ARC simulation and reconstruction

Generated by Doxygen 1.9.0

1 Namespace Index 1

1.1 Namespace List . . . 1

2 Class Index 3

2.1 Class List . . . 3

3 File Index 5

3.1 File List . . . 5

4 Namespace Documentation 7

4.1 ParticleMass Namespace Reference . . . 7

4.1.1 Detailed Description . . . 7

4.1.2 Function Documentation . . . 7

4.1.2.1 GetMass() . . . 7

4.2 PhotonMapper Namespace Reference . . . 7

4.2.1 Detailed Description . . . 8

4.2.2 Function Documentation . . . 8

4.2.2.1 PhotonMirrorDistance() . . . 8

4.2.2.2 TracePhoton() . . . 8

4.2.2.3 TracePhotonToDetector() . . . 8

4.2.2.4 TracePhotonToMirror() . . . 8

5 Class Documentation 9

5.1 ParticleTrack Class Reference . . . 9

5.1.1 Detailed Description . . . 9

5.1.2 Member Enumeration Documentation . . . 9

5.1.2.1 CoordinateSystem . . . 9

5.1.3 Constructor & Destructor Documentation . . . 10

5.1.3.1 ParticleTrack() . . . 10

5.1.4 Member Function Documentation . . . 10

5.1.4.1 Beta() . . . 10

5.1.4.2 ConvertToRadiatorCoordinates() . . . 10

5.1.4.3 GeneratePhoton() . . . 11

5.1.4.4 GeneratePhotonFromAerogel() . . . 11

5.1.4.5 GeneratePhotonFromGas() . . . 11

5.1.4.6 GeneratePhotonsFromAerogel() . . . 11

5.1.4.7 GeneratePhotonsFromGas() . . . 12

5.1.4.8 TrackThroughRadiatorCell() . . . 12

5.1.4.9 TrackThroughTracker() . . . 12

5.2 Photon Struct Reference . . . 12

5.2.1 Detailed Description . . . 13

5.2.2 Member Enumeration Documentation . . . 13

5.2.2.1 Radiator . . . 13

5.2.3 Constructor & Destructor Documentation . . . 13

5.2.3.1 Photon() . . . 13
5.2.4 Member Data Documentation . . . 14
5.2.4.1 m_Direction . . . 14
5.2.4.2 m_EmissionPoint . . . 14
5.2.4.3 m_Energy . . . 14
5.2.4.4 m_Position . . . 14
5.2.4.5 m_Radiator . . . 15
5.3 PhotonHit Struct Reference . . . 15
5.3.1 Detailed Description . . . 15
5.3.2 Constructor & Destructor Documentation . . . 15
5.3.2.1 PhotonHit() . . . 15
5.3.3 Member Data Documentation . . . 16
5.3.3.1 m_Photon . . . 16
5.3.3.2 x . . . 16
5.3.3.3 y . . . 16
5.4 RadiatorCell Class Reference . . . 16
5.4.1 Detailed Description . . . 17
5.4.2 Constructor & Destructor Documentation . . . 17
5.4.2.1 RadiatorCell() . . . 17
5.4.3 Member Function Documentation . . . 17
5.4.3.1 GetAerogelThickness() . . . 17
5.4.3.2 GetCoolingThickness() . . . 17
5.4.3.3 GetMirrorCentre() . . . 18
5.4.3.4 GetMirrorCurvature() . . . 18
5.4.3.5 GetRadiatorPosition() . . . 18
5.4.3.6 GetRadiatorThickness() . . . 18
5.4.3.7 GetVesselThickness() . . . 18
5.4.4 Member Data Documentation . . . 19
5.4.4.1 m_Detector . . . 19
5.5 SiPM Class Reference . . . 19
5.5.1 Detailed Description . . . 19
5.5.2 Constructor & Destructor Documentation . . . 19
5.5.2.1 SiPM() . . . 19
5.5.3 Member Function Documentation . . . 20
5.5.3.1 AddPhotonHit() . . . 20
5.5.3.2 PlotHits() . . . 20
5.6 TrackingVolume Class Reference . . . 20
5.6.1 Detailed Description . . . 20
5.6.2 Constructor & Destructor Documentation . . . 20
5.6.2.1 TrackingVolume() . . . 20
5.6.3 Member Function Documentation . . . 21
5.6.3.1 GetFieldStrength() . . . 21

