# mcnpy

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# Chapter 1

# Namespace Index

## 1.1 Packages

Here are the packages with brief descriptions (if available):

# Chapter 2

# Hierarchical Index

## 2.1 Class Hierarchy

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

# Chapter 3

# Class Index

## 3.1 Class List

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

# Chapter 4

# Namespace Documentation

## 4.1 mcnp_api.mcnpy Namespace Reference

### Namespaces

- namespace override

  *Custom classes that override the default wrappers.*

### Functions

- def kill_gateway ()

  *Kills the Py4j gateway and the MCNP Gateway Server.*

### Variables

- **server** = Server()

### 4.1.1 Detailed Description

#### 4.1.1.0.1 <tt>mcnpy</tt> - The MCNP API from NuCoMP

Read, write, and edit MCNP decks like a pro.

### 4.1.2 Function Documentation

#### 4.1.2.1 kill_gateway()

```
def mcnp_api.mcnpy.kill_gateway ( )
```

Kills the Py4j gateway and the MCNP Gateway Server.

Should be called at the end of your Python script to avoid leaving a Java process running.

## 4.2 mcnp_api.mcnpy.override Namespace Reference

Custom classes that override the default wrappers.

### 4.2.1 Detailed Description

Custom classes that override the default wrappers.

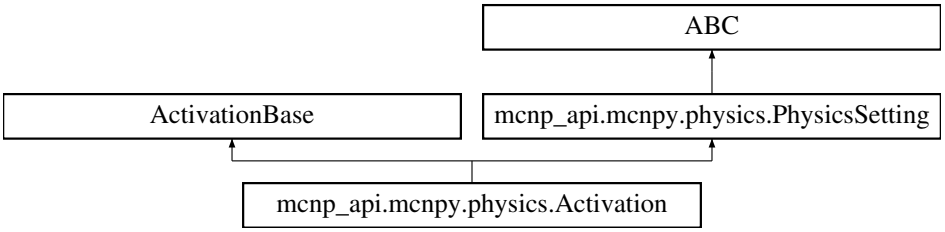
# Chapter 5

# Class Documentation

## 5.1 mcnp_api.mcnpy.physics.Activation Class Reference

ACT.

Inheritance diagram for mcnp_api.mcnpy.physics.Activation:




### 5.1.1 Detailed Description

ACT.

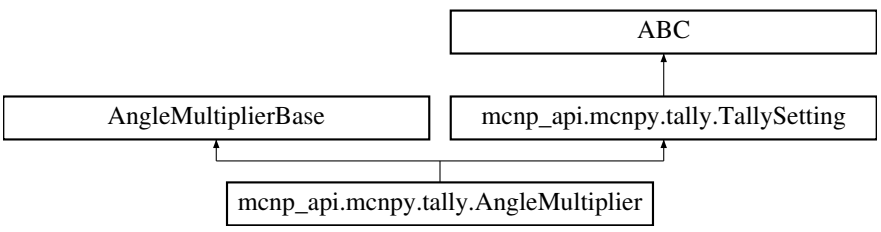
The documentation for this class was generated from the following file:

- physics.py

## 5.2 mcnp_api.mcnpy.tally.AngleMultiplier Class Reference

CM.

Inheritance diagram for mcnp_api.mcnpy.tally.AngleMultiplier:



### 5.2.1 Detailed Description

CM.

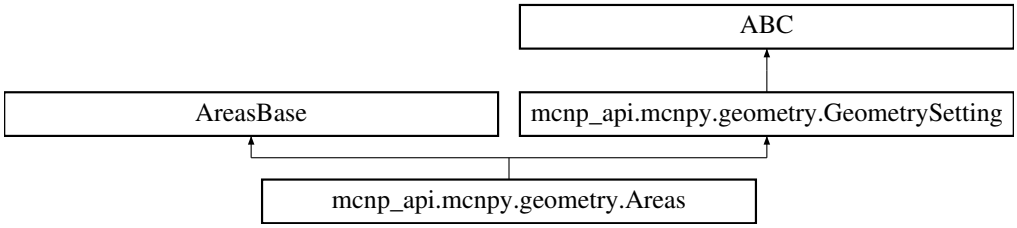
The documentation for this class was generated from the following file:

- tally.py

## 5.3 mcnp_api.mcnpy.geometry.Areas Class Reference

AREA.

Inheritance diagram for mcnp_api.mcnpy.geometry.Areas:




### 5.3.1 Detailed Description

AREA.

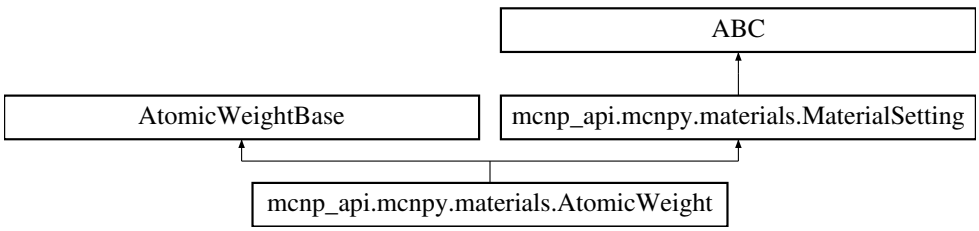
The documentation for this class was generated from the following file:

- geometry.py

## 5.4 mcnp_api.mcnpy.materials.AtomicWeight Class Reference

AWTAB.

Inheritance diagram for mcnp_api.mcnpy.materials.AtomicWeight:



### 5.4.1 Detailed Description

AWTAB.

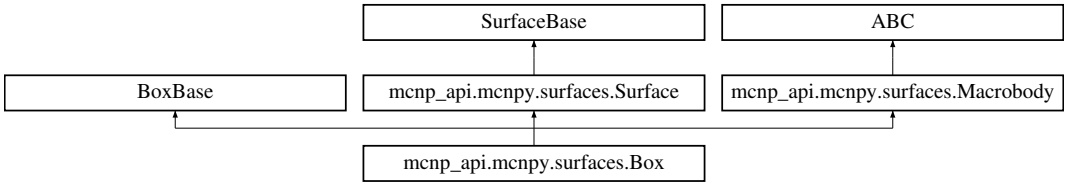
The documentation for this class was generated from the following file:

- materials.py

## 5.5 mcnp_api.mcnpy.surfaces.Box Class Reference

A Box defined by a corner and 2 or 3 vectors.

Inheritance diagram for mcnp_api.mcnpy.surfaces.Box:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **corner**
- **vectors**
- **boundary_type**
- **comment**

### 5.5.1 Detailed Description

A Box defined by a corner and 2 or 3 vectors.

### 5.5.2 Member Function Documentation

#### 5.5.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.Box.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

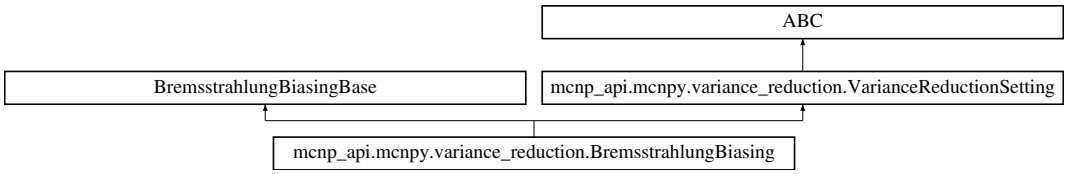
The documentation for this class was generated from the following file:

- surfaces.py

## 5.6 mcnp_api.mcnpy.variance_reduction.BremsstrahlungBiasing Class Reference

BBREM.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.BremsstrahlungBiasing:




### 5.6.1 Detailed Description

BBREM.

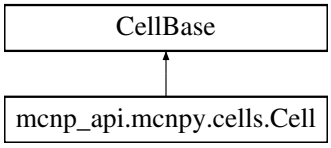
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.7 mcnp_api.mcnpy.cells.Cell Class Reference

Cell class.

Inheritance diagram for mcnp_api.mcnpy.cells.Cell:



## Public Member Functions

- def **get_lattice** (self)

  *Returns a* `Lattice` *object.*
- def **get_importances** (self)

  *Returns cell importances.*
- def set_importances (self, dict importances)

  `importances` *is a* `dict` *where the* `cell importances` *are keys and* `lists of particles` *are values.*
- def **__invert__** (self)
- def **__str__** (self)
- def **__repr__** (self)

## Public Attributes

- **name**
- **universe**
- **material**
- **region**
- **density**
- **density_unit**
- **comment**
- **importances**

### 5.7.1 Detailed Description

Cell class.

### 5.7.2 Member Function Documentation

#### 5.7.2.1 set_importances()

```
def mcnp_api.mcnpy.cells.Cell.set_importances (
             self,
            dict importances )
```

`importances` is a `dict` where the `cell importances` are keys and `lists of particles` are values.

Example: '{1.0 : ['n', 'p']}`

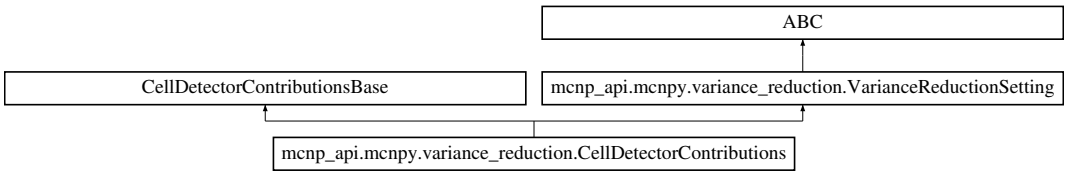
The documentation for this class was generated from the following file:

- cells.py

## 5.8 mcnp_api.mcnpy.variance_reduction.CellDetectorContributions Class Reference

PD.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.CellDetectorContributions:




### 5.8.1 Detailed Description

PD.

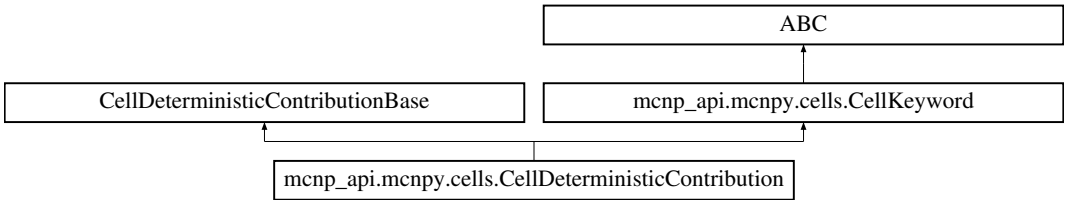
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.9 mcnp_api.mcnpy.cells.CellDeterministicContribution Class Reference

DXC.

Inheritance diagram for mcnp_api.mcnpy.cells.CellDeterministicContribution:




### 5.9.1 Detailed Description

DXC.

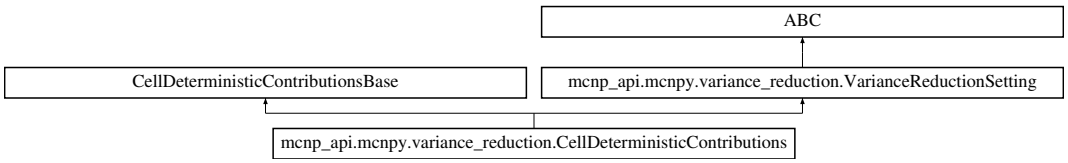
The documentation for this class was generated from the following file:

- cells.py

## 5.10 mcnp_api.mcnpy.variance_reduction.CellDeterministic↩ Contributions Class Reference

DXC.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.CellDeterministicContributions:




### 5.10.1 Detailed Description

DXC.

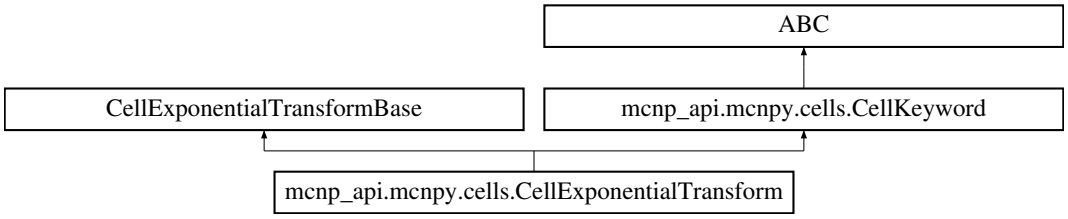
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.11 mcnp_api.mcnpy.cells.CellExponentialTransform Class Reference

EXT.

Inheritance diagram for mcnp_api.mcnpy.cells.CellExponentialTransform:




### 5.11.1 Detailed Description

EXT.

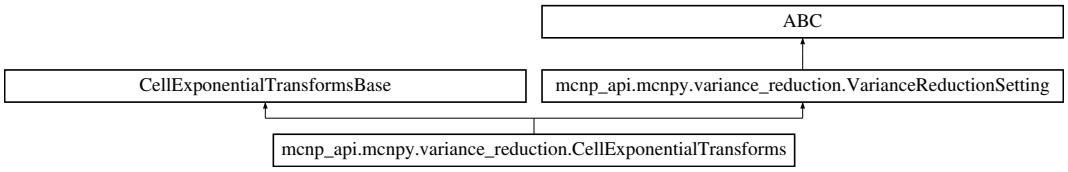
The documentation for this class was generated from the following file:

- cells.py

## 5.12 mcnp_api.mcnpy.variance_reduction.CellExponentialTransforms Class Reference

EXT.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.CellExponentialTransforms:




### 5.12.1 Detailed Description

EXT.

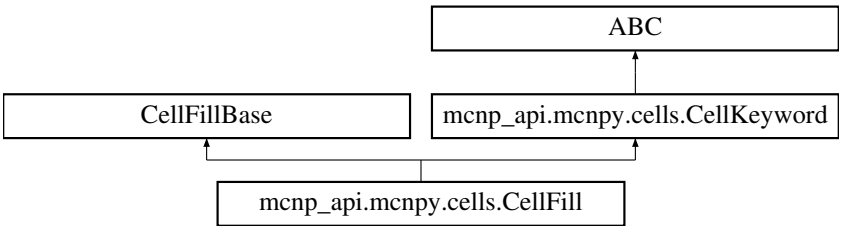
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.13 mcnp_api.mcnpy.cells.CellFill Class Reference

Custom CellFill class.

Inheritance diagram for mcnp_api.mcnpy.cells.CellFill:




### Public Member Functions

- def **universe_fill** (self, universe, cell, transform=None, transformation=None)

  *CellFill using a UniverseList, UniverseBase, or UniversesBase.*
- def **lattice_fill** (self, lattice, cell)

  *CellFill using a Lattice.*

### Public Attributes

- **fill**
- **unit**
- **lattice**
- **transformation**
- **transform**
- **transformations**
- **transforms**
- **i**
- **j**
- **k**

### 5.13.1 Detailed Description

Custom CellFill class.

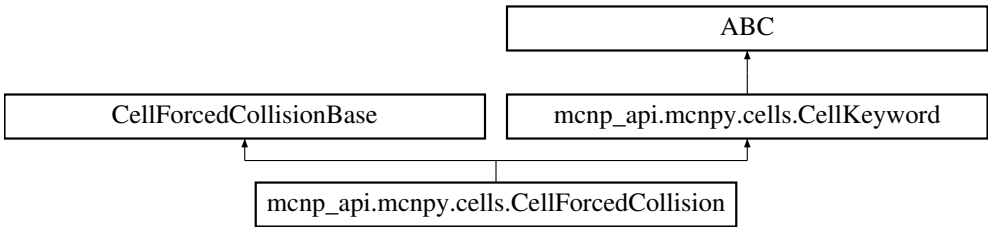
The documentation for this class was generated from the following file:

- cells.py

## 5.14 mcnp_api.mcnpy.cells.CellForcedCollision Class Reference

FCL.

Inheritance diagram for mcnp_api.mcnpy.cells.CellForcedCollision:




### 5.14.1 Detailed Description

FCL.

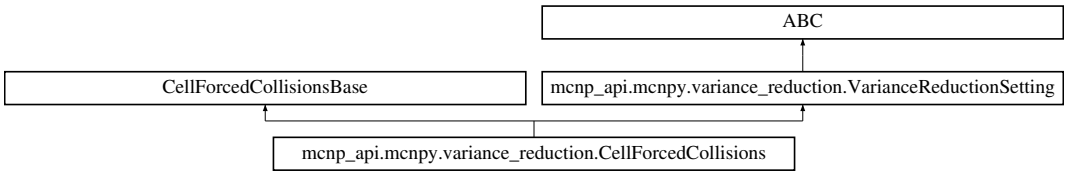
The documentation for this class was generated from the following file:

- cells.py

## 5.15 mcnp_api.mcnpy.variance_reduction.CellForcedCollisions Class Reference

FCL.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.CellForcedCollisions:




### 5.15.1 Detailed Description

FCL.

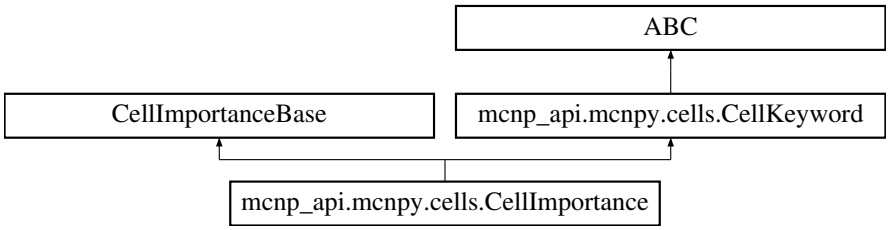
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.16 mcnp_api.mcnpy.cells.CellImportance Class Reference

IMP.

Inheritance diagram for mcnp_api.mcnpy.cells.CellImportance:




### Public Member Functions

- def **__str__** (self)
- str **__repr__** (self)

### Public Attributes

- **importance**
- **particles**

### 5.16.1 Detailed Description

IMP.

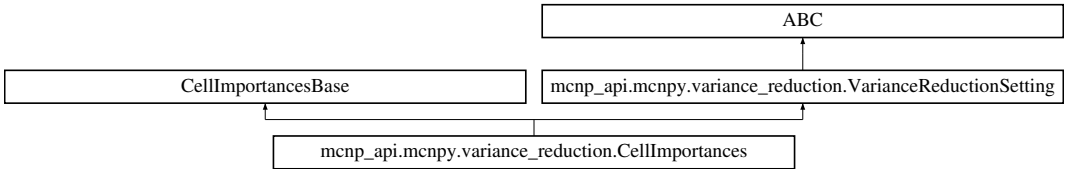
The documentation for this class was generated from the following file:

- cells.py

## 5.17 mcnp_api.mcnpy.variance_reduction.CellImportances Class Reference

IMP.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.CellImportances:




### 5.17.1 Detailed Description

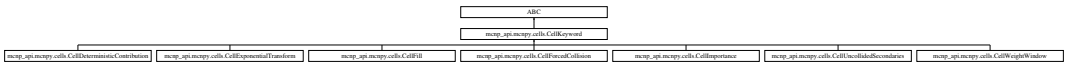
IMP.

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

- variance_reduction.py

## 5.18 mcnp_api.mcnpy.cells.CellKeyword Class Reference

Inheritance diagram for mcnp_api.mcnpy.cells.CellKeyword:



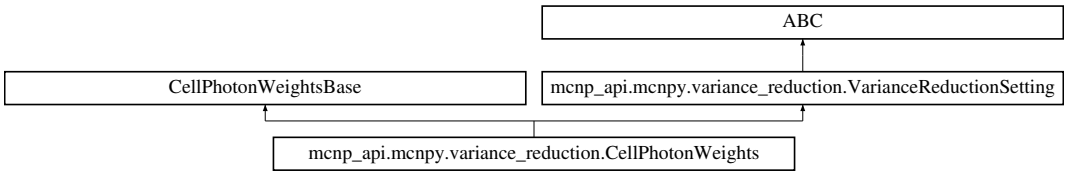

The documentation for this class was generated from the following file:

- cells.py

## 5.19 mcnp_api.mcnpy.variance_reduction.CellPhotonWeights Class Reference

PWT.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.CellPhotonWeights:




### 5.19.1 Detailed Description

PWT.

