



Tutorial

Gaudi / DaVinci / LoKi / Bender

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Topics to be covered



- **Gaudi Architecture**
- **LHCb Event Model**
- **DaVinci**
 - Application/ToolKit for physics analysis
 - “DaVinci for busy people”
- **LoKi**
 - C++ ToolKit for user-friendly physics analysis
- **Bender&GaudiPython**
 - (Gaudi)Python-based interactive environment for physics analysis



Part I



- Configuration & building system: **CMT**
- Gaudi concepts
 - Component model: *Algorithms, Services, Tools,...*
 - *Transient Store*
 - Application Configuration: *properties*
- Data access
- Histograms
- N-tuples
- Few useful services



Part II



- **DaVinci**
- **LHCb Event Model**
 - *Particles, Vertices, ProtoParticles, ...*
- **Major DaVinci tools and concepts**
 - *ParticleMakers, filters, "MakeResonances",*
- **"DaVinci for busy people"**
 - *Programming in options*
- **Selections**
- **Stripping**



Part III



- **LoKi**
 - "Hello, world" example
- **Major LoKi concepts**
 - *Cuts, functions, operations, selections, tools, loops, selections*
- **LoKi cook-book**
 - Selections
 - Loops
 - MC-matching
 - Realistic algorithms



Part IV



- **Python**
- **GaudiPython**
 - Interactive Gaudi
 - "Hello, world" example
 - Writing Gaudi algorithm in Python
 - PyROOT
- **Bender**
 - Interactive LoKi
 - "Hello, world" example
 - Writing DaVinci/LoKi algorithms in Python

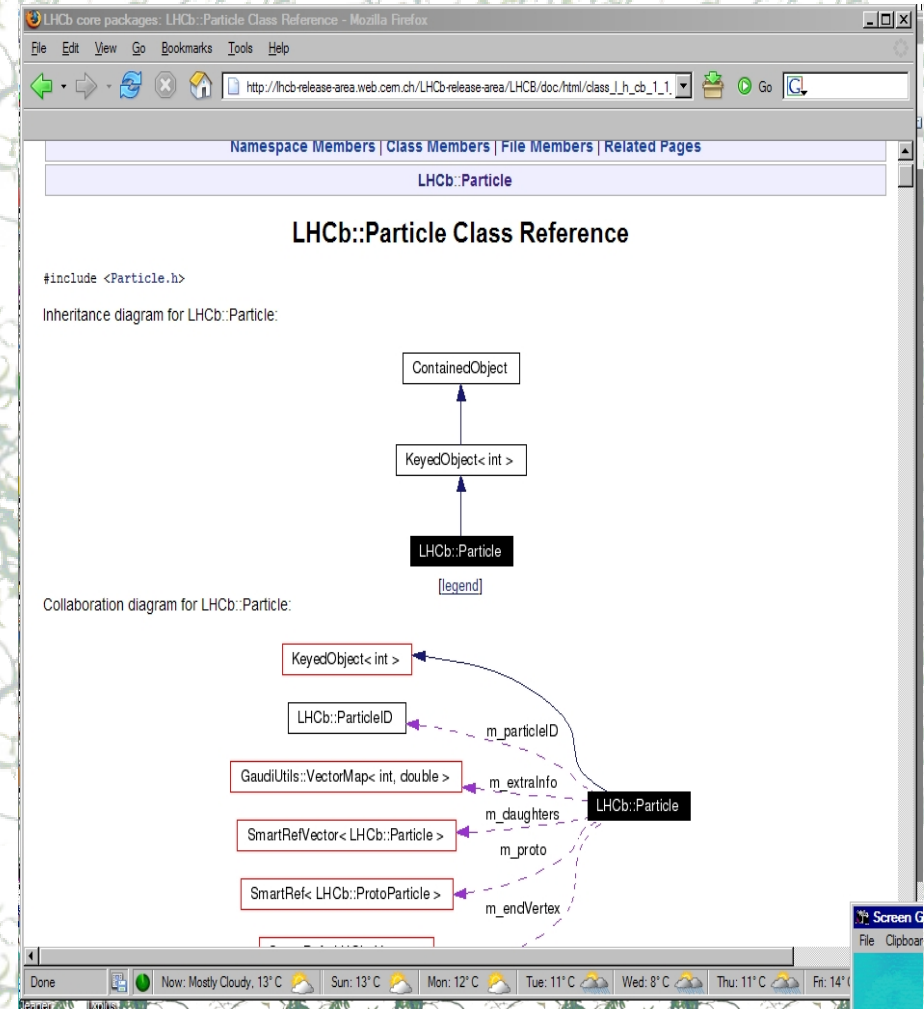


References



- Part I
 - Regular Gaudi Tutorials by Marco Cattaneo
- Part II
 - DaVinci Tutorials by Patrick Koppenburg
- Part III
 - LoKi tutorials
- Part IV
 - GaudiPython tutorial by Pere Mato
 - Bender Tutorial
- Also general tutorials: UK, Italy, China

- Many documentation is available through LHCb computing page
 - Partly obsolete
- Slides of regular tutorials
- Doxygen documentation
 - access through LHCb pages
 - access through Google is also efficient!
- Lbglimpse ClassName



LHCb core packages: LHCb::Particle Class Reference - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://lhcb-release-area.web.cern.ch/LHCb-release-area/LHCb/doc/html/class_h_cb_1_1

Namespace Members | Class Members | File Members | Related Pages

LHCb::Particle

LHCb::Particle Class Reference

```
#include <Particle.h>
```

Inheritance diagram for LHCb::Particle:

```

graph BT
    ContainedObject --> KeyedObject["KeyedObject< int >"]
    KeyedObject --> LHCbParticle["LHCb::Particle"]
    
```

Collaboration diagram for LHCb::Particle:

```

graph TD
    LHCbParticle["LHCb::Particle"]
    KeyedObject["KeyedObject< int >"]
    LHCbParticleID["LHCb::ParticleID"]
    GaudiUtils["GaudiUtils::VectorMap< int, double >"]
    SmartRefVector["SmartRefVector< LHCb::Particle >"]
    SmartRefProto["SmartRef< LHCb::ProtoParticle >"]

    LHCbParticle -.->|m_particleID| KeyedObject
    LHCbParticle -.->|m_extraInfo| GaudiUtils
    LHCbParticle -.->|m_daughters| SmartRefVector
    LHCbParticle -.->|m_proto| SmartRefProto
    LHCbParticle -.->|m_endVertex| SmartRefProto
    
```

Legend

Done Now: Mostly Cloudy, 13° C Sun: 13° C Mon: 12° C Tue: 11° C Wed: 8° C Thu: 11° C Fri: 14° C



Local features



Input data DST-tapes:

`/software/lhcb/BenderData/`

`13144000/`

- 20 files (~10k) $B_s \rightarrow J/\psi\phi$ events

`1000000/`

- 20 files (~10k) "*forward bb-inclusive*" events

`13264010/`

- 20 files (~10k) $B_s \rightarrow D_s K$ events