5.6.3.2 GetRadius() 21

6 File Documentation **23**

6.1 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/apps/RunARC.cpp File Reference 23

6.1.1 Typedef Documentation 23

6.1.1.1 Vector 23

6.1.2 Function Documentation 24

6.1.2.1 main() 24

6.2 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/ParticleMass.h File Reference 24

6.3 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/ParticleTrack.h File Reference 24

6.3.1 Typedef Documentation 25

6.3.1.1 Vector 25

6.4 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/Photon.h File Reference 25

6.4.1 Typedef Documentation 25

6.4.1.1 Vector 25

6.5 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/PhotonMapper.h File Reference 26

6.6 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/RadiatorCell.h File Reference 26

6.6.1 Typedef Documentation 26

6.6.1.1 Vector 26

6.7 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/SiPM.h File Reference 27

6.8 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/TrackingVolume.h File Reference 27

6.9 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/CMakeLists.txt File Reference 27

6.10 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/apps/CMakeLists.txt File Reference 27

6.11 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/ParticleMass.cpp File Reference 27

6.12 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/ParticleTrack.cpp File Reference 28

6.13 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/Photon.cpp File Reference 28

6.14 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/PhotonMapper.cpp File Reference 28

6.15 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/RadiatorCell.cpp File Reference 29

6.16 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/SiPM.cpp File Reference 29

6.17 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/TrackingVolume.cpp File Reference 29

Index **31**

Chapter 1

Namespace Index

1.1 Namespace List

Here is a list of all namespaces with brief descriptions:

ParticleMass 7
PhotonMapper 7

Chapter 2

Class Index

2.1 Class List

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

ParticleTrack 9
Photon 12
PhotonHit 15
RadiatorCell 16
SiPM 19
TrackingVolume 20

Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

/data/lhcb/users/tat/ARC_Simulation_Reconstruction/apps/RunARC.cpp 23
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/ParticleMass.h 24
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/ParticleTrack.h 24
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/Photon.h 25
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/PhotonMapper.h 26
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/RadiatorCell.h 26
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/SiPM.h 27
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/TrackingVolume.h 27
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/ParticleMass.cpp 27
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/ParticleTrack.cpp 28
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/Photon.cpp 28
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/PhotonMapper.cpp 28
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/RadiatorCell.cpp 29
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/SiPM.cpp 29
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/TrackingVolume.cpp 29

Chapter 4

Namespace Documentation

4.1 ParticleMass Namespace Reference

Functions

- double GetMass (int PID)

4.1.1 Detailed Description

ParticleMass is a namespace storing all the particle masses in a static map

4.1.2 Function Documentation

4.1.2.1 GetMass()

```
double ParticleMass::GetMass (
            int PID )
```

Get the particle mass

Definition at line 8 of file ParticleMass.cpp.

4.2 PhotonMapper Namespace Reference

Functions

- double PhotonMirrorDistance (const Photon &photon, const RadiatorCell &radiatorCell)
- void TracePhotonToMirror (Photon &photon, const RadiatorCell &radiatorCell)
- void TracePhotonToDetector (Photon &photon, RadiatorCell &radiatorCell)
- void TracePhoton (Photon &photon, RadiatorCell &radiatorCell)

4.2.1 Detailed Description

PhotonMapper is a namespace containing the functions for mapping photons from their emission point to the detector plane

4.2.2 Function Documentation

4.2.2.1 PhotonMirrorDistance()

```
double PhotonMapper::PhotonMirrorDistance (
            const Photon & photon,
            const RadiatorCell & radiatorCell )
```

Find the distance between the photon and the mirror

Definition at line 11 of file PhotonMapper.cpp.