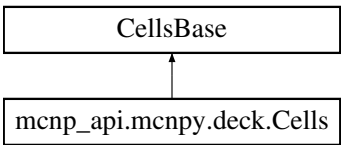
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.20 mcnp_api.mcnpy.deck.Cells Class Reference

My custom cells class.

Inheritance diagram for mcnp_api.mcnpy.deck.Cells:




### Public Attributes

- **cells**

### 5.20.1 Detailed Description

My custom cells class.

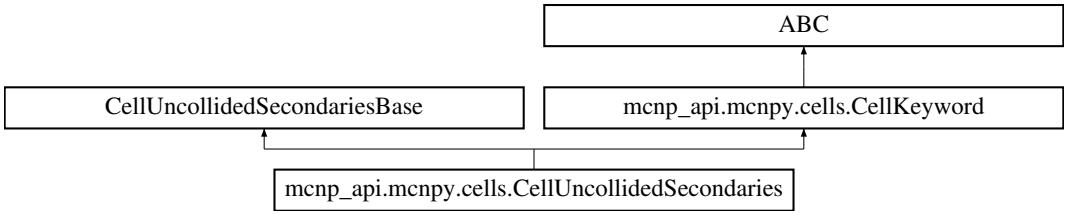
The documentation for this class was generated from the following file:

- deck.py

## 5.21 mcnp_api.mcnpy.cells.CellUncollidedSecondaries Class Reference

UNC.

Inheritance diagram for mcnp_api.mcnpy.cells.CellUncollidedSecondaries:




### 5.21.1 Detailed Description

UNC.

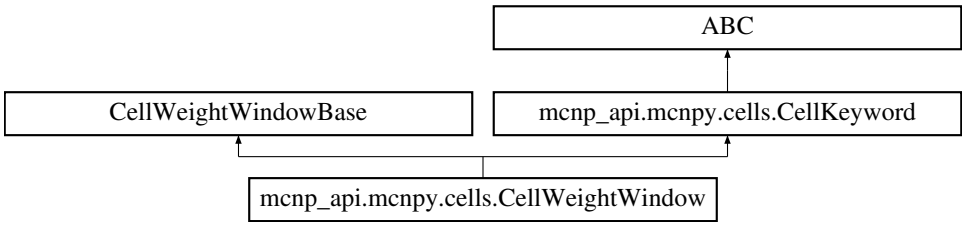
The documentation for this class was generated from the following file:

- cells.py

## 5.22 mcnp_api.mcnpy.cells.CellWeightWindow Class Reference

WWN.

Inheritance diagram for mcnp_api.mcnpy.cells.CellWeightWindow:




### 5.22.1 Detailed Description

WWN.

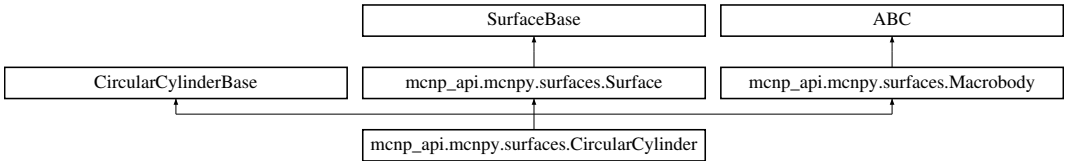
The documentation for this class was generated from the following file:

- cells.py

## 5.23 mcnp_api.mcnpy.surfaces.CircularCylinder Class Reference

A right circular cylinder defined by the center of its `base`, an `axis` vector, and radius `r`.

Inheritance diagram for mcnp_api.mcnpy.surfaces.CircularCylinder:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **base**
- **axis**
- **r**
- **boundary_type**
- **comment**
- **facet**

### 5.23.1 Detailed Description

A right circular cylinder defined by the center of its `base`, an `axis` vector, and radius `r`.

### 5.23.2 Member Function Documentation

#### 5.23.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.CircularCylinder.get_coefficients (
            self )
```

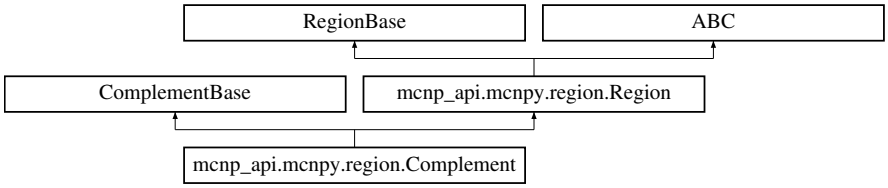
Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

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

- surfaces.py

# 5.24 mcnp_api.mcnpy.region.Complement Class Reference

Inheritance diagram for mcnp_api.mcnpy.region.Complement:




## Public Member Functions

- def **__str__** (self)
- def get_surfaces (self, surfaces=None)

  *Recursively find and return all the surfaces referenced by the node.*
- def remove_redundant_surfaces (self, redundant_surfaces)

  *Recursively remove all redundant surfaces referenced by this region.*

## Public Attributes

- **node**

## 5.24.1 Member Function Documentation

### 5.24.1.1 get_surfaces()

```
def mcnp_api.mcnpy.region.Complement.get_surfaces (
              self,
              surfaces = None )
```

Recursively find and return all the surfaces referenced by the node.

```
    Parameters
    ----------
    surfaces: collections.OrderedDict, optional
        Dictionary mapping surface IDs to :class:`mcnpy.Surface` instances

    Returns
    -------
    surfaces: collections.OrderedDict
        Dictionary mapping surface IDs to :class:`mcnpy.Surface` instances
```

Reimplemented from mcnp_api.mcnpy.region.Region.

#### 5.24.1.2 remove_redundant_surfaces()

```
def mcnp_api.mcnpy.region.Complement.remove_redundant_surfaces (
              self,
              redundant_surfaces )
```

Recursively remove all redundant surfaces referenced by this region.

```
    .. versionadded:: 0.12

    Parameters
    ----------
    redundant_surfaces : dict
        Dictionary mapping redundant surface IDs to class:`mcnpy.Surface`
        instances that should replace them.
```

Reimplemented from mcnp_api.mcnpy.region.Region.

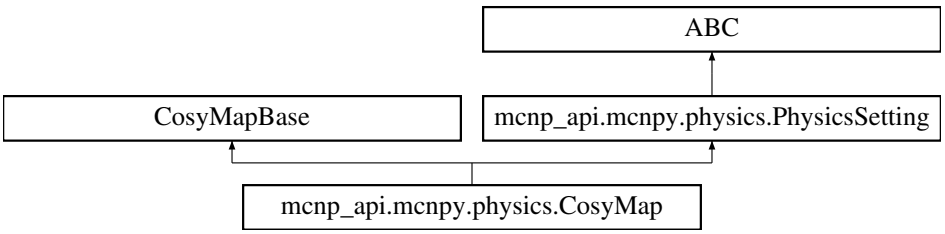
The documentation for this class was generated from the following file:

- region.py

## 5.25 mcnp_api.mcnpy.physics.CosyMap Class Reference

COSYP.

Inheritance diagram for mcnp_api.mcnpy.physics.CosyMap:




### 5.25.1 Detailed Description

COSYP.

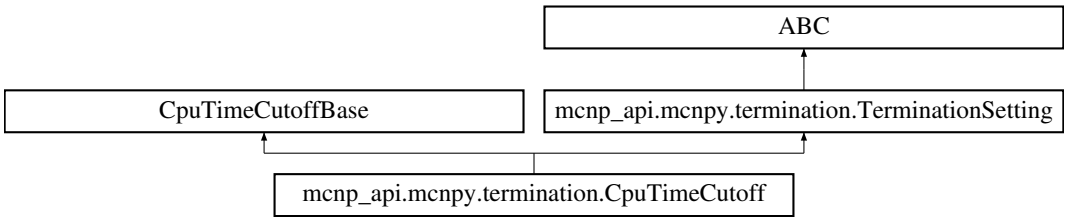
The documentation for this class was generated from the following file:

- physics.py

## 5.26 mcnp_api.mcnpy.termination.CpuTimeCutoff Class Reference

CTME.

Inheritance diagram for mcnp_api.mcnpy.termination.CpuTimeCutoff:




### 5.26.1 Detailed Description

CTME.

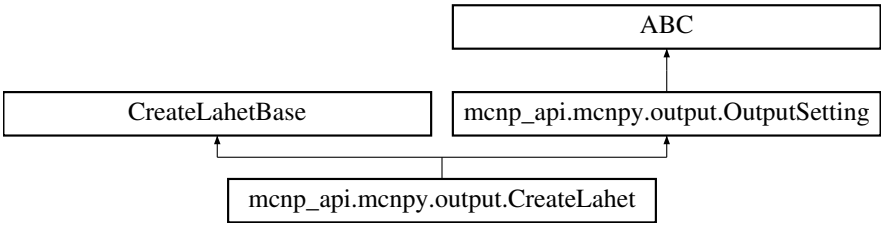
The documentation for this class was generated from the following file:

- termination.py

## 5.27 mcnp_api.mcnpy.output.CreateLahet Class Reference

HISTP.

Inheritance diagram for mcnp_api.mcnpy.output.CreateLahet:




### 5.27.1 Detailed Description

HISTP.

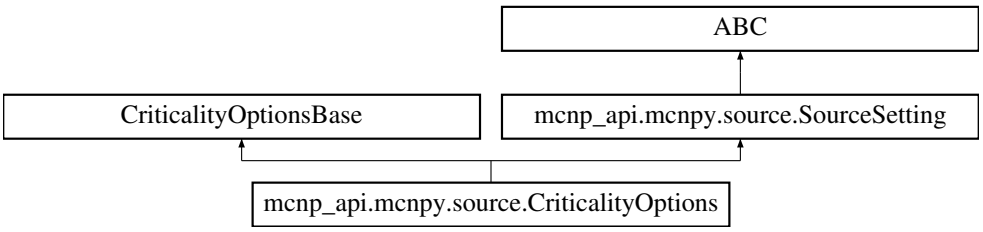
The documentation for this class was generated from the following file:

- output.py

## 5.28 mcnp_api.mcnpy.source.CriticalityOptions Class Reference

KOPTS.

Inheritance diagram for mcnp_api.mcnpy.source.CriticalityOptions:




### 5.28.1 Detailed Description

KOPTS.

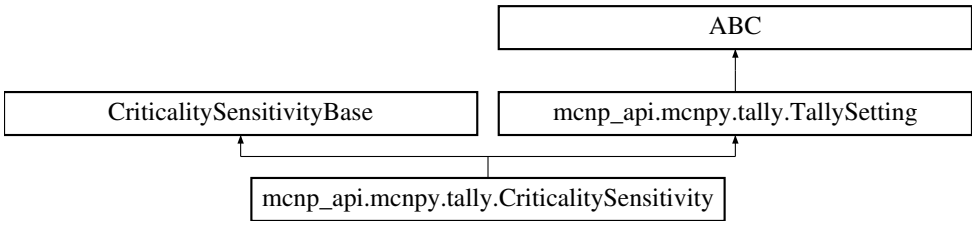
The documentation for this class was generated from the following file:

- source.py

## 5.29 mcnp_api.mcnpy.tally.CriticalitySensitivity Class Reference

KSEN.

Inheritance diagram for mcnp_api.mcnpy.tally.CriticalitySensitivity:




### 5.29.1 Detailed Description

KSEN.

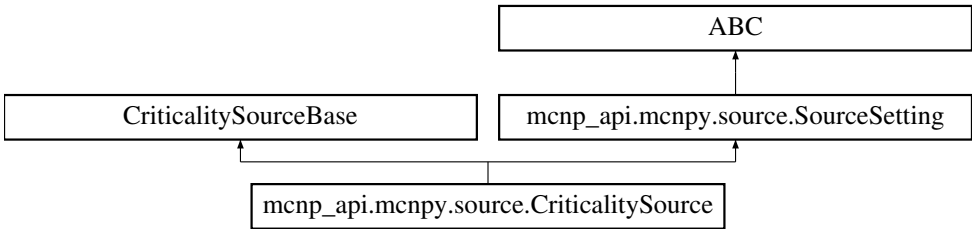
The documentation for this class was generated from the following file:

- tally.py

## 5.30 mcnp_api.mcnpy.source.CriticalitySource Class Reference

def _init(self, histories=None, keff_guess=None, skip_cycles=None, cylces=None, source_point_count=None, normalize_tallies=None, max_cycles=None, average_by_cycles=None):

Inheritance diagram for mcnp_api.mcnpy.source.CriticalitySource:




### Public Member Functions

- def **__str__** (self)
- str **__repr__** (self)

### 5.30.1 Detailed Description

def _init(self, histories=None, keff_guess=None, skip_cycles=None, cylces=None, source_point_count=None, normalize_tallies=None, max_cycles=None, average_by_cycles=None):

