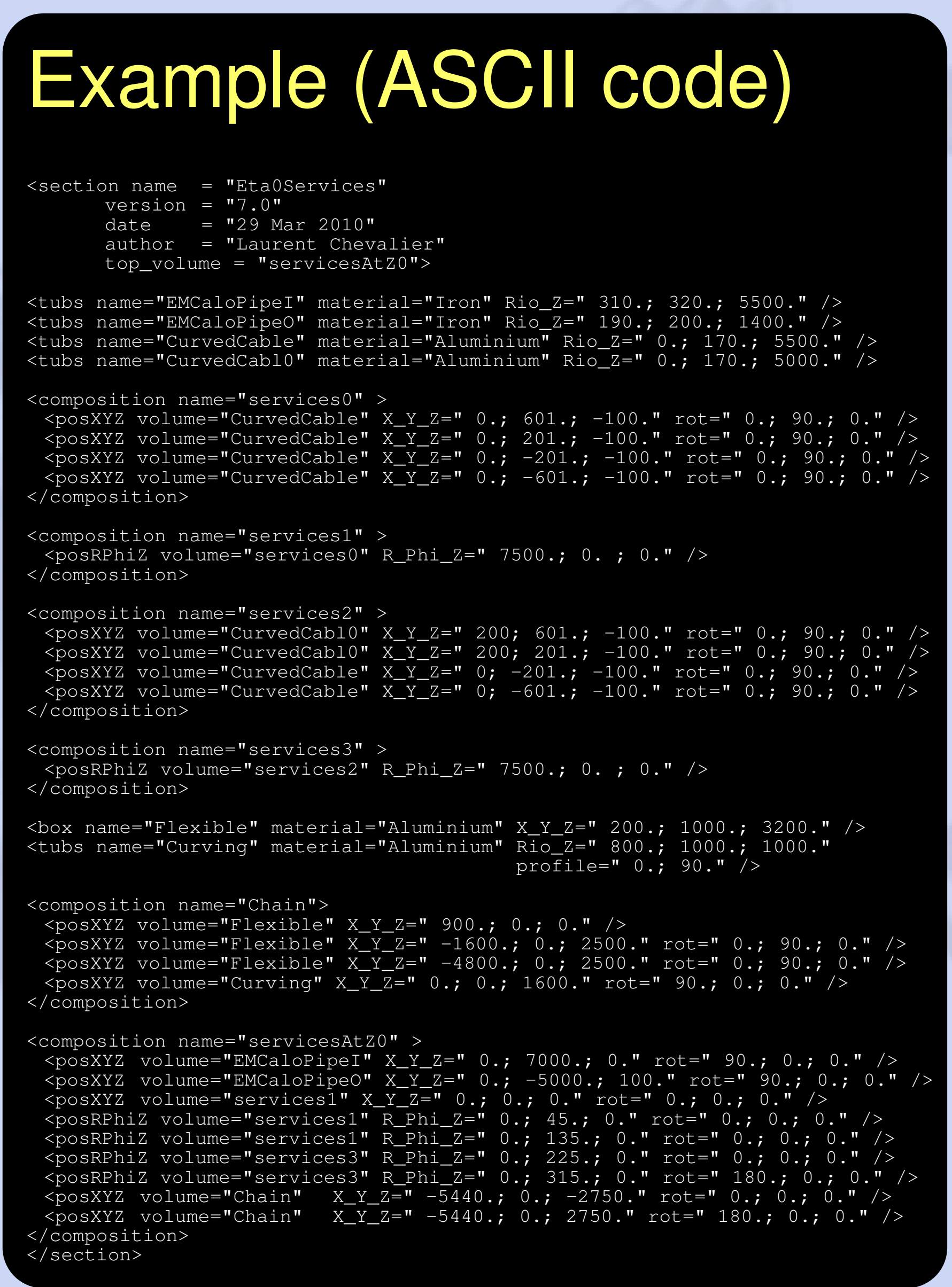
An XML generic detector description system and geometry editor for the ATLAS detector at the LHC

XML input

- ▷ independent language to describe all kinds of shapes (extendable to anybody's needs)
- ▷ visual debugging reduces development duty cycles
- ▷ intuitive interpretation of the code due to direct correspondence of XML elements to shapes and detector elements
- ▷ input for generic visualisation and simulation applications
- ▷ element information using document type defintions
- ▷ common XML tools for syntax debugging