4.2.2.2 TracePhoton()

```
void PhotonMapper::TracePhoton (
            Photon & photon,
            RadiatorCell & radiatorCell )
```

Trace photon from emission point to detector and register detector hit

Definition at line 36 of file PhotonMapper.cpp.

4.2.2.3 TracePhotonToDetector()

```
void PhotonMapper::TracePhotonToDetector (
            Photon & photon,
            RadiatorCell & radiatorCell )
```

Trace photon from mirror to detector plane and register detector hit

Definition at line 31 of file PhotonMapper.cpp.

4.2.2.4 TracePhotonToMirror()

```
void PhotonMapper::TracePhotonToMirror (
            Photon & photon,
            const RadiatorCell & radiatorCell )
```

Trace photon from emission point to mirror

Definition at line 22 of file PhotonMapper.cpp.

Chapter 5

Class Documentation

5.1 ParticleTrack Class Reference

`#include <ParticleTrack.h>`

Public Types

- enum CoordinateSystem { CoordinateSystem::GlobalDetector, CoordinateSystem::LocalRadiator }

Public Member Functions

- ParticleTrack (const Vector &Momentum, int ParticleID)
- void TrackThroughTracker (const TrackingVolume &InnerTracker)
- void ConvertToRadiatorCoordinates (const RadiatorCell &Cell)
- void TrackThroughRadiatorCell (const RadiatorCell &Cell)
- Photon GeneratePhotonFromAerogel () const
- Photon GeneratePhotonFromGas () const
- std::vector< Photon > GeneratePhotonsFromAerogel () const
- std::vector< Photon > GeneratePhotonsFromGas () const
- Photon GeneratePhoton (const Vector &Entry, const Vector &Exit, double n_phase) const
- double Beta () const

5.1.1 Detailed Description

Definition at line 18 of file ParticleTrack.h.

5.1.2 Member Enumeration Documentation

5.1.2.1 CoordinateSystem

`enum ParticleTrack::CoordinateSystem [strong]`

Enum with the two coordinate systems used

Enumerator

GlobalDetector	
LocalRadiator	

Definition at line 29 of file ParticleTrack.h.

5.1.3 Constructor & Destructor Documentation

5.1.3.1 ParticleTrack()

```
ParticleTrack::ParticleTrack (
            const Vector & Momentum,
            int ParticleID )
```

Construct a charged particle with momentum and ID at the interaction point

Parameters

Momentum	Particle momentum, in GeV
ParticleID	PDG particle ID convention

Definition at line 12 of file ParticleTrack.cpp.

5.1.4 Member Function Documentation

5.1.4.1 Beta()

```
double ParticleTrack::Beta ( ) const
```

Get the particle speed, in units of c

Definition at line 117 of file ParticleTrack.cpp.

5.1.4.2 ConvertToRadiatorCoordinates()

```
void ParticleTrack::ConvertToRadiatorCoordinates (
            const RadiatorCell & Cell )
```

Convert to local radiator coordinates

Definition at line 34 of file ParticleTrack.cpp.

5.1.4.3 GeneratePhoton()

```
Photon ParticleTrack::GeneratePhoton (
            const Vector & Entry,
            const Vector & Exit,
            double n_phase ) const
```

Generate Cherenkov photon

Parameters

Entry	point of radiator
Exit	point of ratiator
n_phase	Index of refraction for phase velocity

Definition at line 104 of file ParticleTrack.cpp.

5.1.4.4 GeneratePhotonFromAerogel()

```
Photon ParticleTrack::GeneratePhotonFromAerogel ( ) const
```

Generate Cherenkov photon from aerogel

Definition at line 58 of file ParticleTrack.cpp.