```
self.histories = histories
self.keff_guess = keff_guess
self.skip_cycles = skip_cycles
self.cycles = cylces
self.source_point_count = source_point_count
self.normalize_tallies = normalize_tallies
self.max_cycles=max_cycles
self.average_by_cycles = average_by_cycles
```

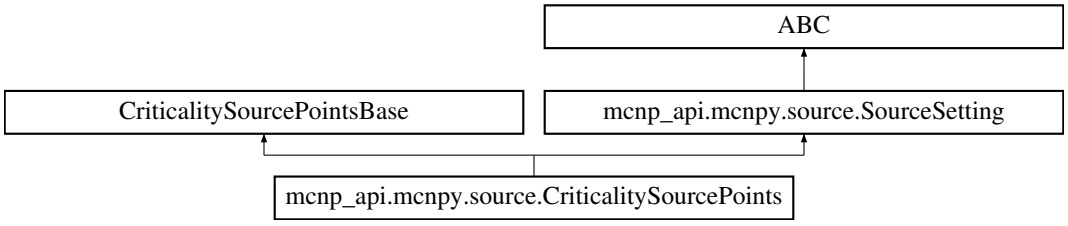
The documentation for this class was generated from the following file:

- source.py

## 5.31 mcnp_api.mcnpy.source.CriticalitySourcePoints Class Reference

KSRC.

Inheritance diagram for mcnp_api.mcnpy.source.CriticalitySourcePoints:



### Public Member Functions

- def **__str__** (self)
- def **__repr__** (self)

### Public Attributes

- **points**

### 5.31.1 Detailed Description

KSRC.

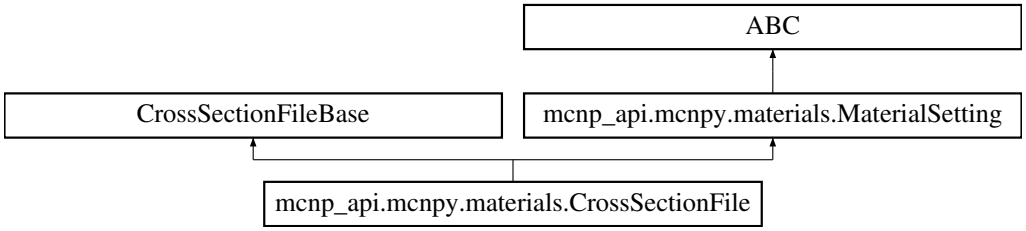
The documentation for this class was generated from the following file:

- source.py

## 5.32 mcnp_api.mcnpy.materials.CrossSectionFile Class Reference

XS.

Inheritance diagram for mcnp_api.mcnpy.materials.CrossSectionFile:




### 5.32.1 Detailed Description

XS.

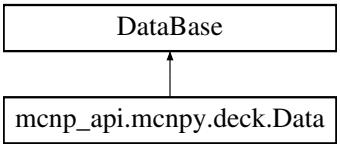
The documentation for this class was generated from the following file:

- materials.py

## 5.33 mcnp_api.mcnpy.deck.Data Class Reference

My custom data class.

Inheritance diagram for mcnp_api.mcnpy.deck.Data:



### Public Attributes

- **materials**
- **settings**

### 5.33.1 Detailed Description

My custom data class.

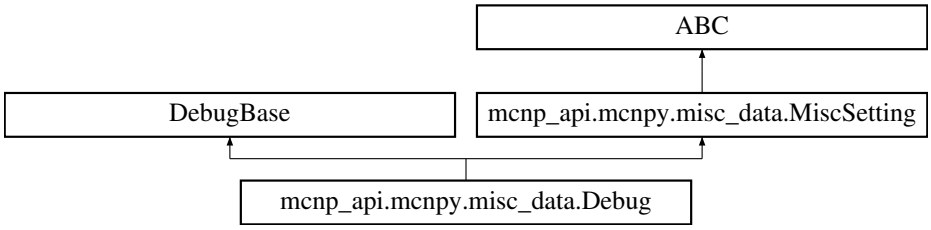
The documentation for this class was generated from the following file:

- deck.py

## 5.34 mcnp_api.mcnpy.misc_data.Debug Class Reference

DBCN.

Inheritance diagram for mcnp_api.mcnpy.misc_data.Debug:




### 5.34.1 Detailed Description

DBCN.

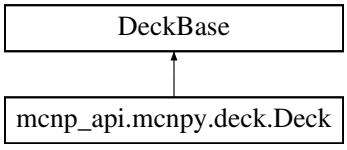
The documentation for this class was generated from the following file:

- misc_data.py

## 5.35 mcnp_api.mcnpy.deck.Deck Class Reference

My custom deck class.

Inheritance diagram for mcnp_api.mcnpy.deck.Deck:



### Public Member Functions

- def **initialize** (self)

  *Adds empty Cells, Surfaces, and Data objects to the Deck.*

### Public Attributes

- **cells**
- **surfaces**
- **data**

### 5.35.1 Detailed Description

My custom deck class.

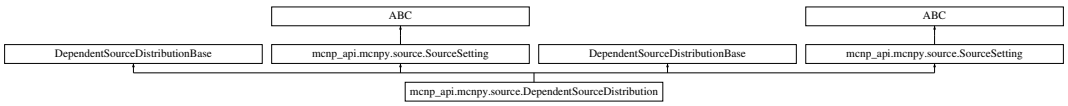
The documentation for this class was generated from the following file:

- deck.py

## 5.36 mcnp_api.mcnpy.source.DependentSourceDistribution Class Reference

DS.

Inheritance diagram for mcnp_api.mcnpy.source.DependentSourceDistribution:




### 5.36.1 Detailed Description

DS.

#

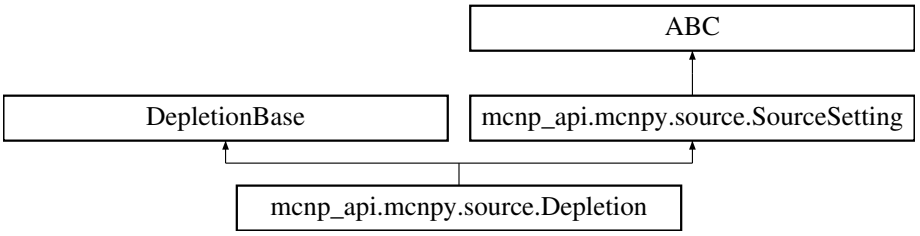
The documentation for this class was generated from the following file:

- source.py

## 5.37 mcnp_api.mcnpy.source.Depletion Class Reference

BURN.

Inheritance diagram for mcnp_api.mcnpy.source.Depletion:




### 5.37.1 Detailed Description

BURN.

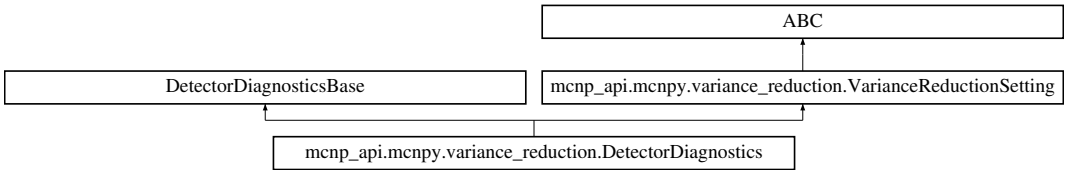
The documentation for this class was generated from the following file:

- source.py

## 5.38 mcnp_api.mcnpy.variance_reduction.DetectorDiagnostics Class Reference

DD.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.DetectorDiagnostics:




### 5.38.1 Detailed Description

DD.

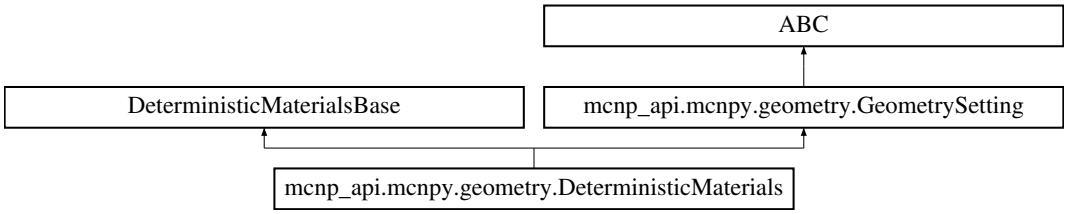
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.39 mcnp_api.mcnpy.geometry.DeterministicMaterials Class Reference

DM.

Inheritance diagram for mcnp_api.mcnpy.geometry.DeterministicMaterials:




### 5.39.1 Detailed Description

DM.

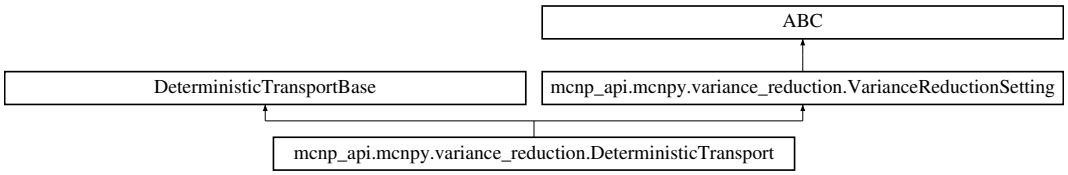
The documentation for this class was generated from the following file:

- geometry.py

## 5.40 mcnp_api.mcnpy.variance_reduction.DeterministicTransport Class Reference

DXT.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.DeterministicTransport:




### 5.40.1 Detailed Description

DXT.

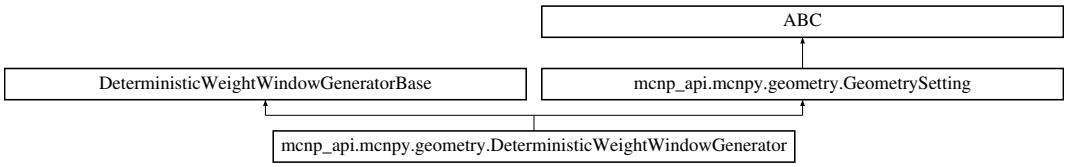
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.41 mcnp_api.mcnpy.geometry.DeterministicWeightWindowGenerator Class Reference

DAWWG.

Inheritance diagram for mcnp_api.mcnpy.geometry.DeterministicWeightWindowGenerator:




### 5.41.1 Detailed Description

DAWWG.

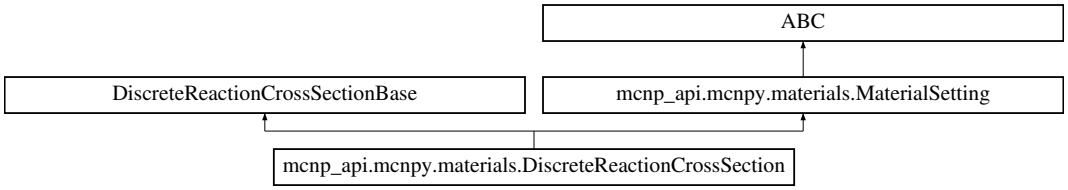
The documentation for this class was generated from the following file:

- geometry.py

## 5.42 mcnp_api.mcnpy.materials.DiscreteReactionCrossSection Class Reference

DRXS.

Inheritance diagram for mcnp_api.mcnpy.materials.DiscreteReactionCrossSection:




### 5.42.1 Detailed Description

DRXS.

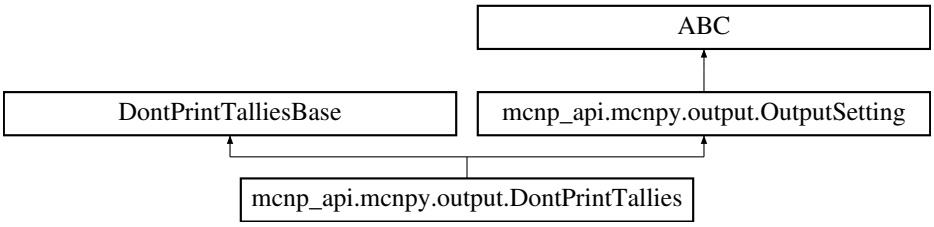
The documentation for this class was generated from the following file:

- materials.py

## 5.43 mcnp_api.mcnpy.output.DontPrintTallies Class Reference

TALNP.

Inheritance diagram for mcnp_api.mcnpy.output.DontPrintTallies:




### 5.43.1 Detailed Description

TALNP.

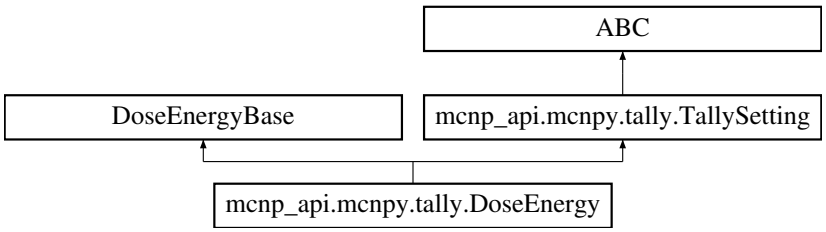
The documentation for this class was generated from the following file:

- output.py

## 5.44 mcnp_api.mcnpy.tally.DoseEnergy Class Reference

DE.

Inheritance diagram for mcnp_api.mcnpy.tally.DoseEnergy:




### 5.44.1 Detailed Description

DE.

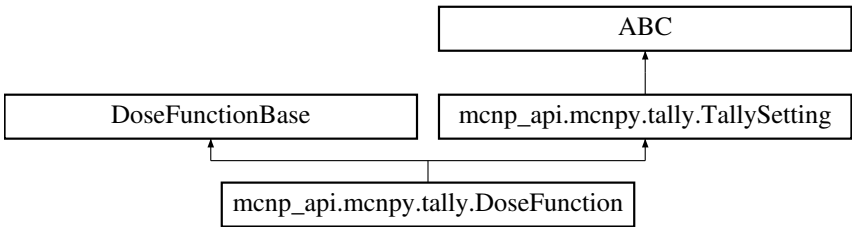
The documentation for this class was generated from the following file:

- tally.py

## 5.45 mcnp_api.mcnpy.tally.DoseFunction Class Reference

DF.

Inheritance diagram for mcnp_api.mcnpy.tally.DoseFunction:




### 5.45.1 Detailed Description

DF.

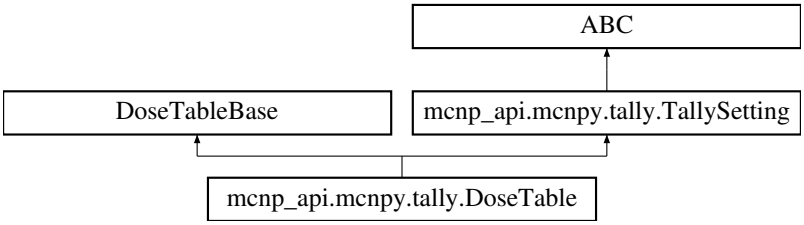
The documentation for this class was generated from the following file:

- tally.py

## 5.46 mcnp_api.mcnpy.tally.DoseTable Class Reference

DF.

Inheritance diagram for mcnp_api.mcnpy.tally.DoseTable:




### 5.46.1 Detailed Description

DF.

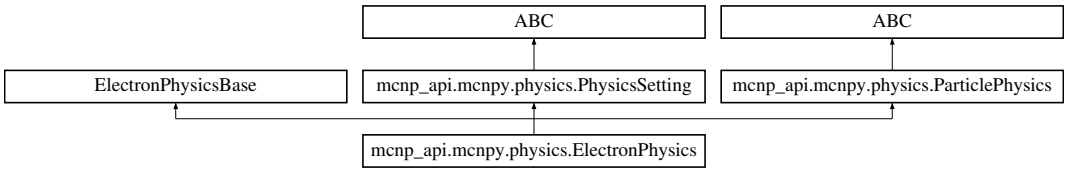
The documentation for this class was generated from the following file:

- tally.py

## 5.47 mcnp_api.mcnpy.physics.ElectronPhysics Class Reference

Electron physics options.

Inheritance diagram for mcnp_api.mcnpy.physics.ElectronPhysics:




### Public Member Functions

- def **__str__** (self)
- def **__repr__** (self)

### 5.47.1 Detailed Description

Electron physics options.