Example (ASCII code)



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         author  = "Laurent Chevalier"
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XML parser

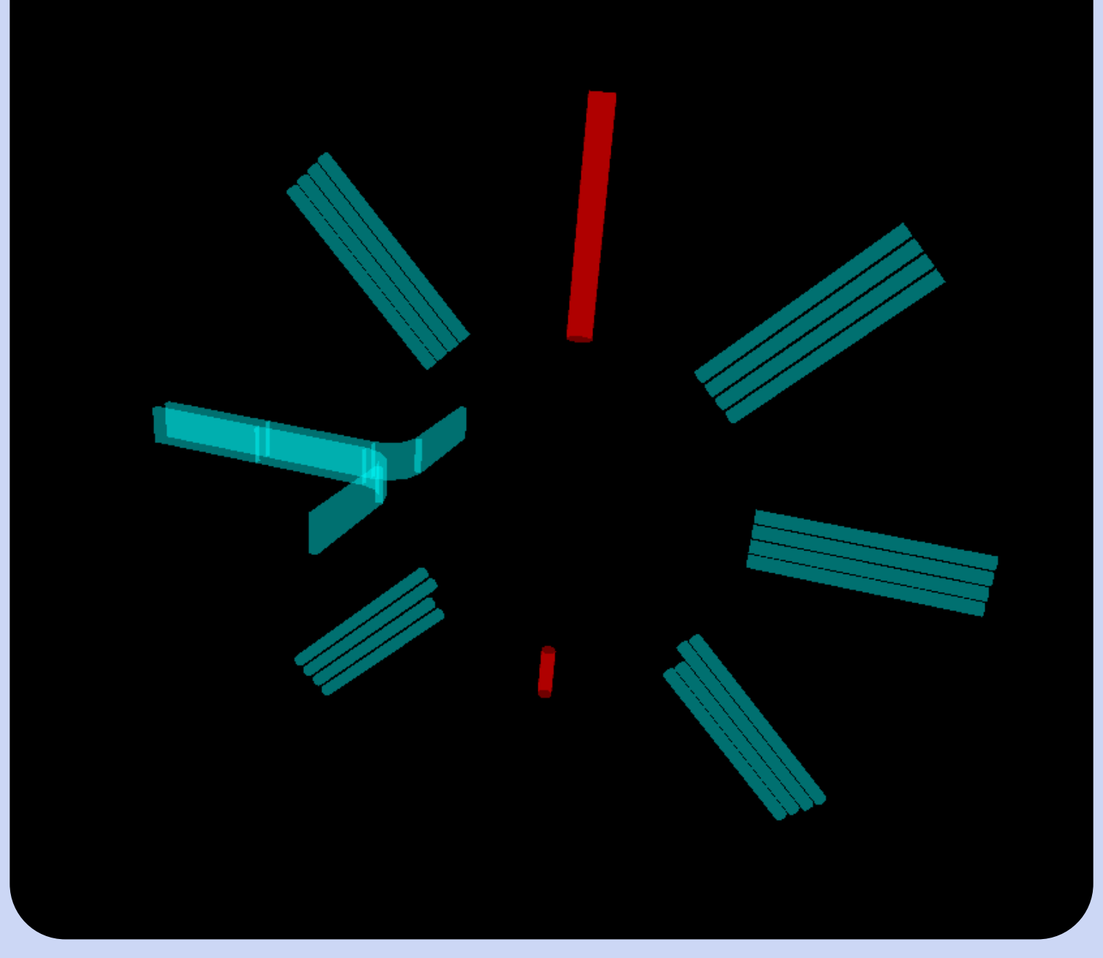
- ▷ interface with minimal interpretation of elements
- ▷ various open source solutions available (e.g. TinyXML, Xerces, ...)

