Muon detector

1.0

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目录

Chapter 1

Hierarchical Index

1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

G4UImessenger
- muonPhysicsListMmessenger . . . . . **??**

G4UserEventAction
- muonEventAction . . . . . **??**

G4UserRunAction
- muonRunAction . . . . . **??**

G4UserSteppingAction
- muonSteppingAction . . . . . **??**

G4VDiscreteProcess
- muonStepMax . . . . . **??**

G4VHit
- EnergyTimeHit . . . . . **??**
- PMThit . . . . . **??**

G4VModularPhysicsList
- muonPhysicsList . . . . . **??**

G4VPhysicsConstructor
- muonExtraPhysics . . . . . **??**
- muonOpticalPhysics . . . . . **??**

G4VSensitiveDetector
- EnergyTimeSD . . . . . **??**
- pmtSD . . . . . **??**

G4VUserActionInitialization
- muonActionInitialization . . . . . **??**

G4VUserDetectorConstruction

muonDetectorConstruction . . . . . ??
G4VUserPrimaryGeneratorAction
muonPrimaryGeneratorAction . . . . . ??
muonMaterial . . . . . ??

Chapter 2

Class Index

2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

EnergyTimeHit
    设置 Hit 容器 . . . . . ??
EnergyTimeSD
    探测器的敏感探测器类 . . . . . ??
muonActionInitialization . . . . . ??
muonDetectorConstruction
    Detector construction class to define materials and geometry . . . . . ??
muonEventAction . . . . . ??
muonExtraPhysics . . . . . ??
muonMaterial . . . . . ??
muonOpticalPhysics . . . . . ??
muonPhysicsList . . . . . ??
muonPhysicsListMessenger
    Provide control of the physics list and cut parameters . . . . . ??
muonPrimaryGeneratorAction . . . . . ??
muonRunAction . . . . . ??
muonStepMax . . . . . ??
muonSteppingAction . . . . . ??
PMThit
    设置 Hit 容器 . . . . . ??
pmtSD . . . . . ??

Chapter 3

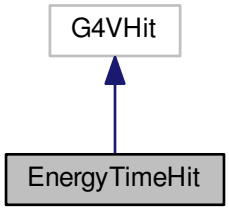
Class Documentation

3.1 EnergyTimeHit Class Reference

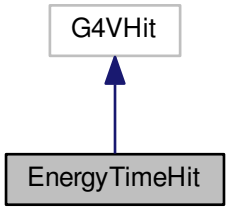
设置 Hit 容器

`#include <EnergyTimeHit.hh>`

Inheritance diagram for EnergyTimeHit:



Collaboration diagram for EnergyTimeHit:



Public Member Functions

- void * **operator new** (size_t)
- void **operator delete** (void *)
- void **SetDeltaEnergy** (G4double deltaE)
- void **SetTime** (G4double time)
- void **SetPosition** (G4ThreeVector pos)
- void **SetName** (G4String name)
- G4double **GetDeltaEnergy** () const
- G4double **GetTime** () const
- G4ThreeVector **GetPosition** () const
- G4String **GetName** () const

3.1.1 Detailed Description

设置 Hit 容器

Hit 容器保存能量，时间，位置，探测器名字

The documentation for this class was generated from the following file:

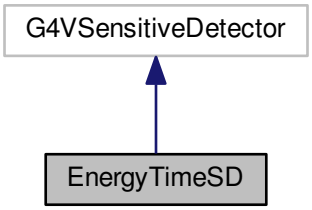
- include/EnergyTimeHit.hh

3.2 EnergyTimeSD Class Reference

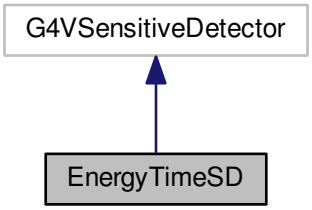
探测器的敏感探测器类

```
#include <EnergyTimeSD.hh>
```

Inheritance diagram for EnergyTimeSD:



Collaboration diagram for EnergyTimeSD:



Public Member Functions

- EnergyTimeSD (G4String name)