```
PARAMETERS
----------
emax : float (DEFAULT=100MeV)
ides : 0 or 1 (DEFAULT=0)
iphot : 0 or 1 (DEFAULT=0)
ibad : 0 or 1 (DEFAULT=0)
istrg : 0 or 1 (DEFAULT=0)
bnum : float (DEFAULT=1)
xnum : float (DEFAULT=1)
rnok : float (DEFAULT=1)
enum : float (DEFAULT=1)
numb : float (DEFAULT=0)
i_mcs_model : -1 or 0 (DEFAULT=0)
el_scatt : float (DEFAULT=J)
efac : float 0.8 to 0.99 (DEFAULT=0.917)
electron_method_boundary : float (DEFAULT=1.0e-3)
ckvnum : float (DEFAULT=0)
```

PROPERTIES = ['max_energy', 'prod_by_photons', 'photon_prod', 'brem_dist', 'straggling', 'brem_mult', 'xray_mult', 'knock_on', 'electron_mult', 'brem_prod', 'clmb_scattering', 'els_scattering', 'stopping_power', 'single_event_energy', 'cerenkov']

def _init(self, emax=100, ides=0, iphot=0, ibad=0, istrg=0, bnum=1, xnum=1, rnok=1, enum=1, numb=0, i_mcs_↩ model=0, el_scatt='J', efac=0.917, electron_method_boundary=1.0e-3, ckvnum=0):

self.max_energy = emax self.prod_by_photons = ides self.photon_prod = iphot self.brem_dist = ibad self.straggling = istrg self.brem_mult = bnum self.xray_mult = xnum self.knock_on = rnok self.electron_multiplier = enum self.↩ brem_prod = numb self.clmb_scattering = i_mcs_model self.els_scattering = el_scatt self.stopping_power = efac self.single_event_energy = electron_method_boundary self.cerenkov = ckvnum

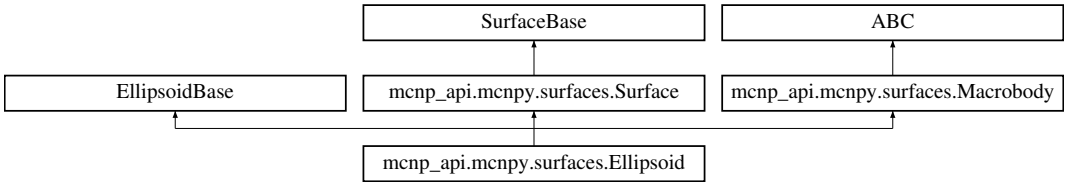
The documentation for this class was generated from the following file:

- physics.py

# 5.48 mcnp_api.mcnpy.surfaces.Ellipsoid Class Reference

An Ellipsoid defined by a 2 points/vectors and a radius.

Inheritance diagram for mcnp_api.mcnpy.surfaces.Ellipsoid:




## Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

## Public Attributes

- **name**
- **v1**
- **v2**
- **rm**
- **boundary_type**
- **comment**

### 5.48.1 Detailed Description

An Ellipsoid defined by a 2 points/vectors and a radius.

By default, `rm` is the major radius and `v1` and `v2` are the coordinates of the first and second focii. If `rm` $<$ `0` (meaning `rm` is now the minor radius), then `v1` is the coordinates of the ellipsoid's center and `v2` is its major axis vector.

### 5.48.2 Member Function Documentation

#### 5.48.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.Ellipsoid.get_coefficients (
            self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

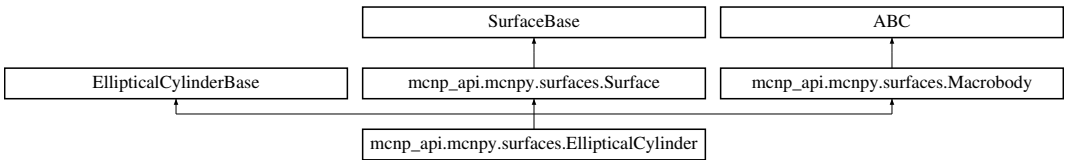
The documentation for this class was generated from the following file:

- surfaces.py

## 5.49 mcnp_api.mcnpy.surfaces.EllipticalCylinder Class Reference

Right Elliptical Cylinder defined by a `base` point, `axis` height vector, ellipse major axis vector `v1`, and ellipse minor axis vector `v1` or radius `r`.

Inheritance diagram for mcnp_api.mcnpy.surfaces.EllipticalCylinder:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **base**
- **axis**
- **v1**
- **v2**
- **rm**
- **boundary_type**
- **comment**

### 5.49.1 Detailed Description

Right Elliptical Cylinder defined by a `base` point, `axis` height vector, ellipse major axis vector `v1`, and ellipse minor axis vector `v1` or radius `r`.

### 5.49.2 Member Function Documentation

#### 5.49.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.EllipticalCylinder.get_coefficients (
            self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

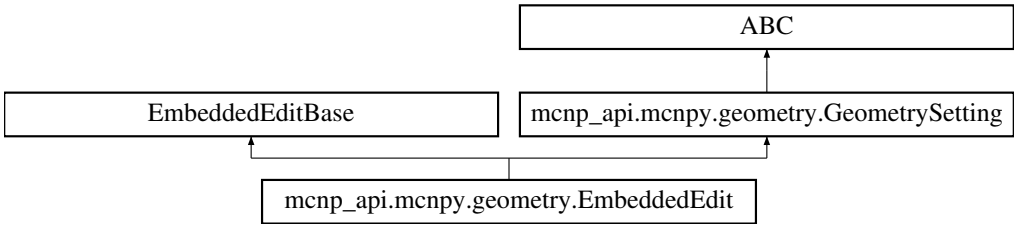
The documentation for this class was generated from the following file:

- surfaces.py

## 5.50 mcnp_api.mcnpy.geometry.EmbeddedEdit Class Reference

EMBEE.

Inheritance diagram for mcnp_api.mcnpy.geometry.EmbeddedEdit:




### 5.50.1 Detailed Description

EMBEE.

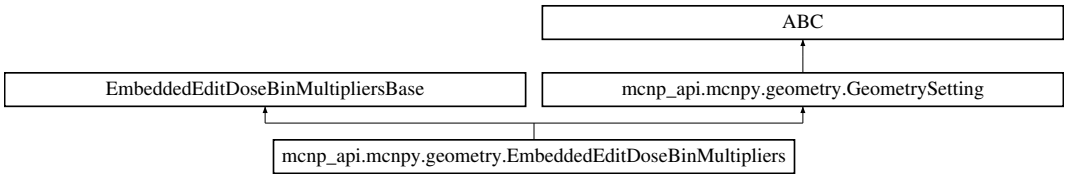
The documentation for this class was generated from the following file:

- geometry.py

## 5.51 mcnp_api.mcnpy.geometry.EmbeddedEditDoseBinMultipliers Class Reference

EMBDF.

Inheritance diagram for mcnp_api.mcnpy.geometry.EmbeddedEditDoseBinMultipliers:




### 5.51.1 Detailed Description

EMBDF.

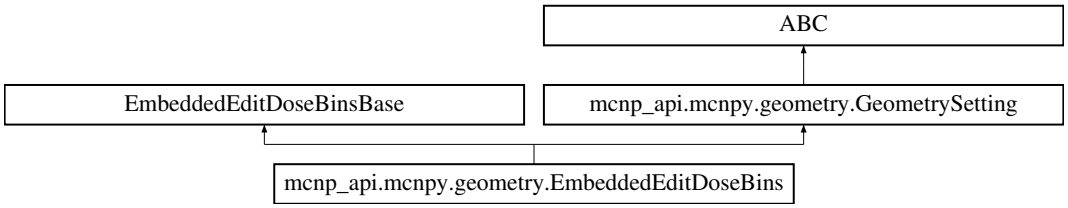
The documentation for this class was generated from the following file:

- geometry.py

## 5.52 mcnp_api.mcnpy.geometry.EmbeddedEditDoseBins Class Reference

EMBDE.

Inheritance diagram for mcnp_api.mcnpy.geometry.EmbeddedEditDoseBins:




### 5.52.1 Detailed Description

EMBDE.

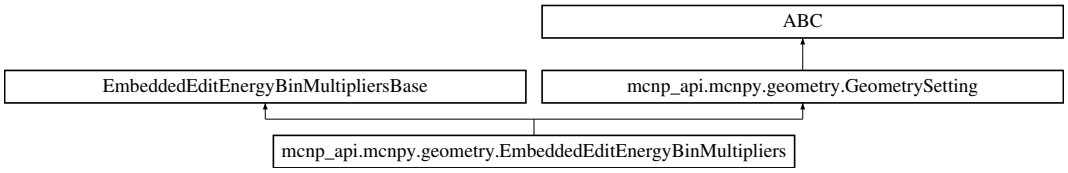
The documentation for this class was generated from the following file:

- geometry.py

## 5.53 mcnp_api.mcnpy.geometry.EmbeddedEditEnergyBinMultipliers Class Reference

EMBEM.

Inheritance diagram for mcnp_api.mcnpy.geometry.EmbeddedEditEnergyBinMultipliers:




### 5.53.1 Detailed Description

EMBEM.

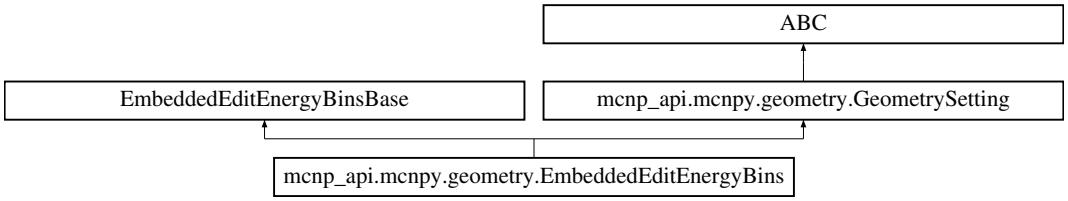
The documentation for this class was generated from the following file:

- geometry.py

## 5.54 mcnp_api.mcnpy.geometry.EmbeddedEditEnergyBins Class Reference

EMBEB.

Inheritance diagram for mcnp_api.mcnpy.geometry.EmbeddedEditEnergyBins:




### 5.54.1 Detailed Description

EMBEB.

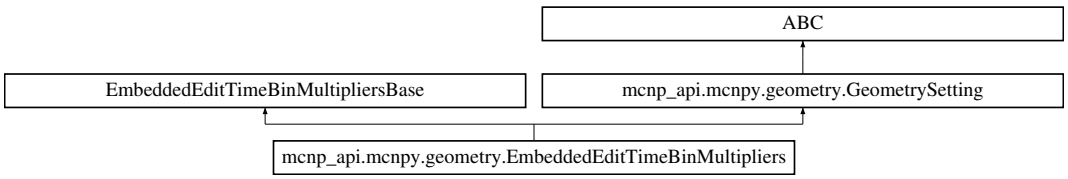
The documentation for this class was generated from the following file:

- geometry.py

## 5.55 mcnp_api.mcnpy.geometry.EmbeddedEditTimeBinMultipliers Class Reference

EMBTM.

Inheritance diagram for mcnp_api.mcnpy.geometry.EmbeddedEditTimeBinMultipliers:




### 5.55.1 Detailed Description

EMBTM.

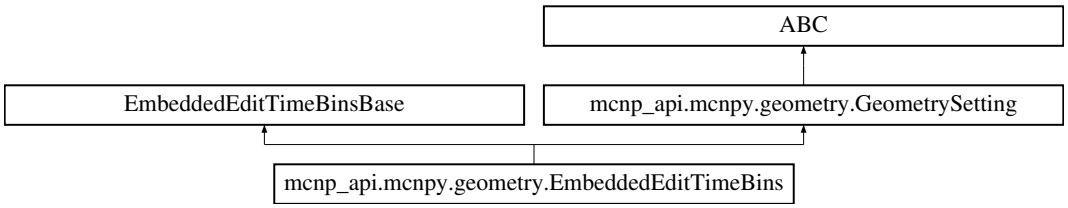
The documentation for this class was generated from the following file:

- geometry.py

## 5.56 mcnp_api.mcnpy.geometry.EmbeddedEditTimeBins Class Reference

EMBTB.

Inheritance diagram for mcnp_api.mcnpy.geometry.EmbeddedEditTimeBins:




### 5.56.1 Detailed Description

EMBTB.

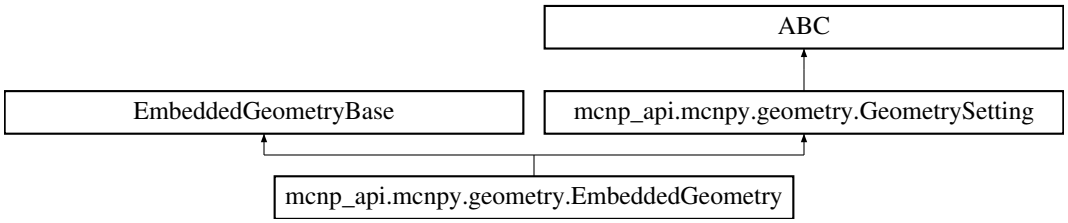
The documentation for this class was generated from the following file:

- geometry.py

## 5.57 mcnp_api.mcnpy.geometry.EmbeddedGeometry Class Reference

EMBED.

Inheritance diagram for mcnp_api.mcnpy.geometry.EmbeddedGeometry:




### 5.57.1 Detailed Description

EMBED.

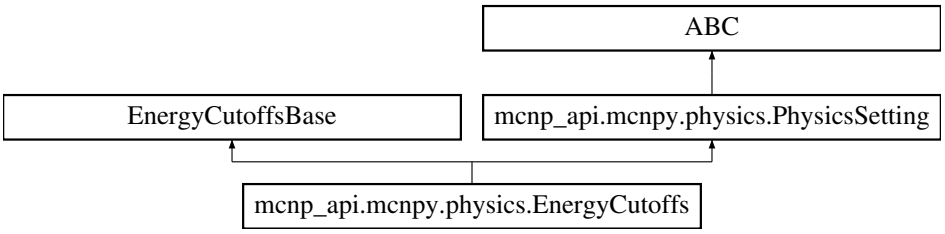
The documentation for this class was generated from the following file:

- geometry.py

## 5.58 mcnp_api.mcnpy.physics.EnergyCutoffs Class Reference

ELPT.

Inheritance diagram for mcnp_api.mcnpy.physics.EnergyCutoffs:




### 5.58.1 Detailed Description

ELPT.

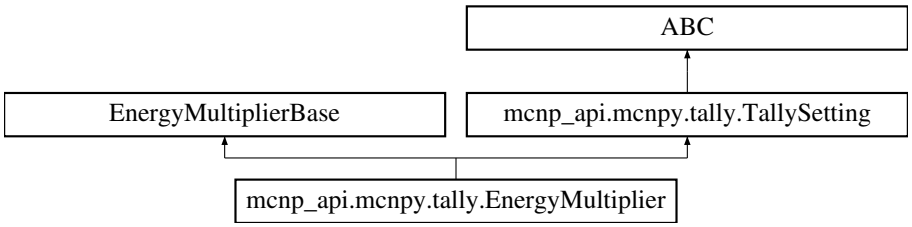
The documentation for this class was generated from the following file:

- physics.py

## 5.59 mcnp_api.mcnpy.tally.EnergyMultiplier Class Reference

EM.

Inheritance diagram for mcnp_api.mcnpy.tally.EnergyMultiplier:




### 5.59.1 Detailed Description

EM.

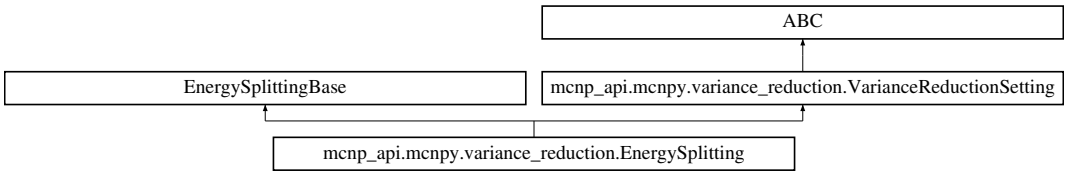
The documentation for this class was generated from the following file:

- tally.py

## 5.60 mcnp_api.mcnpy.variance_reduction.EnergySplitting Class Reference

ESPLT.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.EnergySplitting:




### 5.60.1 Detailed Description

ESPLT.

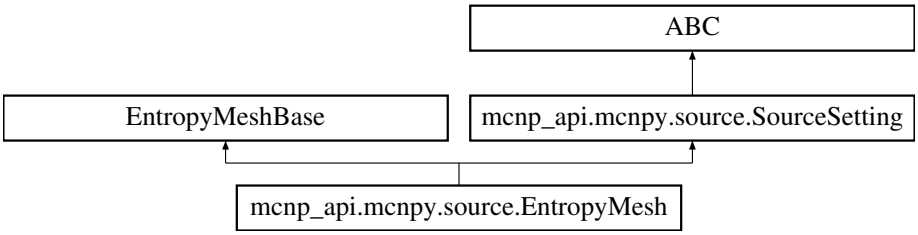
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.61 mcnp_api.mcnpy.source.EntropyMesh Class Reference

HSRC.

Inheritance diagram for mcnp_api.mcnpy.source.EntropyMesh:




### 5.61.1 Detailed Description

HSRC.

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

- source.py

## 5.62 EntryPoint Class Reference

### Public Member Functions

- String **printDeck** (Deck DECK)
- String **printCELLS** (Cells CELLS)
- Deck **loadFile** (String file)
- Deck **deckResource** (Deck deck, String filename)
- Deck **newDeck** (String filename)
- void **setup** ()

### Static Public Member Functions

- static void **main** (String[ ] args)

### Public Attributes

- ISerializer **serializer**
- ValidationTestHelper **validator**
- McnpPackage **ePackage** = McnpPackage.eINSTANCE
- Copier **copier** = new Copier(true)
- EqualityHelper **equalityHelper** = new EqualityHelper()
- ResourceSet **resourceSet**
- McnpFactory **factory** = McnpFactory.eINSTANCE

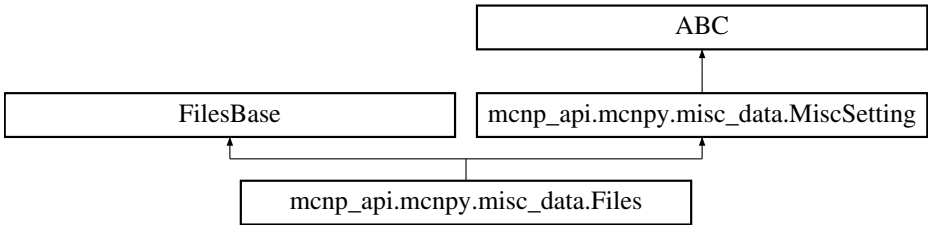
The documentation for this class was generated from the following file:

- EntryPoint.java

## 5.63 mcnp_api.mcnpy.misc_data.Files Class Reference

FILES.

Inheritance diagram for mcnp_api.mcnpy.misc_data.Files:




### 5.63.1 Detailed Description

FILES.

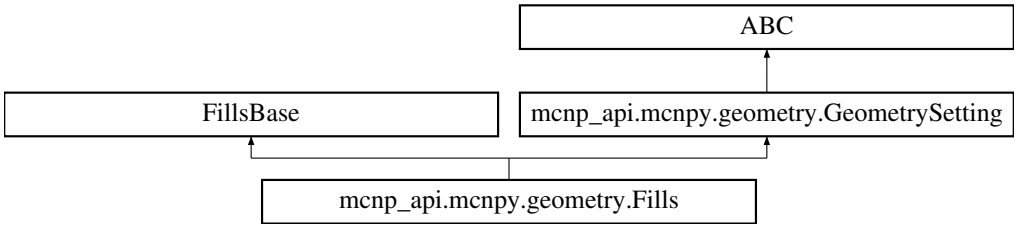
The documentation for this class was generated from the following file:

- misc_data.py

## 5.64 mcnp_api.mcnpy.geometry.Fills Class Reference

FILL.

Inheritance diagram for mcnp_api.mcnpy.geometry.Fills:




### 5.64.1 Detailed Description

FILL.

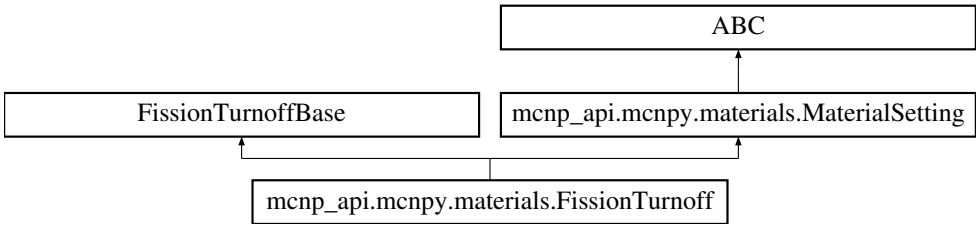
The documentation for this class was generated from the following file:

- geometry.py

## 5.65 mcnp_api.mcnpy.materials.FissionTurnoff Class Reference

NONU.

Inheritance diagram for mcnp_api.mcnpy.materials.FissionTurnoff:




### 5.65.1 Detailed Description

NONU.

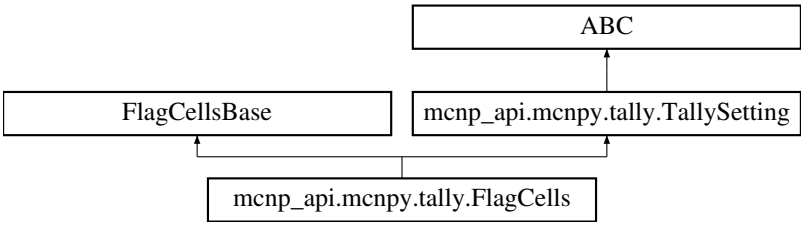
The documentation for this class was generated from the following file:

- materials.py

## 5.66 mcnp_api.mcnpy.tally.FlagCells Class Reference

CF.

Inheritance diagram for mcnp_api.mcnpy.tally.FlagCells:




### 5.66.1 Detailed Description

CF.

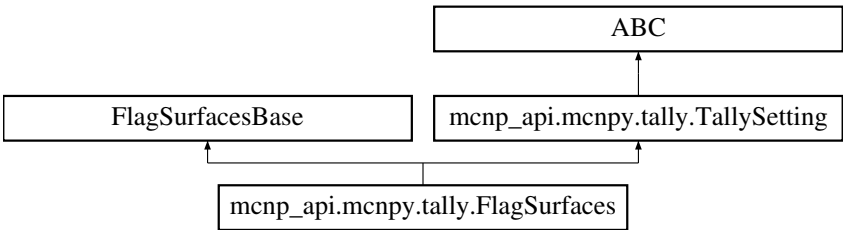
The documentation for this class was generated from the following file:

- tally.py

## 5.67 mcnp_api.mcnpy.tally.FlagSurfaces Class Reference

SF.

Inheritance diagram for mcnp_api.mcnpy.tally.FlagSurfaces:




### 5.67.1 Detailed Description

SF.

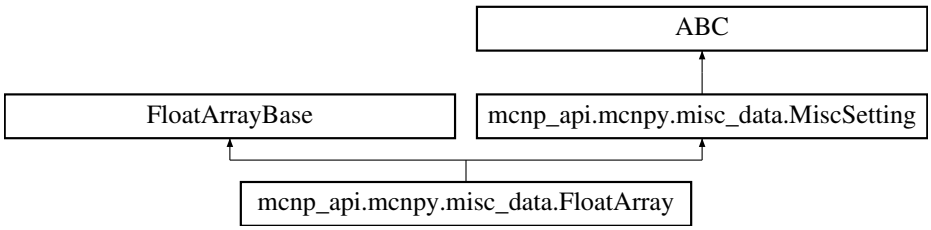
The documentation for this class was generated from the following file:

- tally.py

## 5.68 mcnp_api.mcnpy.misc_data.FloatArray Class Reference

RDUM.

Inheritance diagram for mcnp_api.mcnpy.misc_data.FloatArray:




### 5.68.1 Detailed Description

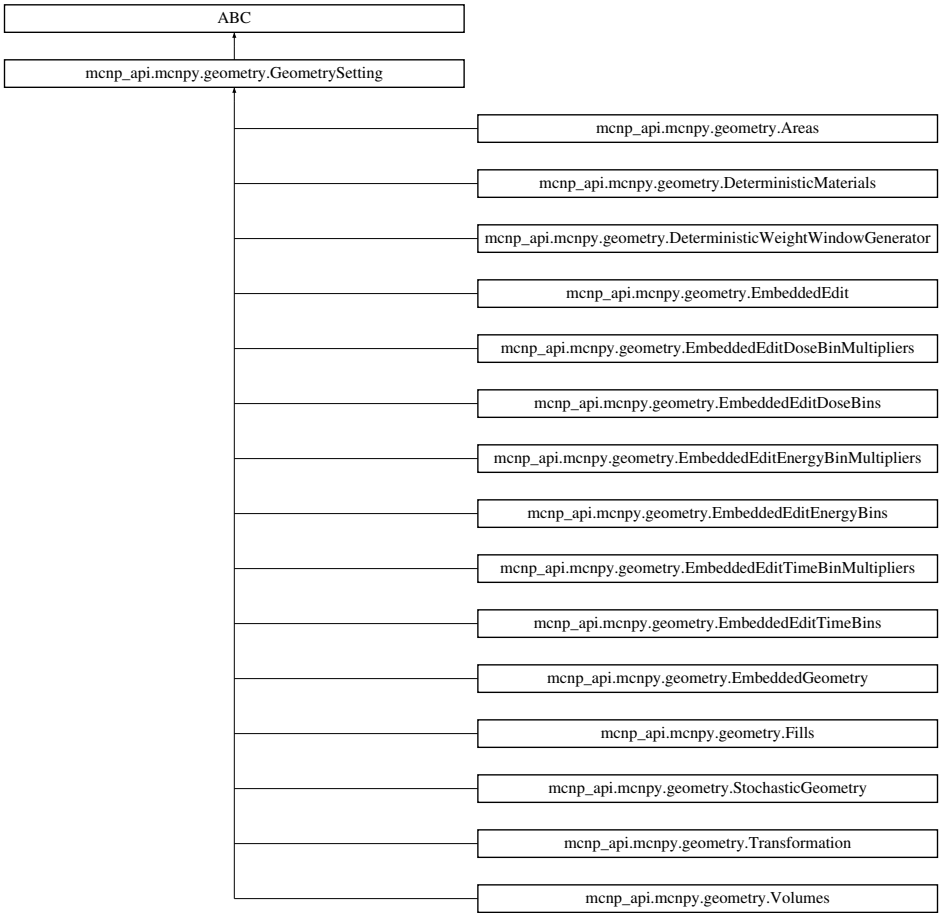
RDUM.

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

- misc_data.py

## 5.69 mcnp_api.mcnpy.geometry.GeometrySetting Class Reference

Inheritance diagram for mcnp_api.mcnpy.geometry.GeometrySetting:



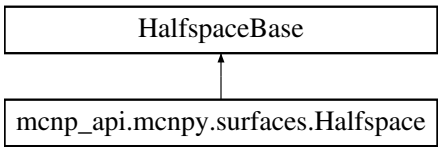
The documentation for this class was generated from the following file:

- geometry.py

## 5.70 mcnp_api.mcnpy.surfaces.Halfspace Class Reference

My custom halfspace class.

Inheritance diagram for mcnp_api.mcnpy.surfaces.Halfspace:




### Public Member Functions

- def **__and__** (self, other)
- def **__or__** (self, other)
- def **__invert__** (self)
- def **__str__** (self)
- def **__repr__** (self)
- def get_surfaces (self, surfaces=None)

  *Returns the surface that this is a halfspace of.*
- def remove_redundant_surfaces (self, redundant_surfaces)

  *Recursively remove all redundant surfaces referenced by this region.*

### Public Attributes

- **side**
- **surface**

### 5.70.1 Detailed Description

My custom halfspace class.

### 5.70.2 Member Function Documentation

#### 5.70.2.1 get_surfaces()

```
def mcnp_api.mcnpy.surfaces.Halfspace.get_surfaces (
              self,
              surfaces = None )
```

Returns the surface that this is a halfspace of.

#### 5.70.2.2 Parameters

surfaces: collections.OrderedDict, optional Dictionary mapping surface IDs to :class:`mcnpy.Surface` instances

#### 5.70.2.3 Returns

surfaces: collections.OrderedDict Dictionary mapping surface IDs to :class:`mcnpy.Surface` instances

#### 5.70.2.4 remove_redundant_surfaces()

```
def mcnp_api.mcnpy.surfaces.Halfspace.remove_redundant_surfaces (
              self,
              redundant_surfaces )
```

Recursively remove all redundant surfaces referenced by this region.