Atlas **G**eneric **D**etector **D**escription

- ▷ generic geometry model based on volumes (solids equipped with material properties) and positions is built inside memory
- ▷ parser from generic representation to arbitrary visitor program (e.g. TGeo, Geant4, GeoModel, ...) or file outstream
- ▷ extensible for new XML elements thanks to modular programming techniques
- ▷ configuration via python scripts (common for ATLAS software framework)
- ▷ resources are saved if several visitors are required by the end user

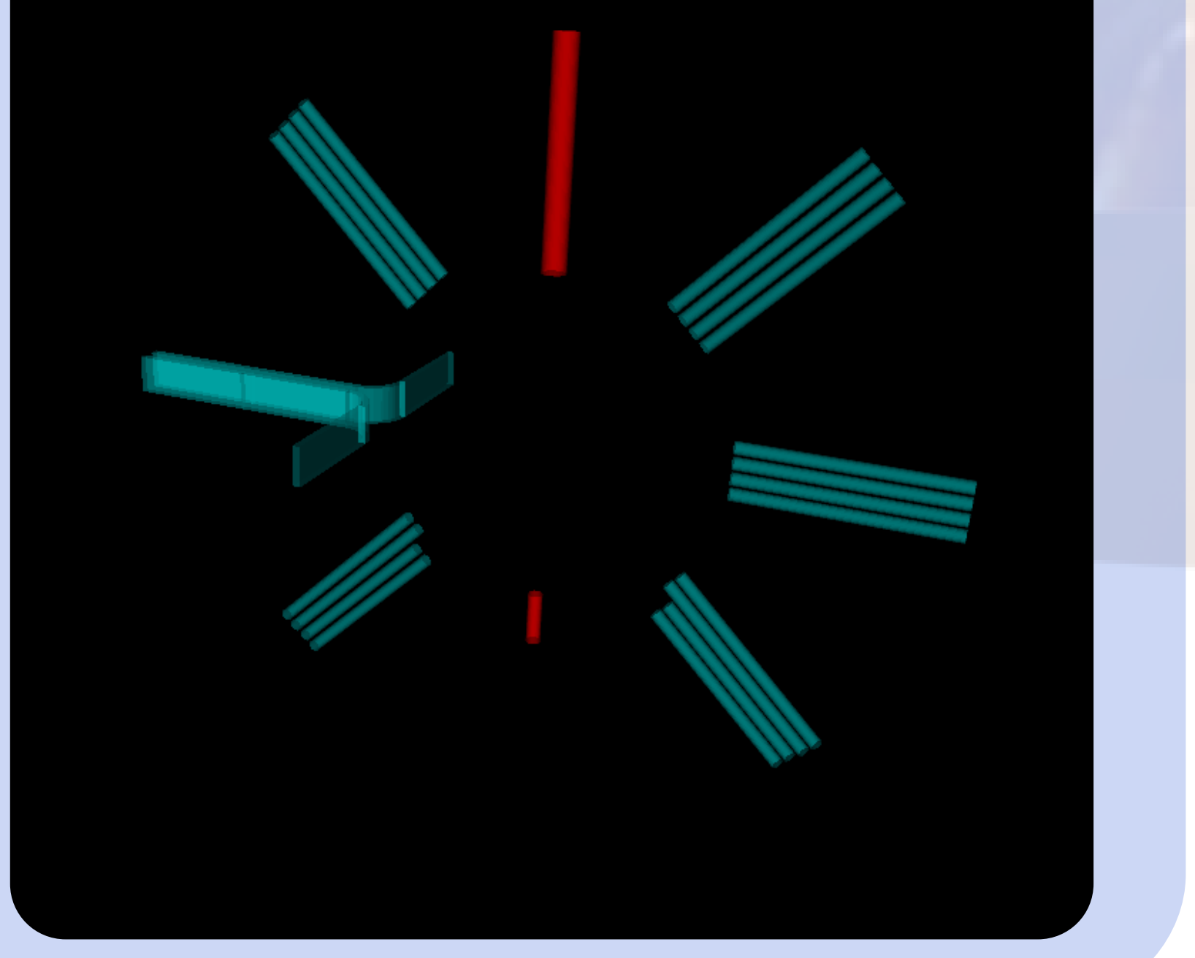
Example (GeoModel)

common geometry description used in ATLAS software



Example (Geant4)