  构造函数
- void Initialize (G4HCofThisEvent ∗) override

  初始化敏感探测器

Protected Member Functions

- G4bool ProcessHits (G4Step ∗aStep, G4TouchableHistory ∗ROhist) override

  击中敏感探测器处理

3.2.1 Detailed Description

探测器的敏感探测器类

3.2.2 Constructor & Destructor Documentation

3.2.2.1 EnergyTimeSD()

```
EnergyTimeSD::EnergyTimeSD (
            G4String name )
```

构造函数

设置敏感探测器保存哪些数据

探测器名字设置

muon 击中敏感探测器，保存时间，能量，位置和击中哪一个探测器信息敏感探测器挂载在敏感探测器管理类格式为 name/energy_time 敏感探测器名字设置

注册管理类时插入 energy_time

Parameters

name	敏感探测器的名字

3.2.3 Member Function Documentation

3.2.3.1 Initialize()

```
void EnergyTimeSD::Initialize (
              G4HCofThisEvent * hcof )  [override]
```

初始化敏感探测器

将敏感探测器的 id 和 Hit 容器注册到敏感探测器管理类中

3.2.3.2 ProcessHits()

```
G4bool EnergyTimeSD::ProcessHits (
              G4Step * aStep,
              G4TouchableHistory * ROhist )  [override], [protected]
```

击中敏感探测器处理

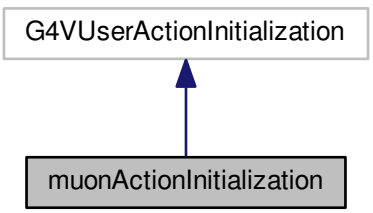
将数据保存到 Hit 容器

The documentation for this class was generated from the following files:

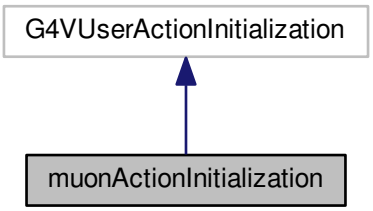
- include/EnergyTimeSD.hh
- src/EnergyTimeSD.cc

3.3 muonActionInitialization Class Reference

Inheritance diagram for muonActionInitialization:



Collaboration diagram for muonActionInitialization:



Public Member Functions

- muonActionInitialization ()

  action 管理类
- virtual void **BuildForMaster** () const override
- virtual void **Build** () const override

3.3.1 Constructor & Destructor Documentation

3.3.1.1 muonActionInitialization()

```
muonActionInitialization::muonActionInitialization ( )
```

action 管理类

runaction eventaction steppingaction 注册一个 primary generator 强制类的注册

The documentation for this class was generated from the following files:

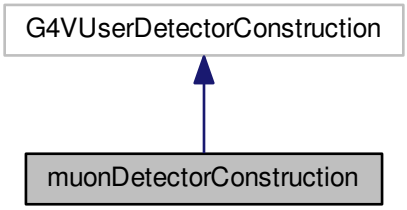
- include/muonActionInitialization.hh
- src/muonActionInitialization.cc

3.4 muonDetectorConstruction Class Reference

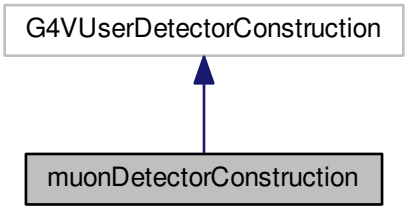
Detector construction class to define materials and geometry.

```
#include <muonDetectorConstruction.hh>
```

Inheritance diagram for muonDetectorConstruction:



Collaboration diagram for muonDetectorConstruction:



Public Member Functions

- muonDetectorConstruction ()

  搭建探测器
- virtual G4VPhysicalVolume * **Construct** () override
- void **Constructmuondetector** (G4LogicalVolume *)
- void **ConstructPMT** (G4LogicalVolume *)
- void **ConstructReflection** (G4LogicalVolume *, G4Trd *)
- void **ConstructSDandField** () override

3.4.1 Detailed Description

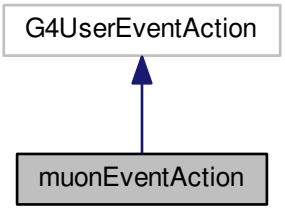
Detector construction class to define materials and geometry.