```
    Parameters
    ----------
    redundant_surfaces : dict
        Dictionary mapping redundant surface IDs to surface IDs for the
        :class:`mcnpy.Surface` instances that should replace them.
```

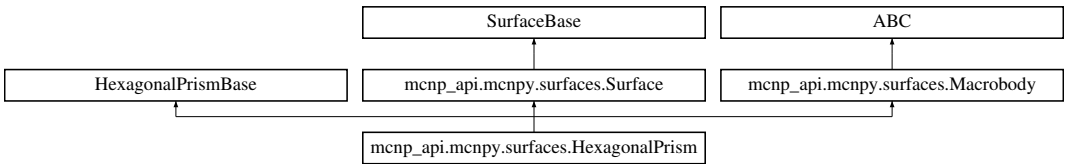
The documentation for this class was generated from the following file:

- surfaces.py

## 5.71 mcnp_api.mcnpy.surfaces.HexagonalPrism Class Reference

Right Hexagonal Prism defined by a `base` point, `height` vector, and facet vectors `facet1`, `facet2`, and `facet3`.

Inheritance diagram for mcnp_api.mcnpy.surfaces.HexagonalPrism:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **base**
- **height**
- **facet1**
- **facet2**
- **facet3**
- **boundary_type**
- **comment**

### 5.71.1 Detailed Description

Right Hexagonal Prism defined by a `base` point, `height` vector, and facet vectors `facet1`, `facet2`, and `facet3`.

The second and third facet vectors are optional.

### 5.71.2 Member Function Documentation

#### 5.71.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.HexagonalPrism.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

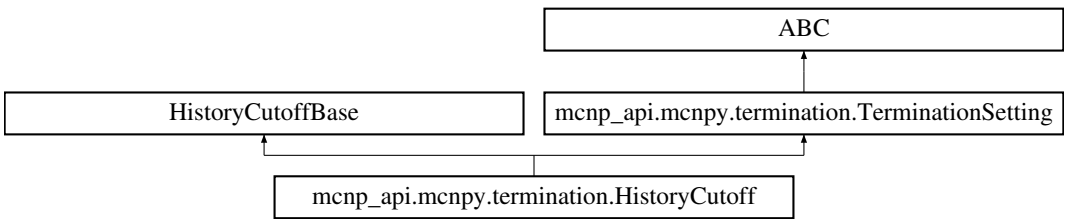
The documentation for this class was generated from the following file:

- surfaces.py

## 5.72 mcnp_api.mcnpy.termination.HistoryCutoff Class Reference

NPS.

Inheritance diagram for mcnp_api.mcnpy.termination.HistoryCutoff:



### 5.72.1 Detailed Description

NPS.

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

- termination.py

## 5.73 mcnp_api.mcnpy.material_helper.Human Class Reference

Homogenized material equivalent to an average human male.

### Public Member Functions

- def **__init__** (self, name, comment=None)

### Public Attributes

- **name**
- **comment**
- **nuclides**
- **density**
- **density_unit**
- **material**

### 5.73.1 Detailed Description

Homogenized material equivalent to an average human male.

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

- material_helper.py

## 5.74 mcnp_api.mcnpy.input_deck.InputDeck Class Reference

An object containing dicts for cells, surfaces, and materials.

## Public Member Functions

- def **__init__** (self, cells=None, surfaces=None, materials=None, geom_settings=None, mat_settings=None, out_settings=None, misc_settings=None, src_settings=None, phys_settings=None, vr_settings=None, tally↩ _settings=None, tallies=None, term_settings=None, settings=None, transformations=None, universes=None)
- def **import_from_file** (self, filename='inp.mcnp', renumber=False, preprocess=False)

  *For reading a deck from a file.*
- def direct_export (self, title=None)

  *For serializing the original deck.*
- def export (self, filename='inp.mcnp', title=None, renumber=False)

  *For exporting to a textual MCNP input file.*
- def **__repr__** (self)
- def **get_universe** (self, cell)
- def **add** (self, card)

  *Add a card to the deck.*
- def **remove** (self, card)

  *Remove a card from the deck.*
- def **add_all** (self, cards)

  *Add a list of cards to the deck.*
- def **remove_all** (self, cards)

  *Remove a list of cards from the deck.*
- def get_all_surfaces (self)

  *Return all surfaces used in the geometry.*
- def get_redundant_surfaces (self)

  *Return all of the topologically redundant surface IDs.*
- def **remove_redundant_surfaces** (self)

  *Remove redundant surfaces from the geometry.*
- def **remove_unused_surfaces** (self)

  *Removes any surface cards that are unused from the deck.*

## Public Attributes

- **cells**
- **surfaces**
- **settings**
- **transformations**
- **geom_settings**
- **mat_settings**
- **out_settings**
- **misc_settings**
- **src_settings**
- **phys_settings**
- **vr_settings**
- **tally_settings**
- **tallies**
- **term_settings**
- **materials**
- **universes**
- **deck**
- **serialized**

### 5.74.1 Detailed Description

An object containing dicts for cells, surfaces, and materials.

Most other data cards are stored as lists.

### 5.74.2 Member Function Documentation

#### 5.74.2.1 direct_export()

```
def mcnp_api.mcnpy.input_deck.InputDeck.direct_export (
              self,
              title = None )
```

For serializing the original deck.

Will preserve comments and most user formatting. Line comments may conflict with additions to an existing card. Only call this when your modifications are complete.

#### 5.74.2.2 export()

```
def mcnp_api.mcnpy.input_deck.InputDeck.export (
              self,
              filename = 'inp.mcnp',
              title = None,
              renumber = False )
```

For exporting to a textual MCNP input file.

As of now, it exports to a string.

#### 5.74.2.3 get_all_surfaces()

```
def mcnp_api.mcnpy.input_deck.InputDeck.get_all_surfaces (
              self )
```

Return all surfaces used in the geometry.

#### 5.74.2.4 Returns

collections.OrderedDict Dictionary mapping surface IDs to :class:`mcnpy.Surface` instances

#### 5.74.2.5 get_redundant_surfaces()

```
def mcnp_api.mcnpy.input_deck.InputDeck.get_redundant_surfaces (
              self )
```

Return all of the topologically redundant surface IDs.

```
    Returns
    -------
    dict
        Dictionary whose keys are the ID of a redundant surface and whose
        values are the topologically equivalent :class:`mcnpy.Surface`
        that should replace it.
```

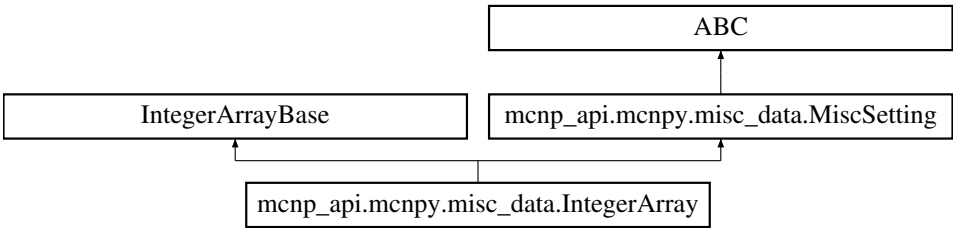
The documentation for this class was generated from the following file:

- input_deck.py

## 5.75 mcnp_api.mcnpy.misc_data.IntegerArray Class Reference

IDUM.

Inheritance diagram for mcnp_api.mcnpy.misc_data.IntegerArray:




### 5.75.1 Detailed Description

IDUM.

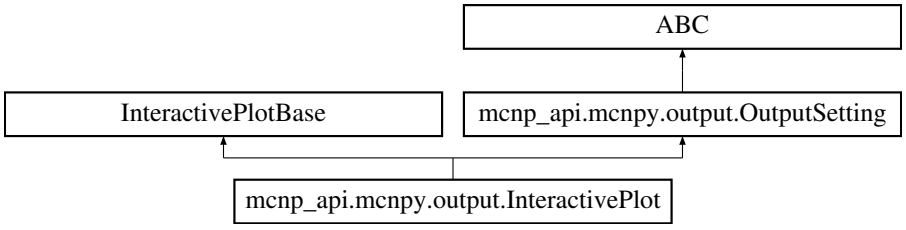
The documentation for this class was generated from the following file:

- misc_data.py

## 5.76 mcnp_api.mcnpy.output.InteractivePlot Class Reference

MPLOT.

Inheritance diagram for mcnp_api.mcnpy.output.InteractivePlot:



### 5.76.1 Detailed Description

MPLOT.

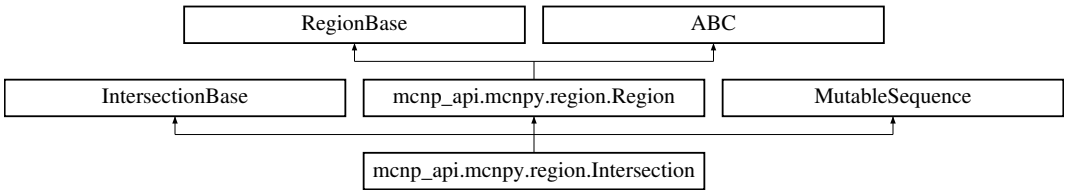
The documentation for this class was generated from the following file:

- output.py

## 5.77 mcnp_api.mcnpy.region.Intersection Class Reference

My custom intersection class.

Inheritance diagram for mcnp_api.mcnpy.region.Intersection:




### Public Member Functions

- def __and__ (self, other)
- def **__iand__** (self, other)
- def **__getitem__** (self, key)
- def **__setitem__** (self, key, value)
- def **__delitem__** (self, key)
- def **__len__** (self)
- def **insert** (self, index, value)
- def **__str__** (self)

### Public Attributes

- **nodes**

### 5.77.1 Detailed Description

My custom intersection class.

### 5.77.2 Member Function Documentation

#### 5.77.2.1 __and__()

```
def mcnp_api.mcnpy.region.Intersection.__and__ (
              self,
              other )
```

Reimplemented from mcnp_api.mcnpy.region.Region.

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

- region.py

## 5.78 mcnp_api.mcnpy.lattice.Lattice Class Reference

### Public Member Functions

- def __init__ (self, i=[ ], j=[ ], k=[ ], lattice=None, type='REC', universes=None, transforms=None, transformations=None)

  *Class for lattices.*
- def **flatten** (self)

  *Flattens the provided lattice.*
- def rings (self)

  *For HEX lattices.*
- def **__repr__** (self)

### Public Attributes

- **dims**
- **i**
- **j**
- **k**
- **type**
- **transforms**
- **transformations**
- **size**
- **lattice**
- **universes**

### 5.78.1 Constructor & Destructor Documentation

#### 5.78.1.1 __init__()

```
def mcnp_api.mcnpy.lattice.Lattice.__init__ (
              self,
              i = [],
              j = [],
              k = [],
              lattice = None,
              type = 'REC',
              universes = None,
              transforms = None,
              transformations = None )
```

Class for lattices.

Defined by max indicies `i`, `j`, `k`, and a 3D array `lattice`. The array should be defined uning `numpy.array()` where `k` indicies are your outermost dimension followed by `j` and `i`. Elements of `lattice` can be `Universe` objects or simply their IDs. For the latter, `universes = dict()` where its keys are universe IDs and its values are the `Universe` objects.

### 5.78.2 Member Function Documentation

#### 5.78.2.1 rings()