5.1.4.5 GeneratePhotonFromGas()

```
Photon ParticleTrack::GeneratePhotonFromGas ( ) const
```

Generate Cherenkov photon from gas

Definition at line 67 of file ParticleTrack.cpp.

5.1.4.6 GeneratePhotonsFromAerogel()

```
std::vector< Photon > ParticleTrack::GeneratePhotonsFromAerogel ( ) const
```

Generate Cherenkov photons from aerogel according to Frank-Tamm relation

Definition at line 76 of file ParticleTrack.cpp.

5.1.4.7 GeneratePhotonsFromGas()

```
std::vector< Photon > ParticleTrack::GeneratePhotonsFromGas ( ) const
```

Generate Cherenkov photons from gas according to Frank-Tamm relation

Definition at line 90 of file ParticleTrack.cpp.

5.1.4.8 TrackThroughRadiatorCell()

```
void ParticleTrack::TrackThroughRadiatorCell (
            const RadiatorCell & Cell )
```

Track particle through radiator cell

Definition at line 42 of file ParticleTrack.cpp.

5.1.4.9 TrackThroughTracker()

```
void ParticleTrack::TrackThroughTracker (
            const TrackingVolume & InnerTracker )
```

Track particle through inner tracker with magnetic field

Definition at line 25 of file ParticleTrack.cpp.

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

- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/ParticleTrack.h
- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/ParticleTrack.cpp

5.2 Photon Struct Reference

```
#include <Photon.h>
```

Public Types

- enum Radiator { Radiator::Aerogel, Radiator::Gas, Radiator::Unknown }

Public Member Functions

- Photon (const Vector &Position, const Vector &Direction, double Energy)

Public Attributes

- Vector m_Position
- const Vector m_EmissionPoint
- Vector m_Direction
- const double m_Energy
- Radiator m_Radiator

5.2.1 Detailed Description

Definition at line 14 of file Photon.h.

5.2.2 Member Enumeration Documentation

5.2.2.1 Radiator

```
enum Photon::Radiator  [strong]
```

Enum class classifying which radiator the photon was emitted from

Enumerator

Aerogel	
Gas	
Unknown	

Definition at line 18 of file Photon.h.

5.2.3 Constructor & Destructor Documentation

5.2.3.1 Photon()

```
Photon::Photon (
            const Vector & Position,
            const Vector & Direction,
            double Energy )
```

Construct a photon with position, direction and energy

Parameters

Position	Position vector
Direction	Direction vector
Energy	Photon energy

Definition at line 5 of file Photon.cpp.

5.2.4 Member Data Documentation

5.2.4.1 m_Direction

```
Vector Photon::m_Direction
```

Photon direction vector

Definition at line 37 of file Photon.h.

5.2.4.2 m_EmissionPoint

```
const Vector Photon::m_EmissionPoint
```

Emission point

Definition at line 33 of file Photon.h.

5.2.4.3 m_Energy

```
const double Photon::m_Energy
```

Photon energy

Definition at line 41 of file Photon.h.

5.2.4.4 m_Position

```
Vector Photon::m_Position
```

Photon position in local cell coordinates, in m

Definition at line 29 of file Photon.h.

5.2.4.5 m_Radiator

```
Radiator Photon::m_Radiator
```

Flag specifying which radiator the photon was emitted from

Definition at line 45 of file Photon.h.

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

- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/Photon.h
- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/Photon.cpp

5.3 PhotonHit Struct Reference

```
#include <SiPM.h>
```

Public Member Functions

- PhotonHit (double x, double y, const Photon *photon)

Public Attributes

- const double x
- const double y
- const Photon * m_Photon

5.3.1 Detailed Description

SiPM represents a single Silicon Photo-Multiplier, which is located on the detector plane of each radiator cell All positions are in the local radiator coordinate system

Definition at line 14 of file SiPM.h.