accurate simulation software

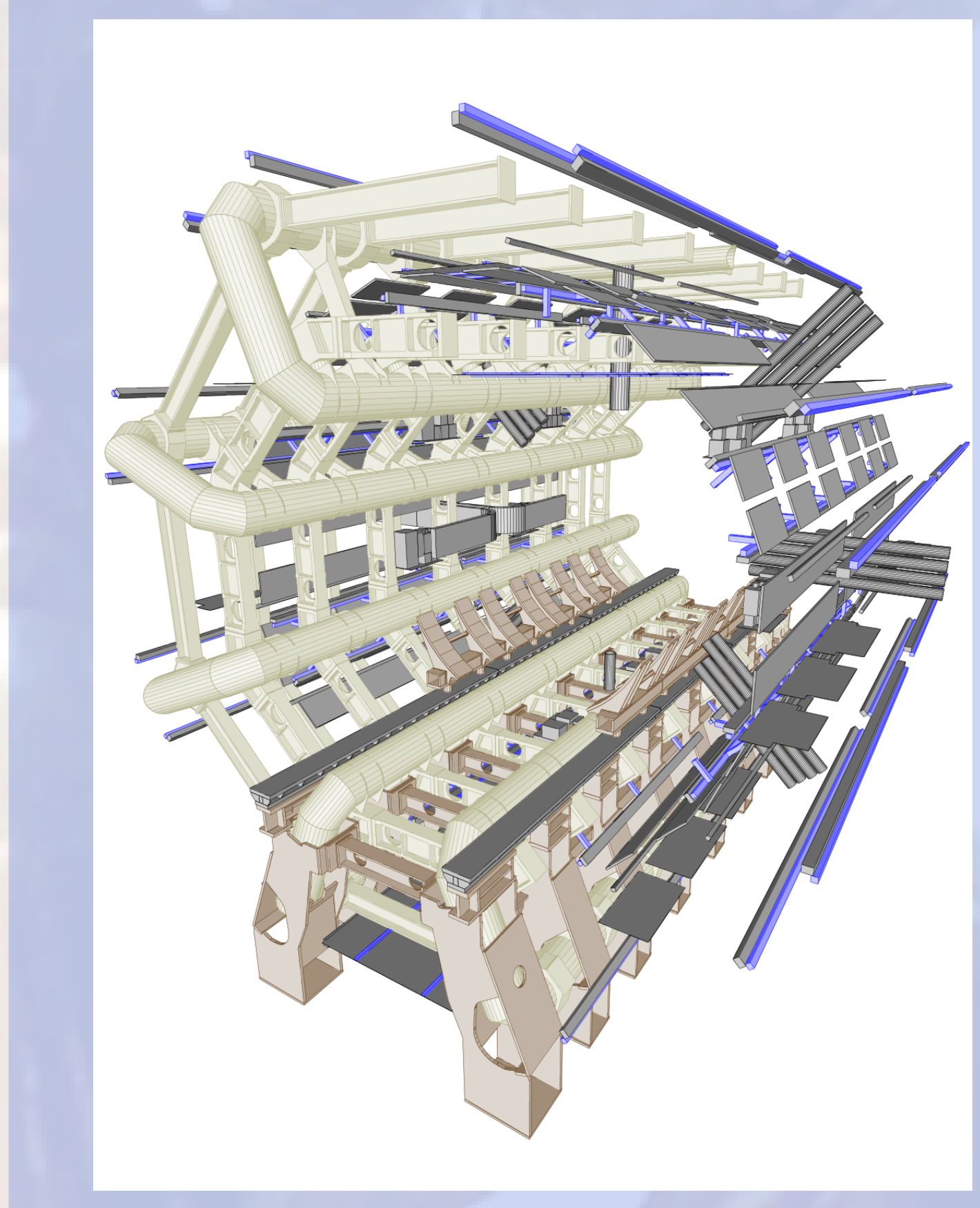


PERSpectively **INT**eractive

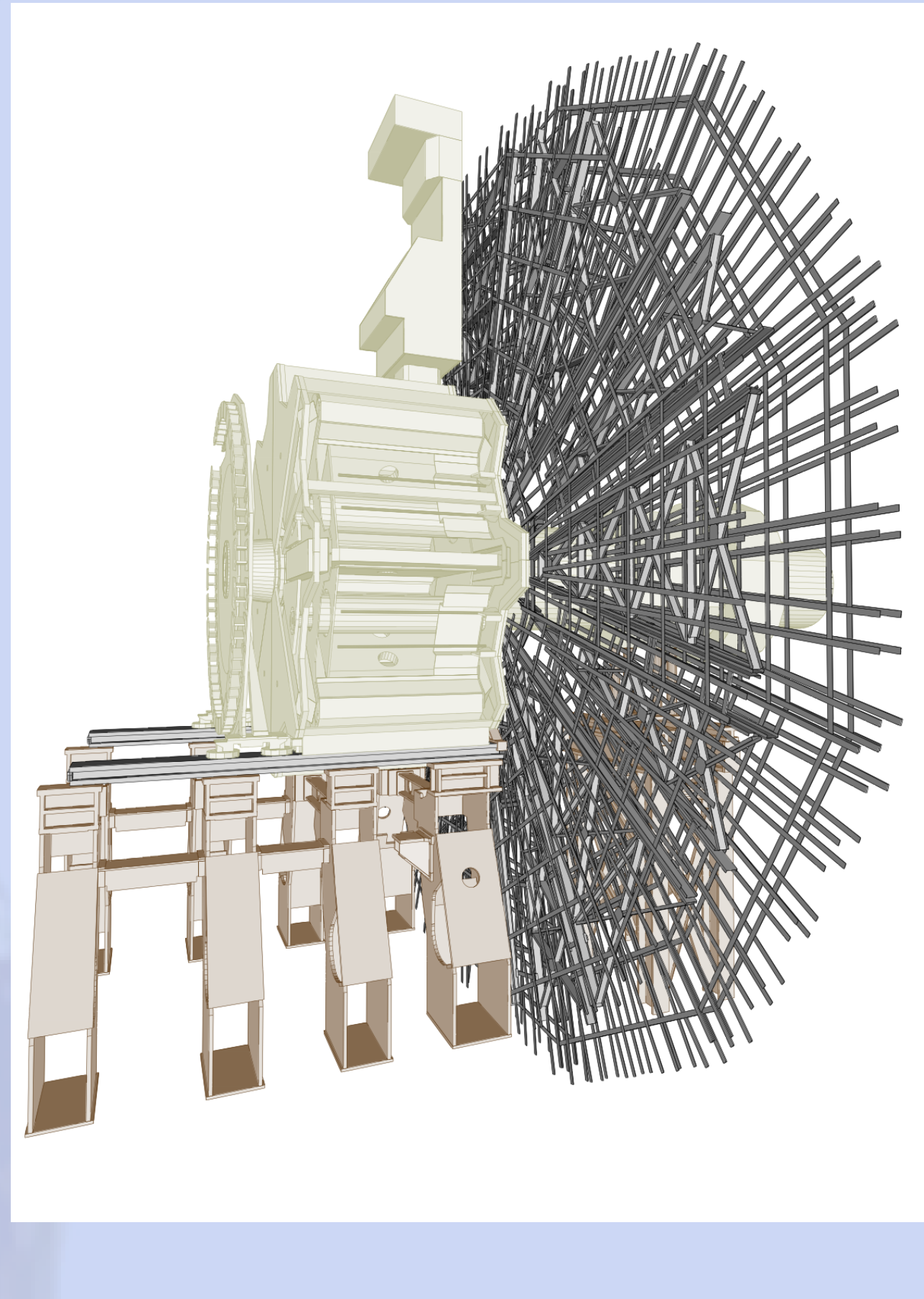
- ▷ stand alone program compatible with common operating systems (e.g. Linux, Windows, MacOS, ...) providing several features:
  - fast tracking and detector simulation
  - reconstruction of Monte Carlo or real Data
  - event display for common HEP objects (e.g. muons, jets, MET, ...)
- ▷ internal parser for XML and other formats
- ▷ full geometry model built in memory and layer based representation derived for fast tracking
- ▷ detection and graphical output of volume clashes
- ▷ geometry representation visualised as:
  - 2D and 3D model (dynamic perspective, volumes in wired or solid mode)
  - 2D radiation length interpretation (exportable as ASCII file)
- ▷ manipulations of representation possible (e.g. moving of volumes, changing of colors, ...)
- ▷ picture export in scalable graphic formats
- ▷ interpretation and display of magnetic field data