```
def mcnp_api.mcnpy.lattice.Lattice.rings (
              self )
```

For HEX lattices.

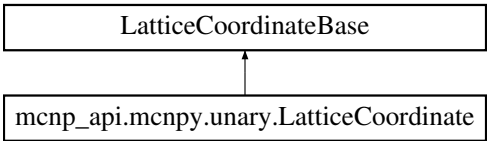
Lattice must have equal X and Y dimensions. Returns a list of rings describing the lattice.

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

- lattice.py

## 5.79 mcnp_api.mcnpy.unary.LatticeCoordinate Class Reference

Inheritance diagram for mcnp_api.mcnpy.unary.LatticeCoordinate:




### Public Member Functions

- def **__str__** (self)

### Public Attributes

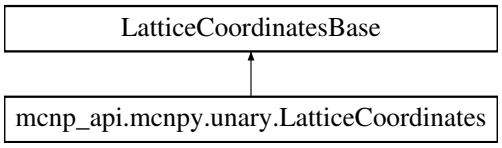
- **i**
- **j**
- **k**

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

- unary.py

## 5.80 mcnp_api.mcnpy.unary.LatticeCoordinates Class Reference

Inheritance diagram for mcnp_api.mcnpy.unary.LatticeCoordinates:




### Public Member Functions

- def **__str__** (self)

### Public Attributes

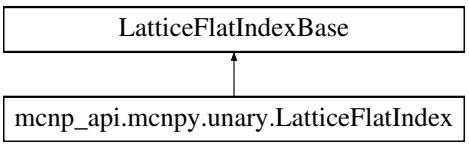
- **coordinates**

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

- unary.py

## 5.81 mcnp_api.mcnpy.unary.LatticeFlatIndex Class Reference

Inheritance diagram for mcnp_api.mcnpy.unary.LatticeFlatIndex:




### Public Member Functions

- def **__str__** (self)

### Public Attributes

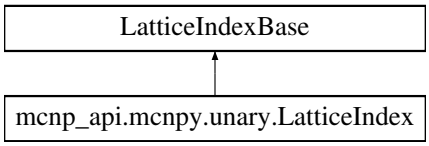
- **i**

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

- unary.py

## 5.82 mcnp_api.mcnpy.unary.LatticeIndex Class Reference

Inheritance diagram for mcnp_api.mcnpy.unary.LatticeIndex:




### Public Attributes

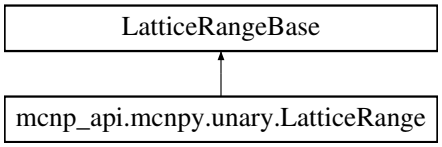
- **index**
- **universe**

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

- unary.py

## 5.83 mcnp_api.mcnpy.unary.LatticeRange Class Reference

Inheritance diagram for mcnp_api.mcnpy.unary.LatticeRange:




### Public Member Functions

- def **__str__** (self)

### Public Attributes

- **i0**
- **i1**
- **j0**
- **j1**
- **k0**
- **k1**

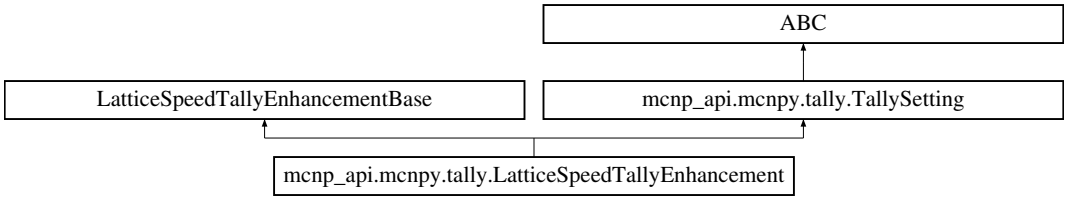
The documentation for this class was generated from the following file:

- unary.py

## 5.84 mcnp_api.mcnpy.tally.LatticeSpeedTallyEnhancement Class Reference

SPDTL.

Inheritance diagram for mcnp_api.mcnpy.tally.LatticeSpeedTallyEnhancement:




### 5.84.1 Detailed Description

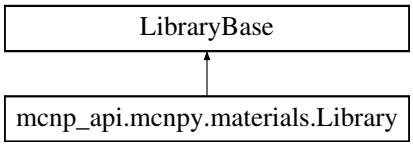
SPDTL.

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

- tally.py

## 5.85 mcnp_api.mcnpy.materials.Library Class Reference

Inheritance diagram for mcnp_api.mcnpy.materials.Library:



### Public Member Functions

- def **__str__** (self)

### Public Attributes

- **library**
- **quantity**

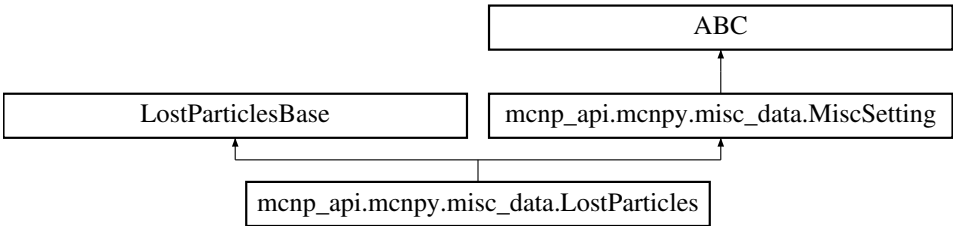
The documentation for this class was generated from the following file:

- materials.py

## 5.86 mcnp_api.mcnpy.misc_data.LostParticles Class Reference

LOST.

Inheritance diagram for mcnp_api.mcnpy.misc_data.LostParticles:




### 5.86.1 Detailed Description

LOST.

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

- misc_data.py

## 5.87 mcnp_api.mcnpy.material_helper.LWTR_Moderator Class Reference

Stainless steel cladding from RPI's RCF.

### Public Member Functions

- def **__init__** (self, name, comment=None)

### Public Attributes

- **name**
- **comment**
- **nuclides**
- **density**
- **density_unit**
- **material**

### 5.87.1 Detailed Description

Stainless steel cladding from RPI's RCF.

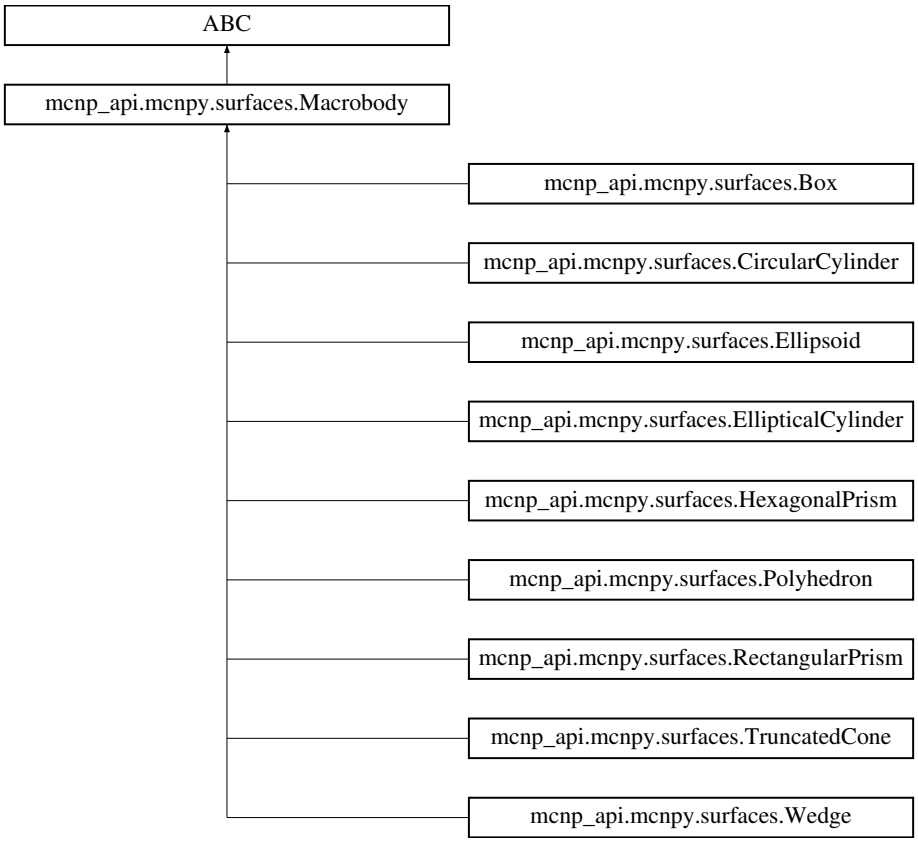
The documentation for this class was generated from the following file:

- material_helper.py

## 5.88 mcnp_api.mcnpy.surfaces.Macrobody Class Reference

All macrobodies with facets.

Inheritance diagram for mcnp_api.mcnpy.surfaces.Macrobody:



### Public Member Functions

- def **facets** (self, int facet)

### Public Attributes

- **facet**

### 5.88.1 Detailed Description

All macrobodies with facets.

Excludes Sphere and Ellipsoid.

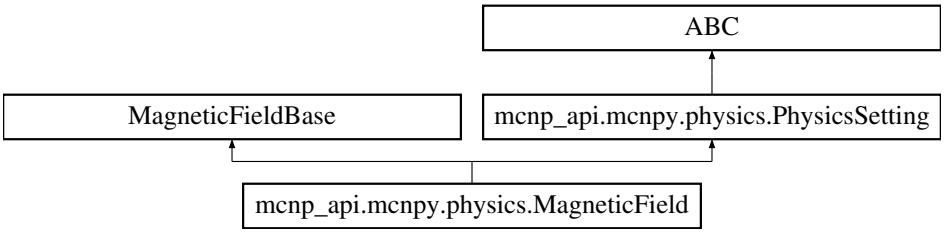
The documentation for this class was generated from the following file:

- surfaces.py

## 5.89 mcnp_api.mcnpy.physics.MagneticField Class Reference

BFLD.

Inheritance diagram for mcnp_api.mcnpy.physics.MagneticField:




### 5.89.1 Detailed Description

BFLD.

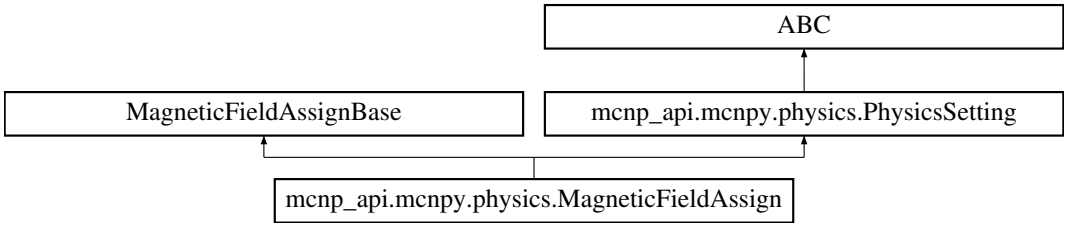
The documentation for this class was generated from the following file:

- physics.py

## 5.90 mcnp_api.mcnpy.physics.MagneticFieldAssign Class Reference

BFLCL.

Inheritance diagram for mcnp_api.mcnpy.physics.MagneticFieldAssign:




### 5.90.1 Detailed Description

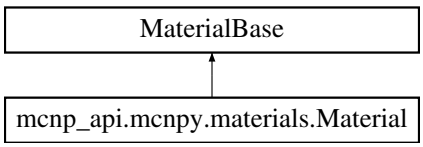
BFLCL.

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

- physics.py

## 5.91 mcnp_api.mcnpy.materials.Material Class Reference

Inheritance diagram for mcnp_api.mcnpy.materials.Material:




### Public Member Functions

- def **fraction_unit** (self, unit)

### Public Attributes

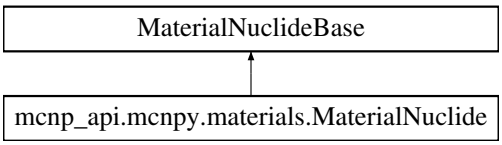
- **name**
- **nuclides**
- **comment**

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

- materials.py

## 5.92 mcnp_api.mcnpy.materials.MaterialNuclide Class Reference

Inheritance diagram for mcnp_api.mcnpy.materials.MaterialNuclide:




### Public Member Functions

- def **element_name** (self)
- def **__str__** (self)
- def **__repr__** (self)

### Public Attributes

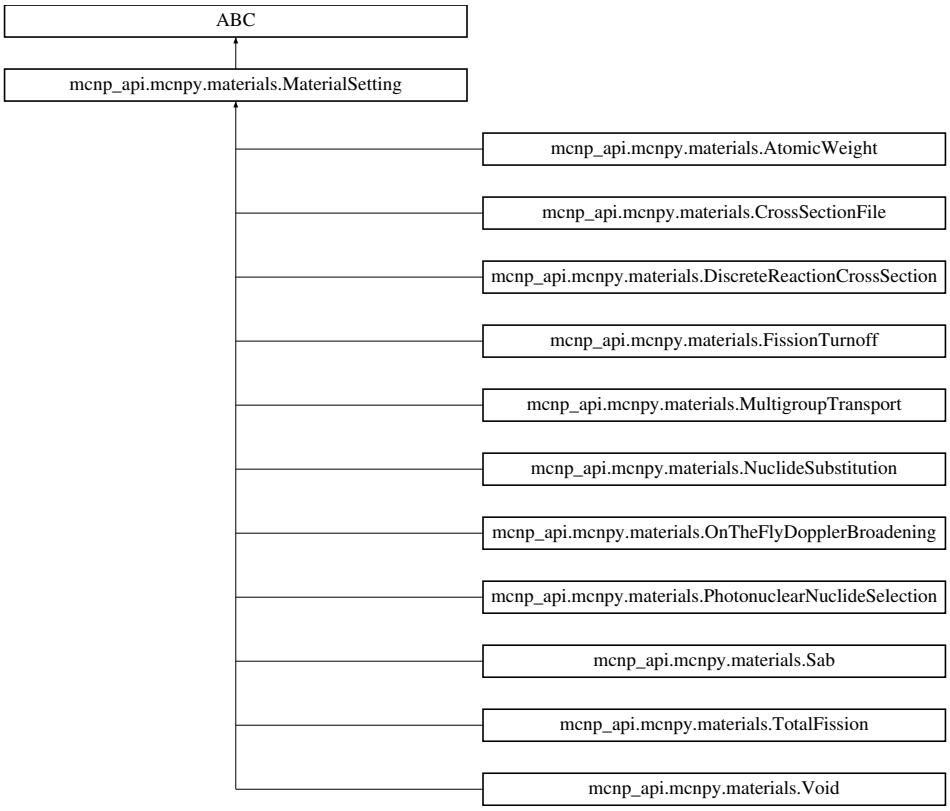
- **name**
- **fraction**
- **unit**
- **library**

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

- materials.py

## 5.93 mcnp_api.mcnpy.materials.MaterialSetting Class Reference

Inheritance diagram for mcnp_api.mcnpy.materials.MaterialSetting:



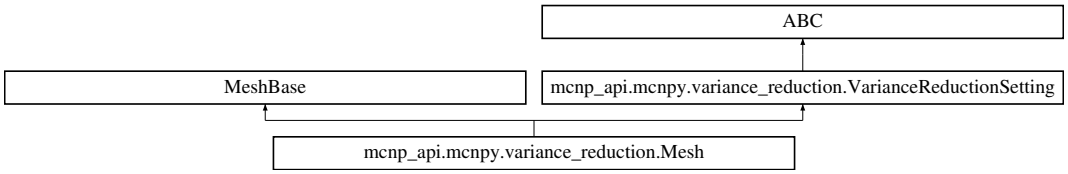

The documentation for this class was generated from the following file:

- materials.py

## 5.94 mcnp_api.mcnpy.variance_reduction.Mesh Class Reference

MESH.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.Mesh:




### 5.94.1 Detailed Description

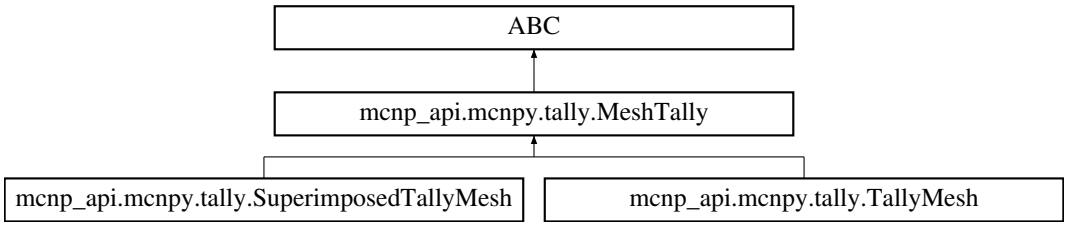
MESH.

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

- variance_reduction.py

## 5.95 mcnp_api.mcnpy.tally.MeshTally Class Reference

Inheritance diagram for mcnp_api.mcnpy.tally.MeshTally:

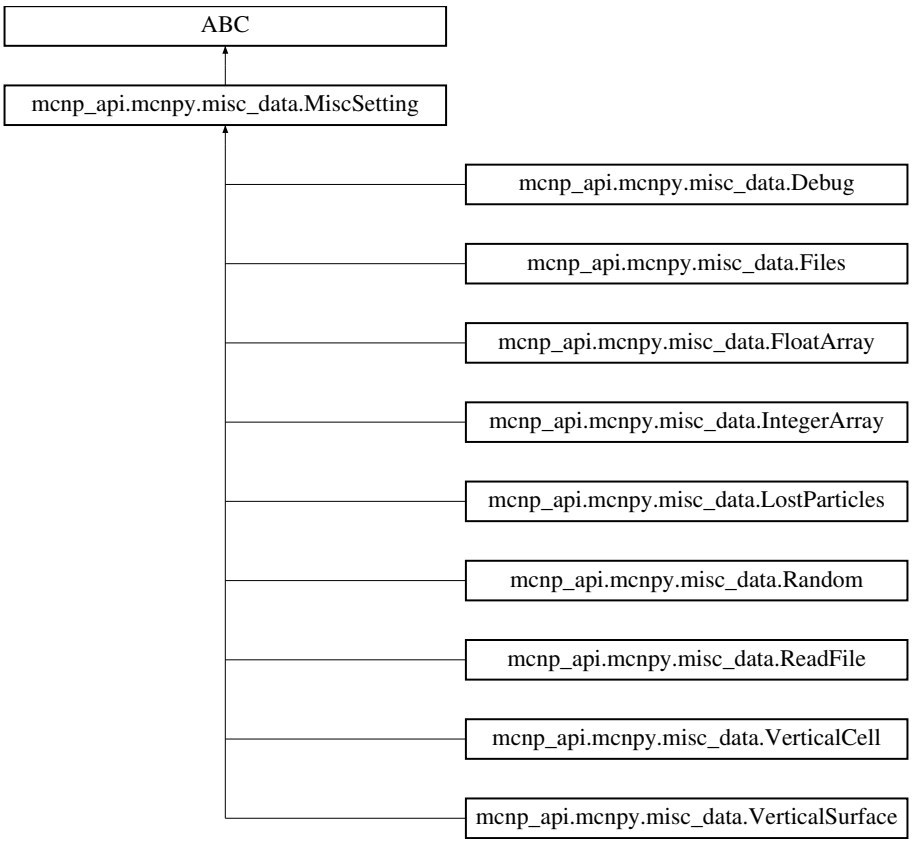



The documentation for this class was generated from the following file:

- tally.py

## 5.96 mcnp_api.mcnpy.misc_data.MiscSetting Class Reference

Inheritance diagram for mcnp_api.mcnpy.misc_data.MiscSetting:



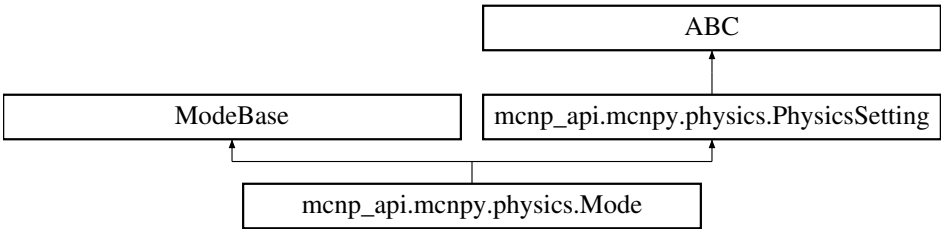

The documentation for this class was generated from the following file:

- misc_data.py

## 5.97 mcnp_api.mcnpy.physics.Mode Class Reference

Set particle physics modes.

Inheritance diagram for mcnp_api.mcnpy.physics.Mode:




### Public Member Functions

- def **__str__** (self)
- def **__repr__** (self)

### Public Attributes

- **particles**

### 5.97.1 Detailed Description

Set particle physics modes.

```
PARAMETERS
----------
particles : list<particle>
```

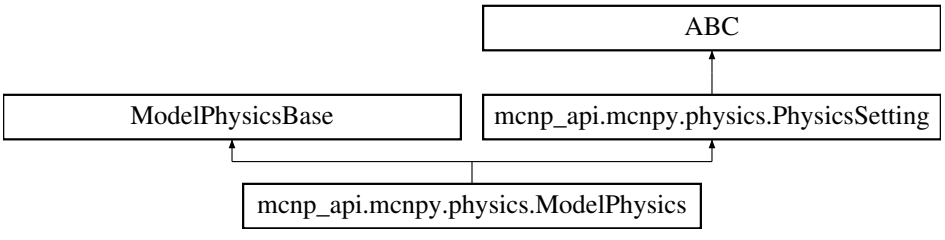
The documentation for this class was generated from the following file:

- physics.py

## 5.98 mcnp_api.mcnpy.physics.ModelPhysics Class Reference

MPHYS.

Inheritance diagram for mcnp_api.mcnpy.physics.ModelPhysics:



### 5.98.1 Detailed Description

MPHYS.

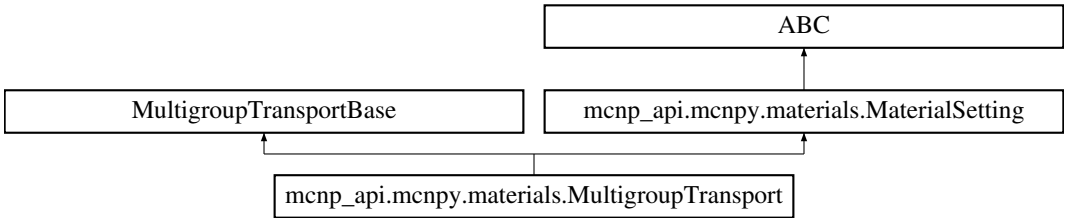
The documentation for this class was generated from the following file:

- physics.py

## 5.99 mcnp_api.mcnpy.materials.MultigroupTransport Class Reference

MGOPT.

Inheritance diagram for mcnp_api.mcnpy.materials.MultigroupTransport:




### 5.99.1 Detailed Description

MGOPT.

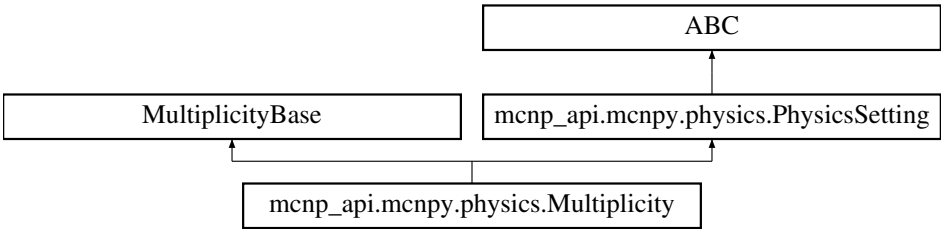
The documentation for this class was generated from the following file:

- materials.py

## 5.100 mcnp_api.mcnpy.physics.Multiplicity Class Reference

FMULT.

Inheritance diagram for mcnp_api.mcnpy.physics.Multiplicity:



### 5.100.1 Detailed Description

FMULT.

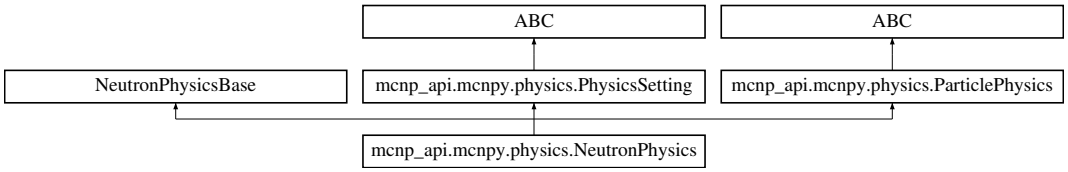
The documentation for this class was generated from the following file:

- physics.py

## 5.101 mcnp_api.mcnpy.physics.NeutronPhysics Class Reference

Neutron physics options.

Inheritance diagram for mcnp_api.mcnpy.physics.NeutronPhysics:




### Public Member Functions

- def **__str__** (self)
- def **__repr__** (self)

### 5.101.1 Detailed Description

Neutron physics options.

```
PARAMETERS
----------
emax : float (DEFAULT=100MeV)
emcnf : float (DEFAULT=0MeV)
iunr : 0 or 1 (DEFAULT=0)
colif : float (DEFAULT=0)
cut : float (DEFAULT=-1)
ngam : 0, 1, or 2 (DEFAULT=1)
i_int_model : -1, 0, 1, or 2 (DEFAULT=0)
i_els_model : -1 or 0 (DEFAULT=0)
```

PROPERTIES = ['max_energy', 'max_analog', 'unresolved_resonance', 'recoil', 'phys_cutoff', 'photon_prod', 'interaction', 'els_scattering']

def _init(self, emax=100, emcnf=0, iunr=0, colif=0, cut=-1, ngam=1, i_int_model=0, i_els_model=0): self.max_↩ energy = emax self.max_analog = emcnf self.unresolved_resonance = iunr self.recoil = colif self.phys_cutoff = cut self.photon_prod = ngam self.interaction = i_int_model self.els_scattering = i_els_model

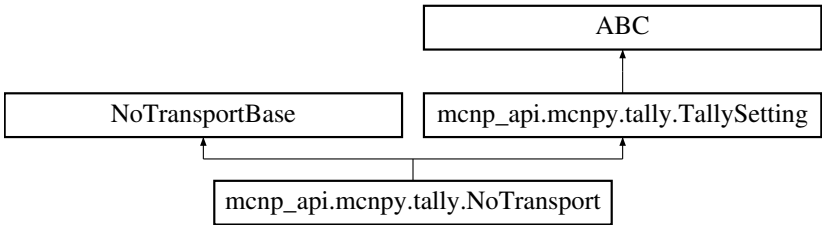
The documentation for this class was generated from the following file:

- physics.py

## 5.102 mcnp_api.mcnpy.tally.NoTransport Class Reference

NOTRN.

Inheritance diagram for mcnp_api.mcnpy.tally.NoTransport:




### 5.102.1 Detailed Description

NOTRN.

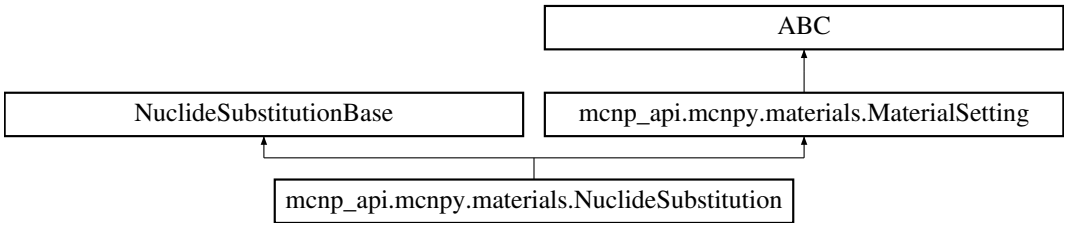
The documentation for this class was generated from the following file:

- tally.py

## 5.103 mcnp_api.mcnpy.materials.NuclideSubstitution Class Reference

MX.

Inheritance diagram for mcnp_api.mcnpy.materials.NuclideSubstitution:




### 5.103.1 Detailed Description

MX.

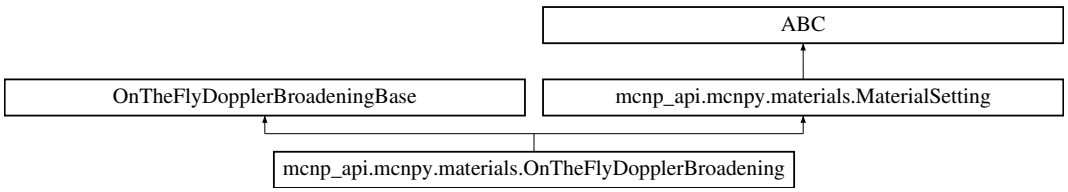
The documentation for this class was generated from the following file:

- materials.py

## 5.104 mcnp_api.mcnpy.materials.OnTheFlyDopplerBroadening Class Reference

OTFDB.

Inheritance diagram for mcnp_api.mcnpy.materials.OnTheFlyDopplerBroadening:




### 5.104.1 Detailed Description

OTFDB.

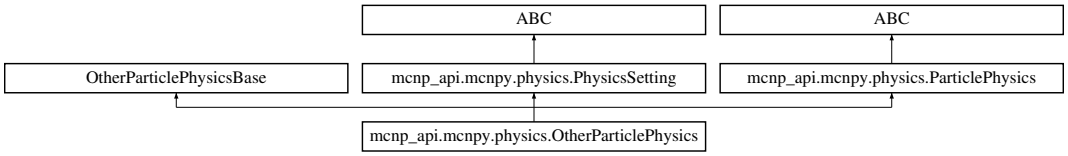
The documentation for this class was generated from the following file:

- materials.py

## 5.105 mcnp_api.mcnpy.physics.OtherParticlePhysics Class Reference

Other Particle physics options.

Inheritance diagram for mcnp_api.mcnpy.physics.OtherParticlePhysics:




### Public Member Functions

- def **__str__** (self)
- def **__repr__** (self)

### 5.105.1 Detailed Description

Other Particle physics options.