5.3.2 Constructor & Destructor Documentation

5.3.2.1 PhotonHit()

```
PhotonHit::PhotonHit (
            double x,
            double y,
            const Photon * photon )  [inline]
```

Constructor saving the photon hits

Definition at line 18 of file SiPM.h.

5.3.3 Member Data Documentation

5.3.3.1 m_Photon

```
const Photon* PhotonHit::m_Photon
```

Pointer to the photon that caused this hit

Definition at line 27 of file SiPM.h.

5.3.3.2 x

```
const double PhotonHit::x
```

Detector hit coordinates

Definition at line 22 of file SiPM.h.

5.3.3.3 y

```
const double PhotonHit::y
```

Definition at line 23 of file SiPM.h.

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

- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/SiPM.h

5.4 RadiatorCell Class Reference

```
#include <RadiatorCell.h>
```

Public Member Functions

- RadiatorCell (const Vector &Position)
- double GetRadiatorThickness () const
- double GetVesselThickness () const
- double GetCoolingThickness () const
- double GetAerogelThickness () const
- const Vector & GetMirrorCentre () const
- double GetMirrorCurvature () const
- const Vector & GetRadiatorPosition () const

Public Attributes

- SiPM m_Detector

5.4.1 Detailed Description

Definition at line 16 of file RadiatorCell.h.

5.4.2 Constructor & Destructor Documentation

5.4.2.1 RadiatorCell()

```
RadiatorCell::RadiatorCell (
            const Vector & Position )
```

Constructor that sets up the geometry

Parameters

Position	Position of radiator cell in global coordinates

Definition at line 5 of file RadiatorCell.cpp.

5.4.3 Member Function Documentation

5.4.3.1 GetAerogelThickness()

```
double RadiatorCell::GetAerogelThickness ( ) const
```

Get thickness of aerogel

Definition at line 27 of file RadiatorCell.cpp.

5.4.3.2 GetCoolingThickness()

```
double RadiatorCell::GetCoolingThickness ( ) const
```

Get thickness of cooling plate

Definition at line 23 of file RadiatorCell.cpp.

5.4.3.3 GetMirrorCentre()

```
const Vector & RadiatorCell::GetMirrorCentre ( ) const
```

Get the mirror centre of curvature

Definition at line 31 of file RadiatorCell.cpp.

5.4.3.4 GetMirrorCurvature()

```
double RadiatorCell::GetMirrorCurvature ( ) const
```

Get the mirror curvature

Definition at line 40 of file RadiatorCell.cpp.

5.4.3.5 GetRadiatorPosition()

```
const Vector & RadiatorCell::GetRadiatorPosition ( ) const
```

Get the radiator cell position in the global coordinates

Definition at line 44 of file RadiatorCell.cpp.

5.4.3.6 GetRadiatorThickness()

```
double RadiatorCell::GetRadiatorThickness ( ) const
```

Get total radiator cell thickness

Definition at line 15 of file RadiatorCell.cpp.

5.4.3.7 GetVesselThickness()

```
double RadiatorCell::GetVesselThickness ( ) const
```

Get thickness of vessel

Definition at line 19 of file RadiatorCell.cpp.

5.4.4 Member Data Documentation

5.4.4.1 m_Detector

```
SiPM RadiatorCell::m_Detector
```

The SiPM in the radiator cell

Definition at line 50 of file RadiatorCell.h.

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

- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/RadiatorCell.h
- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/RadiatorCell.cpp

5.5 SiPM Class Reference

```
#include <SiPM.h>
```

Public Member Functions

- SiPM ()
- void AddPhotonHit (const Photon &photon)
- void PlotHits (const std::string &Filename) const

5.5.1 Detailed Description

Definition at line 30 of file SiPM.h.

5.5.2 Constructor & Destructor Documentation

5.5.2.1 SiPM()

```
SiPM::SiPM ( )
```

Constructor setting up the detector coordinates and detector size

Definition at line 11 of file SiPM.cpp.