The documentation for this class was generated from the following files:

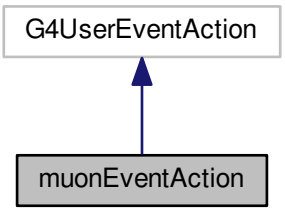
- include/muonDetectorConstruction.hh
- src/muonDetectorConstruction.cc

3.5 muonEventAction Class Reference

Inheritance diagram for muonEventAction:



Collaboration diagram for muonEventAction:



Public Member Functions

- virtual void EndOfEventAction (const G4Event ∗anEvent) override

  获得敏感探测器的 *id*, 输出数据

3.5.1 Member Function Documentation

3.5.1.1 EndOfEventAction()

```
void muonEventAction::EndOfEventAction (
            const G4Event * event )  [override], [virtual]
```

获得敏感探测器的 id, 输出数据

Parameters

event	[description]

第一列能量第二列时间第三列如果是探测器‘PMT1' 则为 1，探测器’PMT2‘则为 2 第四列 event id

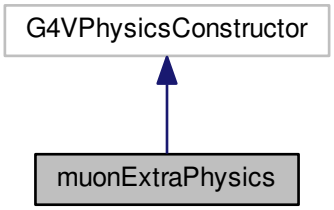
第一列能量第二列深度信息第三列如果是探测器‘muondector1' 则为 1，探测器’muondector2‘则为 2 第四列 event id

The documentation for this class was generated from the following files:

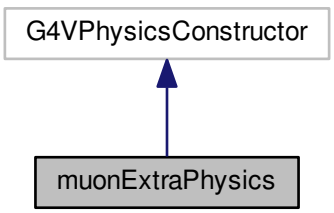
- include/muonEventAction.hh
- src/muonEventAction.cc

3.6 muonExtraPhysics Class Reference

Inheritance diagram for muonExtraPhysics:



Collaboration diagram for muonExtraPhysics:



Public Member Functions

- virtual void **ConstructParticle** ()
- virtual void **ConstructProcess** ()

The documentation for this class was generated from the following files:

- include/muonExtraPhysics.hh
- src/muonExtraPhysics.cc

3.7 muonMaterial Class Reference

Public Member Functions

- G4Material ∗ **GetMaterial** (const G4String)
- G4Material ∗ **Getfdetector** ()
- G4Material ∗ **GetfPMT** ()
- G4Material ∗ **Getfreflect** ()
- G4Material ∗ **GetfAir** ()

Static Public Member Functions

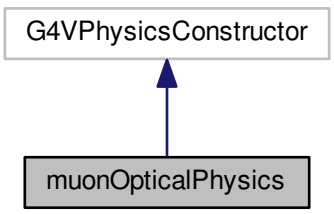
- static muonMaterial ∗ **GetInstance** ()

The documentation for this class was generated from the following files:

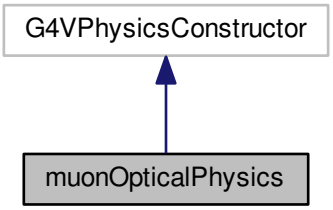
- include/muonMaterial.hh
- src/muonMaterial.cc

3.8 muonOpticalPhysics Class Reference

Inheritance diagram for muonOpticalPhysics:



Collaboration diagram for muonOpticalPhysics:



Public Member Functions

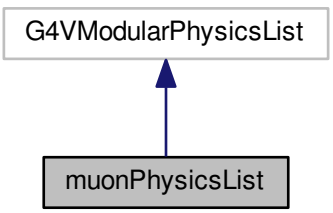
- **muonOpticalPhysics** (G4bool toggle=true)
- virtual void **ConstructParticle** ()
- virtual void **ConstructProcess** ()
- G4OpWLS * **GetWLSProcess** ()
- G4Cerenkov * **GetCerenkovProcess** ()
- G4Scintillation * **GetScintillationProcess** ()
- G4OpAbsorption * **GetAbsorptionProcess** ()
- G4OpRayleigh * **GetRayleighScatteringProcess** ()
- G4OpMieHG * **GetMieHGScatteringProcess** ()
- G4OpBoundaryProcess * **GetBoundaryProcess** ()
- void **SetNbOfPhotonsCerenkov** (G4int)

The documentation for this class was generated from the following files:

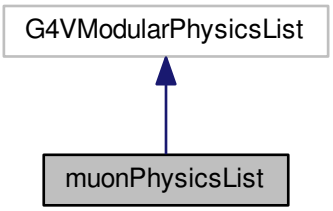
- include/muonOpticalPhysics.hh
- src/muonOpticalPhysics.cc

3.9 muonPhysicsList Class Reference

Inheritance diagram for muonPhysicsList:



Collaboration diagram for muonPhysicsList:



Public Member Functions

- **muonPhysicsList** (G4String)
- void **SetCuts** ()
- void **SetCutForGamma** (G4double)
- void **SetCutForElectron** (G4double)
- void **SetCutForPositron** (G4double)
- void **SetStepMax** (G4double)
- muonStepMax * **GetStepMaxProcess** ()
- void **AddStepMax** ()
- void RemoveFromPhysicsList (const G4String &)

  Remove specific physics from physics list.
- void ClearPhysics ()

  Make sure that the physics list is empty.
- virtual void **ConstructParticle** ()
- virtual void **ConstructProcess** ()
- void **SetAbsorption** (G4bool)
- void **SetNbOfPhotonsCerenkov** (G4int)
- void **SetVerbose** (G4int)

The documentation for this class was generated from the following files:

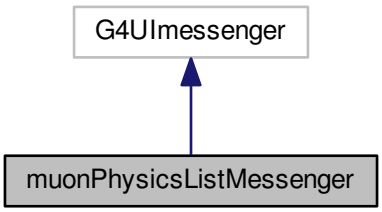
- include/muonPhysicsList.hh
- src/muonPhysicsList.cc

3.10 muonPhysicsListMessenger Class Reference

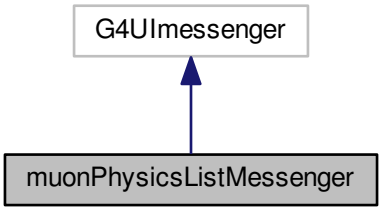
Provide control of the physics list and cut parameters.

`#include <muonPhysicsListMessenger.hh>`

Inheritance diagram for muonPhysicsListMessenger:



Collaboration diagram for muonPhysicsListMessenger:



Public Member Functions

- **muonPhysicsListMessenger** (muonPhysicsList ∗)
- virtual void **SetNewValue** (G4UIcommand ∗, G4String)

3.10.1 Detailed Description

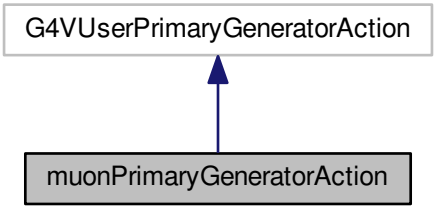
Provide control of the physics list and cut parameters.

The documentation for this class was generated from the following files:

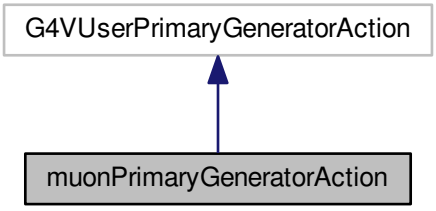
- include/muonPhysicsListMessenger.hh
- src/muonPhysicsListMessenger.cc

3.11 muonPrimaryGeneratorAction Class Reference

Inheritance diagram for muonPrimaryGeneratorAction:



Collaboration diagram for muonPrimaryGeneratorAction:



Public Member Functions

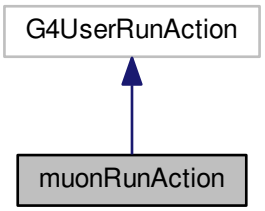
- virtual void **GeneratePrimaries** (G4Event ∗anEvent) override
- const G4ParticleGun ∗ **GetParticleGun** () const

The documentation for this class was generated from the following files:

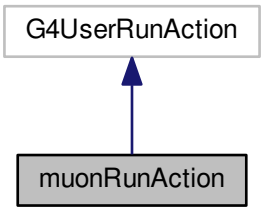
- include/muonPrimaryGeneratorAction.hh
- src/muonPrimaryGeneratorAction.cc

3.12 muonRunAction Class Reference

Inheritance diagram for muonRunAction:



Collaboration diagram for muonRunAction:



Public Member Functions

- muonRunAction ()

  打开 *csv* 文件，文件名，声明哪些数据被保存

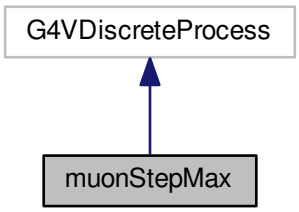
- virtual void **EndOfRunAction** (const G4Run ∗run)

The documentation for this class was generated from the following files:

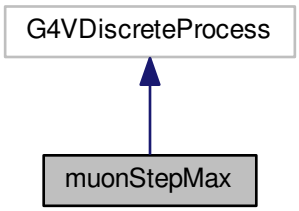
- include/muonRunAction.hh
- src/muonRunAction.cc

3.13 muonStepMax Class Reference

Inheritance diagram for muonStepMax:



Collaboration diagram for muonStepMax:



Public Member Functions

- **muonStepMax** (const G4String &processName="UserStepMax")
- **muonStepMax** (muonStepMax &)
- virtual G4bool **IsApplicable** (const G4ParticleDefinition &)
- void **SetStepMax** (G4double)
- G4double **GetStepMax** ()
- virtual G4double **PostStepGetPhysicalInteractionLength** (const G4Track &track, G4double previousStepSize, G4ForceCondition ∗condition)
- virtual G4VParticleChange ∗ **PostStepDoIt** (const G4Track &, const G4Step &)

Protected Member Functions

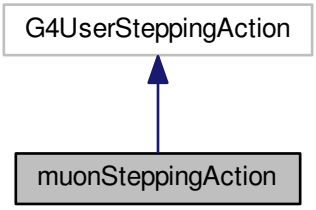
- G4double **GetMeanFreePath** (const G4Track &, G4double, G4ForceCondition ∗)

The documentation for this class was generated from the following files:

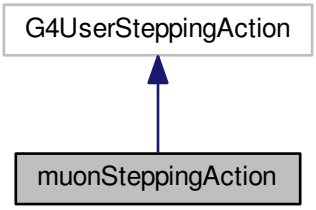
- include/muonStepMax.hh
- src/muonStepMax.cc

3.14 muonSteppingAction Class Reference

Inheritance diagram for muonSteppingAction:



Collaboration diagram for muonSteppingAction:



Public Member Functions

- **muonSteppingAction** (muonEventAction ∗eventAction)
- virtual void **UserSteppingAction** (const G4Step ∗)

The documentation for this class was generated from the following files:

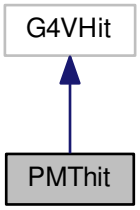
- include/muonSteppingAction.hh
- src/muonSteppingAction.cc

3.15 PMThit Class Reference

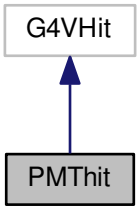
设置 Hit 容器

`#include <PMThit.hh>`

Inheritance diagram for PMThit:



Collaboration diagram for PMThit:



Public Member Functions

- void * **operator new** (size_t)
- void **operator delete** (void *)
- void **SetDeltaEnergy** (G4double deltaE)
- void **SetTime** (G4double time)
- void **SetPosition** (G4ThreeVector pos)
- void **SetName** (G4String name)
- G4double **GetDeltaEnergy** () const
- G4double **GetTime** () const
- G4ThreeVector **GetPosition** () const
- G4String **GetName** () const

3.15.1 Detailed Description

设置 Hit 容器

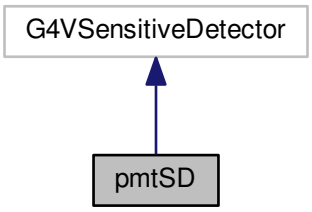
Hit 容器保存能量，时间，位置，探测器名字

The documentation for this class was generated from the following file:

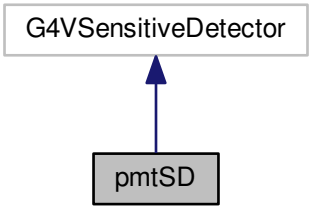
- include/PMThit.hh

3.16 pmtSD Class Reference

Inheritance diagram for pmtSD:



Collaboration diagram for pmtSD:



Public Member Functions

- pmtSD (G4String name)

  设置敏感探测器保存哪些数据
- void **Initialize** (G4HCofThisEvent ∗) override

Protected Member Functions

- G4bool **ProcessHits** (G4Step ∗aStep, G4TouchableHistory ∗ROhist) override

3.16.1 Constructor & Destructor Documentation

3.16.1.1 pmtSD()

```
pmtSD::pmtSD (
              G4String name )
```

设置敏感探测器保存哪些数据

muon 击中 pmt，保存时间，能量，位置和击中哪一个 pmt 信息敏感探测器挂载在敏感探测器管理类格式为 name/pmt_energy_time

Parameters

name	pmt 的名字

The documentation for this class was generated from the following files:

- include/pmtSD.hh
- src/pmtSD.cc