```
PARAMETERS
----------
particle : particle (other than N, P, E, H)
emax : float (DEFAULT=100MeV)
istrg : 0 or 1 (DEFAULT=0)
xmunum : -1 or 1 (DEFAULT=1)
xmugam : float (DEFAULT=0.65)
i_mcs_model : -1, 0, 1, 2 (DEFAULT=0)
i_int_model : -1, 0, 1, 2 (DEFAULT=0)
i_els_model : -1 or 0 (DEFAULT=0)
efac : float 0.8 to 0.99 (DEFAULT=0.917)
ckvnum : float (DEFAULT=0)
drp : float (DEFAULT=0MeV)
```

PROPERTIES = ['max_energy', 'straggling', 'muon_xrays', 'k_shell_photon', 'clmb_scattering', 'interaction', 'els_↩ scattering', 'stopping_power', 'cerenkov', 'delta_ray_cutoff']

def _init(self, particle, emax=100, istrg=0, xmunum=-1, xmugam=0.65, i_mcs_model=0, i_int_model=0, i_els_↩ model=0, efac=0.917, ckvnum=0, drp=0):

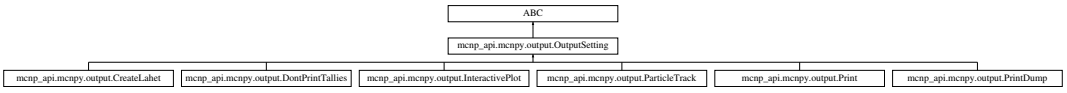
self.particle = particle self.max_energy = emax self.straggling = istrg self.muon_xrays = xmunum self.k_shell_↩ photon = xmugam self.clmb_scattering = i_mcs_model self.interaction = i_int_model self.els_scattering = i_els_↩ model self.stopping_power = efac self.cerenkov = ckvnum self.delta_ray_cutoff = drp

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

- physics.py

## 5.106 mcnp_api.mcnpy.output.OutputSetting Class Reference

Inheritance diagram for mcnp_api.mcnpy.output.OutputSetting:

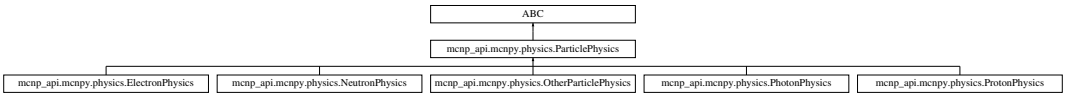



The documentation for this class was generated from the following file:

- output.py

## 5.107 mcnp_api.mcnpy.physics.ParticlePhysics Class Reference

Inheritance diagram for mcnp_api.mcnpy.physics.ParticlePhysics:



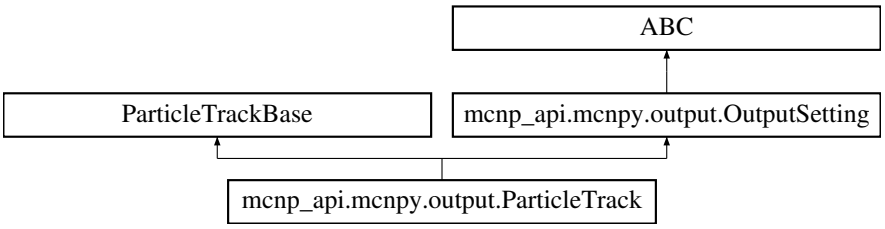

The documentation for this class was generated from the following file:

- physics.py

## 5.108 mcnp_api.mcnpy.output.ParticleTrack Class Reference

PTRAC.

Inheritance diagram for mcnp_api.mcnpy.output.ParticleTrack:




### 5.108.1 Detailed Description

PTRAC.

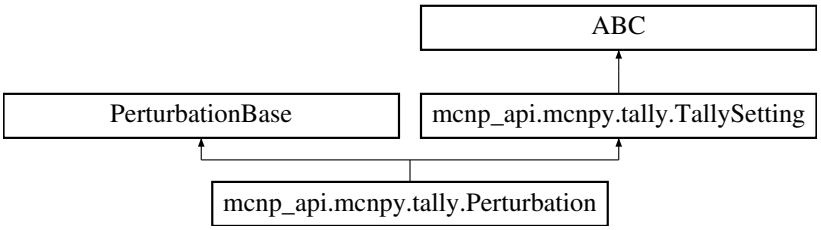
The documentation for this class was generated from the following file:

- output.py

## 5.109 mcnp_api.mcnpy.tally.Perturbation Class Reference

PERT.

Inheritance diagram for mcnp_api.mcnpy.tally.Perturbation:




### 5.109.1 Detailed Description

PERT.

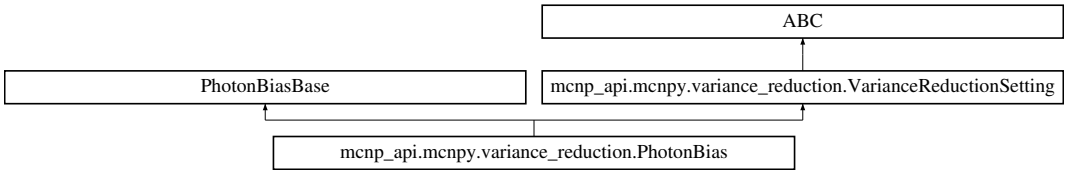
The documentation for this class was generated from the following file:

- tally.py

## 5.110 mcnp_api.mcnpy.variance_reduction.PhotonBias Class Reference

PIKMT.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.PhotonBias:




### 5.110.1 Detailed Description

PIKMT.

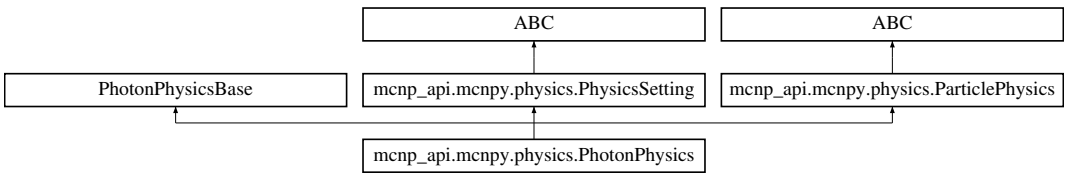
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.111 mcnp_api.mcnpy.physics.PhotonPhysics Class Reference

Photon physics options.

Inheritance diagram for mcnp_api.mcnpy.physics.PhotonPhysics:




### Public Member Functions

- def **__str__** (self)
- def **__repr__** (self)

### Static Public Attributes

- list PROPERTIES

### 5.111.1 Detailed Description

Photon physics options.

```
PARAMETERS
----------
empf : float (DEFAULT=100MeV)
ides : 0 or 1 (DEFAULT=0)
nocoh : 0 or 1 (DEFAULT=0)
ispn : -1, 0, or 1 (DEFAULT=0)
nodop : 0 or 1 (DEFAULT=0)
fism : 0 or 1 (DEFAULT=0)
```

### 5.111.2 Member Data Documentation

#### 5.111.2.1 PROPERTIES

```
list mcnp_api.mcnpy.physics.PhotonPhysics.PROPERTIES  [static]
```

**Initial value:**

```
=  ['max_energy',
               'particle_prod',
               'coh_scattering',
               'photonuclear',
               'doppler',
               'photofission']
```

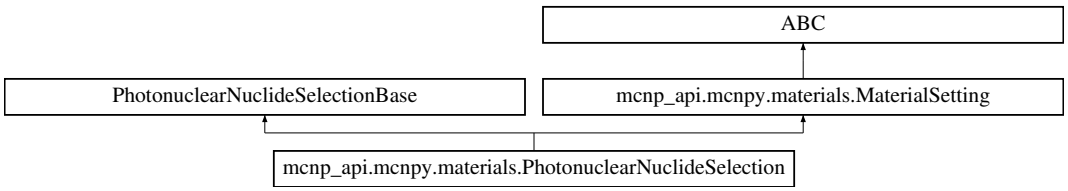
The documentation for this class was generated from the following file:

- physics.py

## 5.112 mcnp_api.mcnpy.materials.PhotonuclearNuclideSelection Class Reference

MPN.

Inheritance diagram for mcnp_api.mcnpy.materials.PhotonuclearNuclideSelection:




### 5.112.1 Detailed Description

MPN.

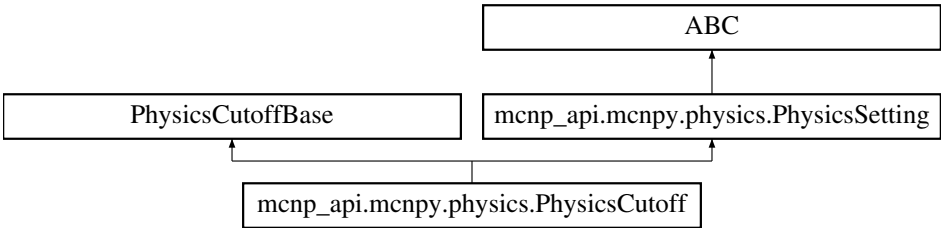
The documentation for this class was generated from the following file:

- materials.py

## 5.113 mcnp_api.mcnpy.physics.PhysicsCutoff Class Reference

CUT.

Inheritance diagram for mcnp_api.mcnpy.physics.PhysicsCutoff:




### 5.113.1 Detailed Description

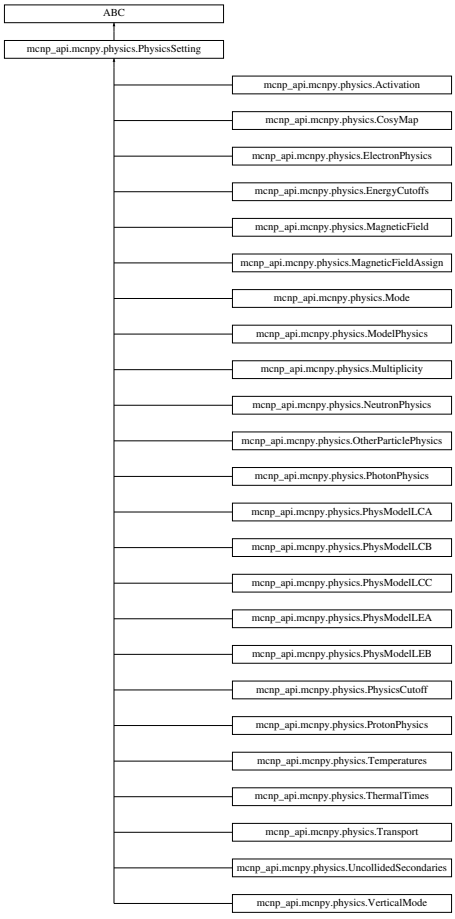
CUT.

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

- physics.py

## 5.114 mcnp_api.mcnpy.physics.PhysicsSetting Class Reference

Inheritance diagram for mcnp_api.mcnpy.physics.PhysicsSetting:



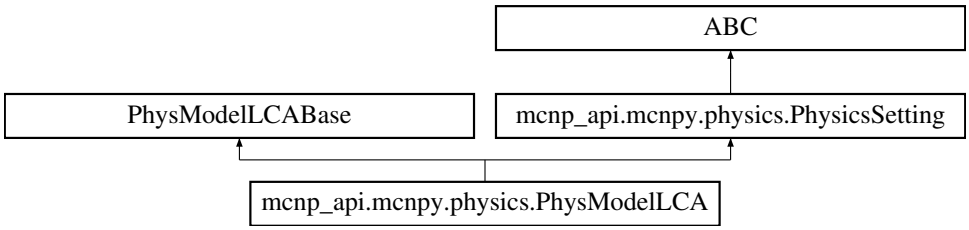
The documentation for this class was generated from the following file:

- physics.py

## 5.115 mcnp_api.mcnpy.physics.PhysModelLCA Class Reference

LCA.

Inheritance diagram for mcnp_api.mcnpy.physics.PhysModelLCA:




### 5.115.1 Detailed Description

LCA.

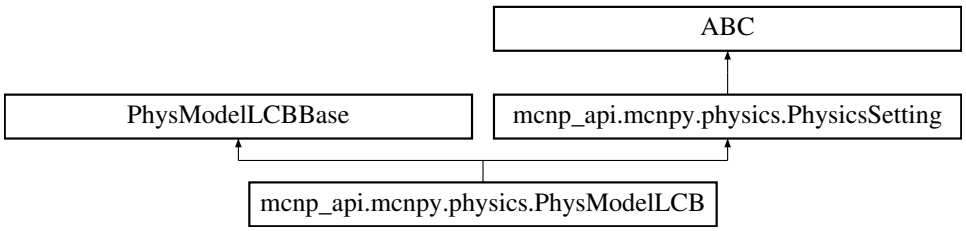
The documentation for this class was generated from the following file:

- physics.py

## 5.116 mcnp_api.mcnpy.physics.PhysModelLCB Class Reference

LCB.

Inheritance diagram for mcnp_api.mcnpy.physics.PhysModelLCB:




### 5.116.1 Detailed Description

LCB.

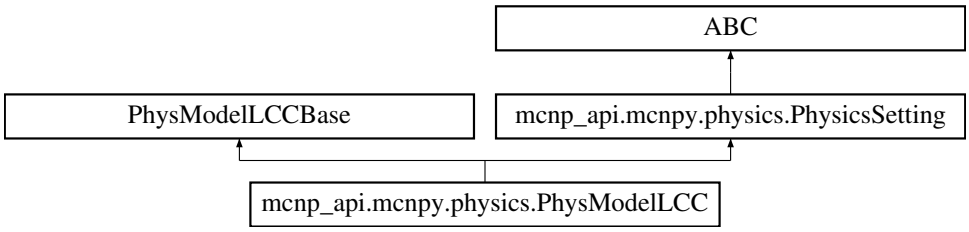
The documentation for this class was generated from the following file:

- physics.py

## 5.117 mcnp_api.mcnpy.physics.PhysModelLCC Class Reference

LCC.

Inheritance diagram for mcnp_api.mcnpy.physics.PhysModelLCC:




### 5.117.1 Detailed Description

LCC.

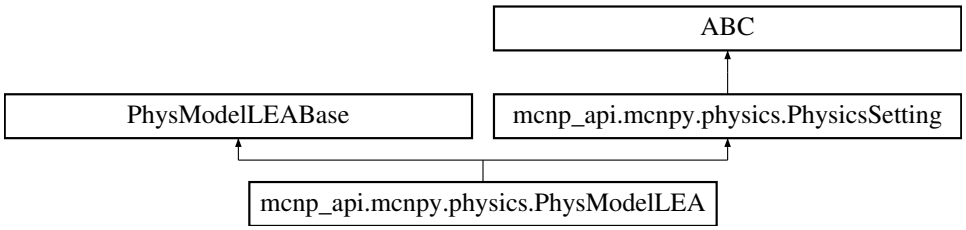
The documentation for this class was generated from the following file:

- physics.py

## 5.118 mcnp_api.mcnpy.physics.PhysModelLEA Class Reference

LEA.

Inheritance diagram for mcnp_api.mcnpy.physics.PhysModelLEA:




### 5.118.1 Detailed Description

LEA.

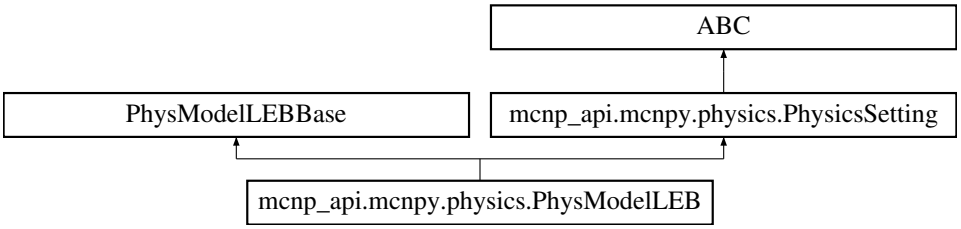
The documentation for this class was generated from the following file:

- physics.py

## 5.119 mcnp_api.mcnpy.physics.PhysModelLEB Class Reference

LEB.

Inheritance diagram for mcnp_api.mcnpy.physics.PhysModelLEB:




### 5.119.1 Detailed Description

LEB.

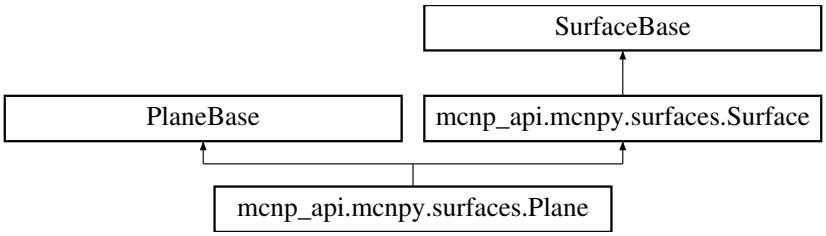
The documentation for this class was generated from the following file:

- physics.py

## 5.120 mcnp_api.mcnpy.surfaces.Plane Class Reference

A plane defined by Ax + By + Cz - D = 0.

Inheritance diagram for mcnp_api.mcnpy.surfaces.Plane:




### Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

### Public Attributes

- **name**
- **a**
- **b**
- **c**
- **d**
- **boundary_type**
- **comment**

### 5.120.1 Detailed Description

A plane defined by Ax + By + Cz - D = 0.

### 5.120.2 Member Function Documentation

#### 5.120.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.Plane.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.120.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.Plane.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

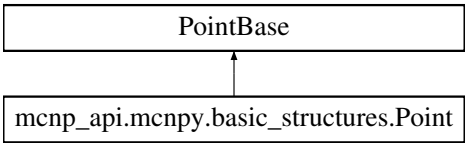
The documentation for this class was generated from the following file:

- surfaces.py

## 5.121 mcnp_api.mcnpy.basic_structures.Point Class Reference

Custom Point Class.

Inheritance diagram for mcnp_api.mcnpy.basic_structures.Point:



### Public Member Functions

- def **aspoint** (p)
- def **__str__** (self)
- def **__repr__** (self)

### Public Attributes

- **x**
- **y**
- **z**

### 5.121.1 Detailed Description

Custom Point Class.

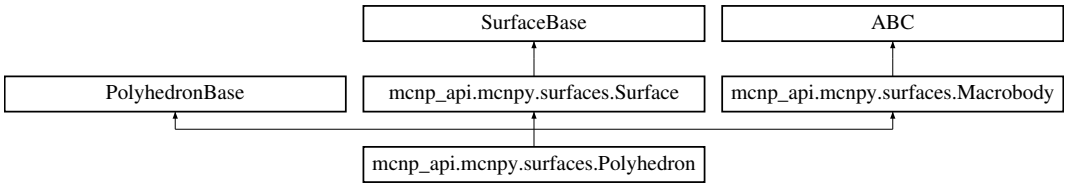
The documentation for this class was generated from the following file:

- basic_structures.py

## 5.122 mcnp_api.mcnpy.surfaces.Polyhedron Class Reference

An Arbitrary Polyhedron.

Inheritance diagram for mcnp_api.mcnpy.surfaces.Polyhedron:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)
- def **validate** (self)

  *Checks that the corners and sides for a valid ARB.*

### Public Attributes

- **name**
- **corners**
- **sides**
- **boundary_type**
- **comment**

### 5.122.1 Detailed Description

An Arbitrary Polyhedron.

There must be eight triplets of entries input for the ARB to describe the (x,y,z) of the corners, although some may not be used (just use triplets of zeros). These are followed by six more entries, ni, which follow a prescribed convention: each entry is a four-digit integer that defines a side of the ARB in terms of the corners for the side. For example, the entry 1278 would define this plane surface to be bounded by the first, second, seventh, and eighth triplets (or equivalently, corners). Since three points are sufficient to determine the plane, only the first, second, and seventh corners would be used in this example to determine the plane. The distance from the plane to the fourth corner (corner 8 in the example) is determined by MCNP6. If the absolute value of this distance is greater than 1.0E-6, an error message is given and the distance is printed in the OUTP file along with the (x,y,z) that would lie on the plane. If the fourth digit is zero, the fourth point is ignored. For a four-sided ARB, four non-zero four-digit integers (last digit is zero for four-sided since there are only three corners for each side) are required to define the sides. For a five-sided ARB, five non-zero four-digit integers are required, and six non-zero four-digit integers are required for a six-sided ARB. Since there must be 30 entries altogether for an ARB (or MCNP6 gives an error message), the last two integers are zero for the four-sided ARB and the last integer is zero for a five-sided ARB.

### 5.122.2 Member Function Documentation

#### 5.122.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.Polyhedron.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

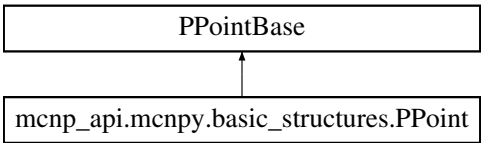
The documentation for this class was generated from the following file:

- surfaces.py

## 5.123 mcnp_api.mcnpy.basic_structures.PPoint Class Reference

Custom PPoint class.

Inheritance diagram for mcnp_api.mcnpy.basic_structures.PPoint:




### Public Member Functions

- def **__str__** (self)
- def **__repr__** (self)

### Public Attributes

- **d**
- **r**

### 5.123.1 Detailed Description

Custom PPoint class.

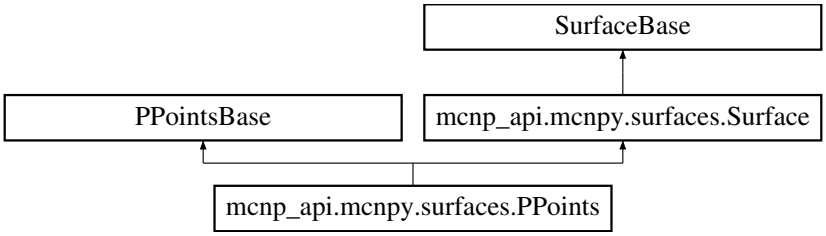
The documentation for this class was generated from the following file:

- basic_structures.py

## 5.124 mcnp_api.mcnpy.surfaces.PPoints Class Reference

Plane defined by 3 points.

Inheritance diagram for mcnp_api.mcnpy.surfaces.PPoints:




### Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

### Public Attributes

- **name**
- **points**
- **boundary_type**
- **comment**

### 5.124.1 Detailed Description

Plane defined by 3 points.

### 5.124.2 Member Function Documentation

#### 5.124.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.PPoints.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.124.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.PPoints.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

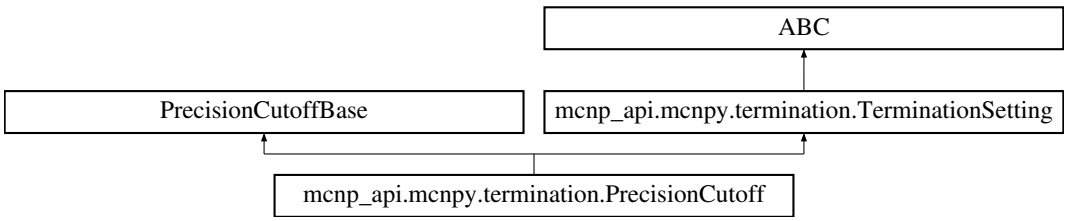
The documentation for this class was generated from the following file:

- surfaces.py

## 5.125 mcnp_api.mcnpy.termination.PrecisionCutoff Class Reference

STOP.

Inheritance diagram for mcnp_api.mcnpy.termination.PrecisionCutoff:




### 5.125.1 Detailed Description

STOP.

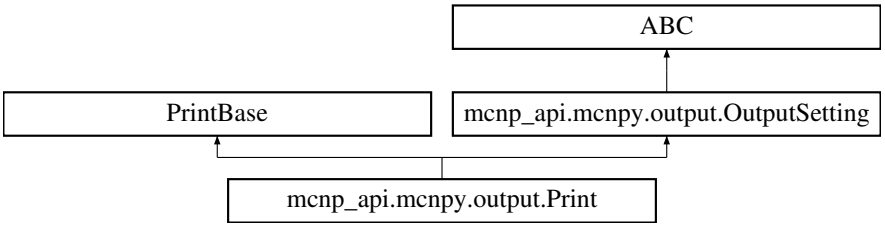
The documentation for this class was generated from the following file:

- termination.py

## 5.126 mcnp_api.mcnpy.output.Print Class Reference

PRINT.

Inheritance diagram for mcnp_api.mcnpy.output.Print:




### 5.126.1 Detailed Description

PRINT.

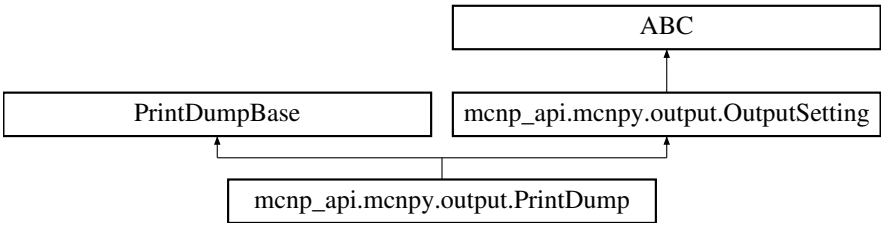
The documentation for this class was generated from the following file:

- output.py

## 5.127 mcnp_api.mcnpy.output.PrintDump Class Reference

PRDMP.

Inheritance diagram for mcnp_api.mcnpy.output.PrintDump:




### 5.127.1 Detailed Description

PRDMP.

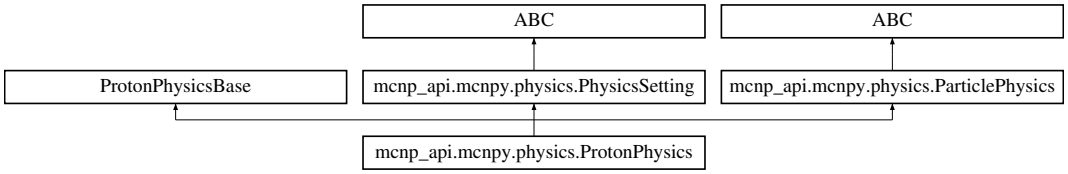
The documentation for this class was generated from the following file:

- output.py

## 5.128 mcnp_api.mcnpy.physics.ProtonPhysics Class Reference

Proton physics options.

Inheritance diagram for mcnp_api.mcnpy.physics.ProtonPhysics:




### Public Member Functions

- def **__str__** (self)
- def **__repr__** (self)

### 5.128.1 Detailed Description

Proton physics options.