5.5.3 Member Function Documentation

5.5.3.1 AddPhotonHit()

```
void SiPM::AddPhotonHit (
            const Photon & photon )
```

Add a photon hit

Definition at line 17 of file SiPM.cpp.

5.5.3.2 PlotHits()

```
void SiPM::PlotHits (
            const std::string & Filename ) const
```

Plot photon hits

Definition at line 21 of file SiPM.cpp.

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

- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/SiPM.h
- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/SiPM.cpp

5.6 TrackingVolume Class Reference

```
#include <TrackingVolume.h>
```

Public Member Functions

- TrackingVolume (double Radius, double FieldStrength)
- double GetRadius () const
- double GetFieldStrength () const

5.6.1 Detailed Description

The TrackingVolume is the inner detector that contains the magnetic field and the interaction point

Definition at line 9 of file TrackingVolume.h.

5.6.2 Constructor & Destructor Documentation

5.6.2.1 TrackingVolume()

```
TrackingVolume::TrackingVolume (
            double Radius,
            double FieldStrength )
```

Constructor that sets up the geometry of the tracking volume

Parameters

Radius	The inner radius of the tracker
FieldStrength	The magnetic field strenth, in T

Definition at line 5 of file TrackingVolume.cpp.

5.6.3 Member Function Documentation

5.6.3.1 GetFieldStrength()

```
double TrackingVolume::GetFieldStrength ( ) const
```

Get magnetic field strength

Definition at line 13 of file TrackingVolume.cpp.

5.6.3.2 GetRadius()

```
double TrackingVolume::GetRadius ( ) const
```

Get inner tracking radius

Definition at line 9 of file TrackingVolume.cpp.

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

- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/TrackingVolume.h
- /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/TrackingVolume.cpp

Chapter 6

File Documentation

6.1 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/apps/RunARC.cpp File Reference

```
#include <vector>
#include "Math/Vector3Dfwd.h"
#include "Math/DisplacementVector3D.h"
#include "ParticleTrack.h"
#include "TrackingVolume.h"
#include "Photon.h"
#include "PhotonMapper.h"
#include "RadiatorCell.h"
```

Typedefs

- using Vector = ROOT::Math::XYZVector

Functions

- int main ()

6.1.1 Typedef Documentation

6.1.1.1 Vector

```
using Vector = ROOT::Math::XYZVector
```

RunARC is an application for running ARC simulations and reconstructions

Definition at line 15 of file RunARC.cpp.

6.1.2 Function Documentation

6.1.2.1 main()

```
int main ( )
```

Definition at line 17 of file RunARC.cpp.

6.2 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/↩ ParticleMass.h File Reference

Namespaces

- ParticleMass

Functions

- double ParticleMass::GetMass (int PID)

6.3 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/↩ ParticleTrack.h File Reference

```
#include <vector>
#include "Math/Vector3Dfwd.h"
#include "Math/DisplacementVector3D.h"
#include "Photon.h"
#include "TrackingVolume.h"
#include "RadiatorCell.h"
```

Classes

- class ParticleTrack

Typedefs

- using Vector = ROOT::Math::XYZVector

6.3.1 Typedef Documentation

6.3.1.1 Vector

```
using Vector = ROOT::Math::XYZVector
```

ParticleTrack represents a charged particle with position, direction and momentum inside the detector volume

Definition at line 16 of file ParticleTrack.h.

6.4 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/↩ Photon.h File Reference

```
#include "Math/Vector3Dfwd.h"
#include "Math/DisplacementVector3D.h"
```

Classes

- struct Photon

Typedefs

- using Vector = ROOT::Math::XYZVector

6.4.1 Typedef Documentation

6.4.1.1 Vector

```
using Vector = ROOT::Math::XYZVector
```

A Photon has a position, direction and energy

Definition at line 12 of file Photon.h.