ATLAS described in XML

barrel structures

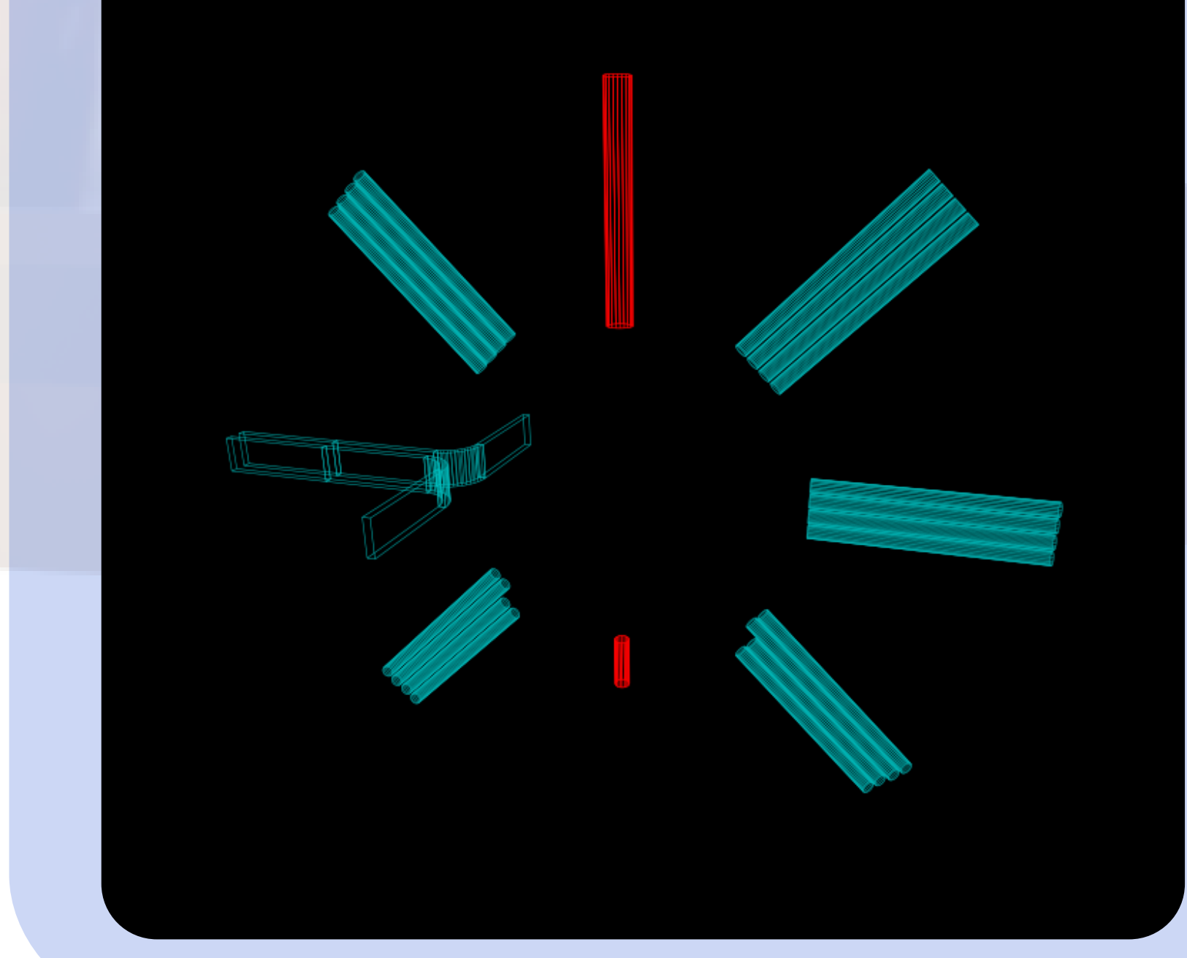


endcap structures



Example (Persint)

visualisation and fast simulation software



- ▷ visual cross check of AGDD geometry model
- ▷ validation of AGDD visitors

ATHENA: common ATLAS computing framework for Monte Carlo simulation, Data and Monte Carlo reconstruction and physics analysis

ATLAS Collaboration

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