6.5 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/↩ PhotonMapper.h File Reference

```
#include "RadiatorCell.h"
#include "Photon.h"
```

Namespaces

- PhotonMapper

Functions

- double PhotonMapper::PhotonMirrorDistance (const Photon &photon, const RadiatorCell &radiatorCell)
- void PhotonMapper::TracePhotonToMirror (Photon &photon, const RadiatorCell &radiatorCell)
- void PhotonMapper::TracePhotonToDetector (Photon &photon, RadiatorCell &radiatorCell)
- void PhotonMapper::TracePhoton (Photon &photon, RadiatorCell &radiatorCell)

6.6 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/↩ RadiatorCell.h File Reference

```
#include "Math/Vector3Dfwd.h"
#include "SiPM.h"
```

Classes

- class RadiatorCell

Typedefs

- using Vector = ROOT::Math::XYZVector

6.6.1 Typedef Documentation

6.6.1.1 Vector

```
using Vector = ROOT::Math::XYZVector
```

RadiatorCell describes the geometry of a single radiator cell of the ARC The radiator cell has a local coordinate system with its origin in the middle of the detector plane All lengths are in meter

Definition at line 14 of file RadiatorCell.h.

6.7 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/SiPM.h File Reference

```
#include <vector>
#include <string>
#include "Photon.h"
```

Classes

- struct PhotonHit
- class SiPM

6.8 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/TrackingVolume.h File Reference

Classes

- class TrackingVolume

6.9 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/CMakeLists.txt File Reference

6.10 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/apps/CMakeLists.txt File Reference

6.11 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/ParticleMass.cpp File Reference

```
#include <map>
#include "ParticleMass.h"
```

Namespaces

- ParticleMass

Functions

- double ParticleMass::GetMass (int PID)

6.12 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/ParticleTrack.cpp File Reference

```
#include <stdexcept>
#include "TMath.h"
#include "TRandom.h"
#include "ParticleTrack.h"
#include "Photon.h"
#include "TrackingVolume.h"
#include "RadiatorCell.h"
#include "ParticleMass.h"
```

6.13 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/Photon.cpp File Reference

```
#include "Photon.h"
```

6.14 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/PhotonMapper.cpp File Reference

```
#include <algorithm>
#include "TMath.h"
#include "PhotonMapper.h"
#include "RadiatorCell.h"
#include "Photon.h"
```

Namespaces

- PhotonMapper

Functions

- double PhotonMapper::PhotonMirrorDistance (const Photon &photon, const RadiatorCell &radiatorCell)
- void PhotonMapper::TracePhotonToMirror (Photon &photon, const RadiatorCell &radiatorCell)
- void PhotonMapper::TracePhotonToDetector (Photon &photon, RadiatorCell &radiatorCell)
- void PhotonMapper::TracePhoton (Photon &photon, RadiatorCell &radiatorCell)

6.15 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/RadiatorCell.cpp File Reference

```
#include "RadiatorCell.h"
```

6.16 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/SiPM.cpp File Reference

```
#include <string>
#include <iostream>
#include "TGraph.h"
#include "TCanvas.h"
#include "TLegend.h"
#include "SiPM.h"
#include "Photon.h"
```

6.17 /data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/TrackingVolume.cpp File Reference

```
#include "TrackingVolume.h"
```

Index

/data/lhcb/users/tat/ARC_Simulation_Reconstruction/apps/GeneratePhoton, 27
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/apps/GeneratePhotonFromAerogel, 23
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/ParticleMass.h, 24
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/ParticleTrack.h, 24
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/Photon.h, 25
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/PhotonMapper.h, 26
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/RadiatorCell.h, 26
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/SiPM.h, 27
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/include/TrackingVolume.h, 27
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/CMakeLists.txt, 27
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/ParticleMass.cpp, 27
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/ParticleTrack.cpp, 28
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/PhotonMapper.cpp, 28
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/PhotonMapper.cpp, 28
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/RadiatorCell.cpp, 29
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/SiPM.cpp, 29
/data/lhcb/users/tat/ARC_Simulation_Reconstruction/src/TrackingVolume.cpp, 29

AddPhotonHit
SiPM, 20
Aerogel
Photon, 13

Beta
ParticleTrack, 10

ConvertToRadiatorCoordinates
ParticleTrack, 10
CoordinateSystem
ParticleTrack, 9

Gas
Photon, 13

GeneratePhoton
ParticleTrack, 10
GeneratePhotonFromAerogel
ParticleTrack, 11
GeneratePhotonFromGas
ParticleTrack, 11
GenerateTrack.h,
ParticleTrack, 11
GeneratePhotonsFromGas
ParticleTrack, 11
GetAerogelThickness
RadiatorCell, 17
GetRadiatorThickness
RadiatorCell, 17
GetFieldStrength
TrackingVolume, 21
GetMassVolume.h,
ParticleMass, 7
GetMirrorCentre
RadiatorCell, 17
GetMirrorCurvature
RadiatorCell, 18
GetRadiatorPosition
RadiatorCell, 18
GetRadiatorThickness
RadiatorCell, 18
GetRadiatorMapper.cpp,
TrackingVolume, 21
GetVerseThickness
RadiatorCell, 18
GlobalDetector
ParticleTrack, 10
LocalRadiator
ParticleTrack, 10

m_Detector
RadiatorCell, 19
m_Direction
Photon, 14
m_EmissionPoint
Photon, 14
m_Energy
Photon, 14
m_Photon
PhotonHit, 16
m_Position
Photon, 14
m_Radiator
Photon, 14

main
RunARC.cpp, 24

ParticleMass, 7
GetMass, 7
ParticleTrack, 9
Beta, 10
ConvertToRadiatorCoordinates, 10
CoordinateSystem, 9
GeneratePhoton, 10
GeneratePhotonFromAerogel, 11
GeneratePhotonFromGas, 11
GeneratePhotonsFromAerogel, 11
GeneratePhotonsFromGas, 11
GlobalDetector, 10
LocalRadiator, 10
ParticleTrack, 10
TrackThroughRadiatorCell, 12
TrackThroughTracker, 12
ParticleTrack.h
Vector, 25
Photon, 12
Aerogel, 13
Gas, 13
m_Direction, 14
m_EmissionPoint, 14
m_Energy, 14
m_Position, 14
m_Radiator, 14
Photon, 13
Radiator, 13
Unknown, 13
Photon.h
Vector, 25
PhotonHit, 15
m_Photon, 16
PhotonHit, 15
x, 16
y, 16
PhotonMapper, 7
PhotonMirrorDistance, 8
TracePhoton, 8
TracePhotonToDetector, 8
TracePhotonToMirror, 8
PhotonMirrorDistance
PhotonMapper, 8
PlotHits
SiPM, 20

Radiator
Photon, 13
RadiatorCell, 16
GetAerogelThickness, 17
GetCoolingThickness, 17
GetMirrorCentre, 17
GetMirrorCurvature, 18
GetRadiatorPosition, 18
GetRadiatorThickness, 18
GetVesselThickness, 18
m_Detector, 19
RadiatorCell, 17
RadiatorCell.h
Vector, 26
RunARC.cpp
main, 24
Vector, 23

SiPM, 19
AddPhotonHit, 20
PlotHits, 20
SiPM, 19

TracePhoton
PhotonMapper, 8
TracePhotonToDetector
PhotonMapper, 8
TracePhotonToMirror
PhotonMapper, 8
TrackingVolume, 20
GetFieldStrength, 21
GetRadius, 21
TrackingVolume, 20
TrackThroughRadiatorCell
ParticleTrack, 12
TrackThroughTracker
ParticleTrack, 12

Unknown
Photon, 13

Vector
ParticleTrack.h, 25
Photon.h, 25
RadiatorCell.h, 26
RunARC.cpp, 23

x
PhotonHit, 16

y
PhotonHit, 16