```
PARAMETERS
----------
emax : float (DEFAULT=100MeV)
ean : float (DEFAULT=0)
tabl : float (DEFAULT=-1)
istrg : 0 or 1 (DEFAULT=0)
recl : float (DEFAULT=0)
i_mcs_model : -1, 0, 1, 2 (DEFAULT=0)
i_int_model : -1, 0, 1, 2 (DEFAULT=0)
i_els_model : -1 or 0 (DEFAULT=0)
efac : float 0.8 to 0.99 (DEFAULT=0.917)
ckvnum : float (DEFAULT=0)
drp : float (DEFAULT=0MeV)
```

PROPERTIES = ['max_energy', 'max_analog', 'phys_cutoff', 'straggling', 'recoil', 'clmb_scattering', 'interaction', 'els_scattering', 'stopping_power', 'single_event_energy', 'cerenkov', 'delta_ray_cutoff']

def _init(self, emax=100, ean=0, tabl=-1, istrg=0, recl=0, i_mcs_model=0, i_int_model=0, i_els_model=0, efac=0.↩ 917, ckvnum=0, drp=0):

self.max_energy = emax self.max_analog = ean self.phys_cutoff = tabl self.straggling = istrg self.recoil = recl self.↩ clmb_scattering = i_mcs_model self.interaction = i_int_model self.els_scattering = i_els_model self.stopping_power = efac self.cerenkov = ckvnum self.delta_ray_cutoff = drp

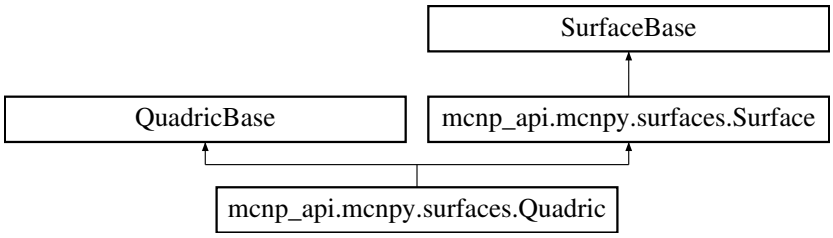
The documentation for this class was generated from the following file:

- physics.py

# 5.129 mcnp_api.mcnpy.surfaces.Quadric Class Reference

Quadric (GQ) with axes not parallel to x-, y-, or z-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.Quadric:




## Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

## Public Attributes

- **name**
- **a**
- **b**
- **c**
- **d**
- **e**
- **f**
- **g**
- **h**
- **j**
- **k**
- **boundary_type**
- **comment**

### 5.129.1 Detailed Description

Quadric (GQ) with axes not parallel to x-, y-, or z-axis.

### 5.129.2 Member Function Documentation

#### 5.129.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.Quadric.get_base_coefficients (
            self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.129.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.Quadric.get_coefficients (
            self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

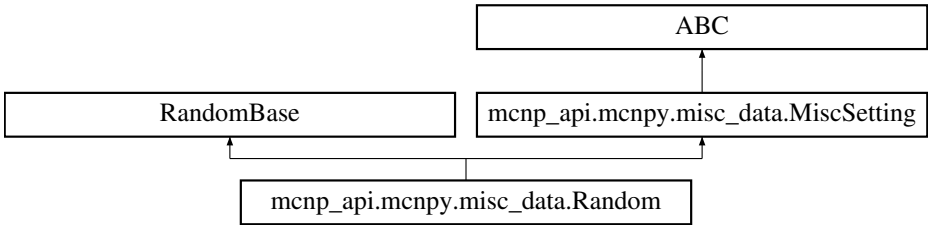
The documentation for this class was generated from the following file:

- surfaces.py

## 5.130 mcnp_api.mcnpy.misc_data.Random Class Reference

RAND.

Inheritance diagram for mcnp_api.mcnpy.misc_data.Random:




### 5.130.1 Detailed Description

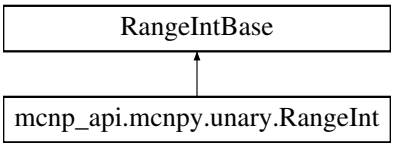
RAND.

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

- misc_data.py

## 5.131 mcnp_api.mcnpy.unary.RangeInt Class Reference

Inheritance diagram for mcnp_api.mcnpy.unary.RangeInt:



### Public Member Functions

- def **__str__** (self)

### Public Attributes

- **value**
- **sign**

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

- unary.py

## 5.132 mcnp_api.mcnpy.example.RCF Class Reference

### Public Member Functions

- def __init__ (self, filename='rcf_full_api.mcnp', water=68.0, bank=0.0, sporty=False)

  *A full core model of RPI's Reactor Critical Facility.*
- def **__repr__** (self)
- def **write** (self, filename=None)

### Public Attributes

- **filename**
- **water**
- **bank**
- **sporty**
- **deck**
- **title**

### 5.132.1 Constructor & Destructor Documentation

#### 5.132.1.1 __init__()

```
def mcnp_api.mcnpy.example.RCF.__init__ (
              self,
              filename = 'rcf_full_api.mcnp',
              water = 68.0,
              bank = 0.0,
              sporty = False )
```

A full core model of RPI's Reactor Critical Facility.

A very critical reactor that will live on in the virtual world no matter what Shirley and the RPI administration does. This example will generate a new MCNP deck, build the RCF, and write the model to file.`water` sets the height of the water in the reactor in inches (default is `68.0in`). `bank` sets the control rod bank height in inches (default is rods fully bottomed at `0.0in`). `sporty` when set to `True` removes the center fuel pin which puts the RCF in sport mode. `filename` specifies the name of the new MCNP input (default is `./mcnp_inps/rcf_full_api.mcnp`). The model can be accessed with the `model` attribute.

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

- example.py

## 5.133 mcnp_api.mcnpy.material_helper.RCF_Cladding Class Reference

Stainless steel cladding from RPI's RCF.

### Public Member Functions

- def **__init__** (self, name, comment=None)

### Public Attributes

- **name**
- **comment**
- **nuclides**
- **density**
- **density_unit**
- **material**

### 5.133.1 Detailed Description

Stainless steel cladding from RPI's RCF.

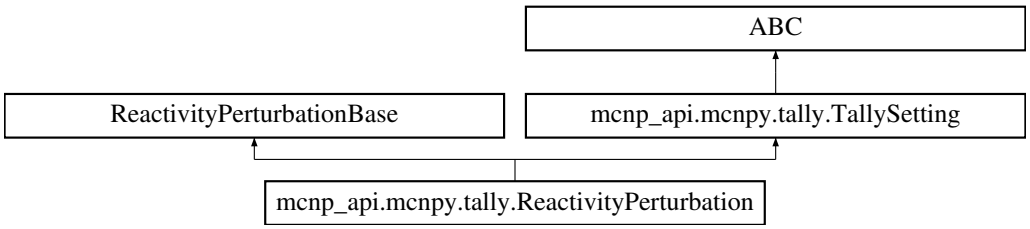
The documentation for this class was generated from the following file:

- material_helper.py

## 5.134 mcnp_api.mcnpy.tally.ReactivityPerturbation Class Reference

KPERT.

Inheritance diagram for mcnp_api.mcnpy.tally.ReactivityPerturbation:




### 5.134.1 Detailed Description

KPERT.

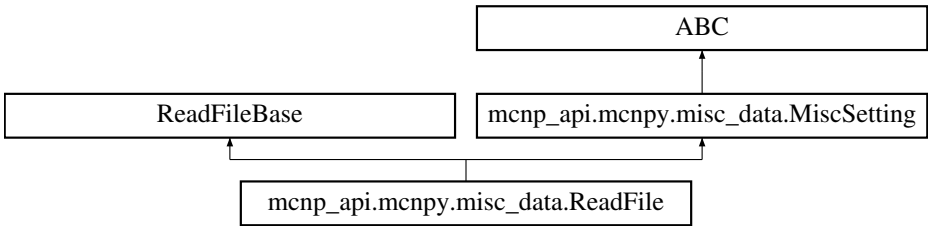
The documentation for this class was generated from the following file:

- tally.py

## 5.135 mcnp_api.mcnpy.misc_data.ReadFile Class Reference

READ.

Inheritance diagram for mcnp_api.mcnpy.misc_data.ReadFile:




### 5.135.1 Detailed Description

READ.

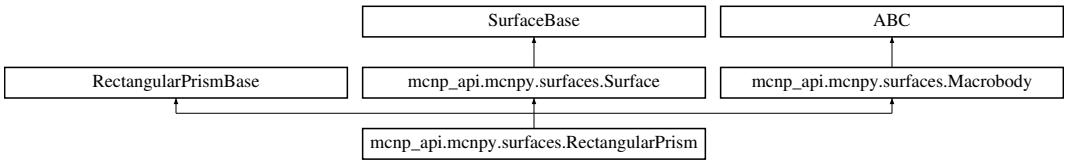
The documentation for this class was generated from the following file:

- misc_data.py

## 5.136 mcnp_api.mcnpy.surfaces.RectangularPrism Class Reference

A rectangular parallelpiped defined by X, Y, and Z limits.

Inheritance diagram for mcnp_api.mcnpy.surfaces.RectangularPrism:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **x0**
- **x1**
- **y0**
- **y1**
- **z0**
- **z1**
- **boundary_type**
- **comment**
- **facet**

### 5.136.1 Detailed Description

A rectangular parallelpiped defined by X, Y, and Z limits.

Can be infinite in 1 dimension if upper and lower bounds are equal.

### 5.136.2 Member Function Documentation

#### 5.136.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.RectangularPrism.get_coefficients (
            self )
```

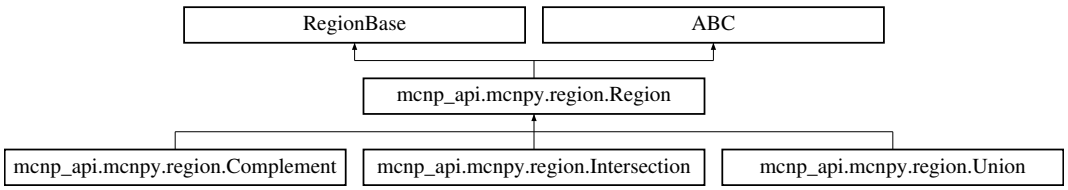
Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

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

- surfaces.py

## 5.137 mcnp_api.mcnpy.region.Region Class Reference

Inheritance diagram for mcnp_api.mcnpy.region.Region:




### Public Member Functions

- def **__and__** (self, other)
- def **__or__** (self, other)
- def **__invert__** (self)
- def get_surfaces (self, surfaces=None)

  *Recursively find all surfaces referenced by a region and return them.*
- def remove_redundant_surfaces (self, redundant_surfaces)

  *Recursively remove all redundant surfaces referenced by this region.*

### 5.137.1 Member Function Documentation

#### 5.137.1.1 get_surfaces()

```
def mcnp_api.mcnpy.region.Region.get_surfaces (
              self,
              surfaces = None )
```

Recursively find all surfaces referenced by a region and return them.

```
    Parameters
    ----------
    surfaces: collections.OrderedDict, optional
        Dictionary mapping surface IDs to :class:`mcnpy.Surface` instances

    Returns
    -------
    surfaces: collections.OrderedDict
        Dictionary mapping surface IDs to :class:`mcnpy.Surface` instances
```

Reimplemented in mcnp_api.mcnpy.region.Complement.

#### 5.137.1.2 remove_redundant_surfaces()

```
def mcnp_api.mcnpy.region.Region.remove_redundant_surfaces (
              self,
              redundant_surfaces )
```

Recursively remove all redundant surfaces referenced by this region.

```
    .. versionadded:: 0.12

    Parameters
    ----------
    redundant_surfaces : dict
        Dictionary mapping redundant surface IDs to class:`mcnpy.Surface`
        instances that should replace them.
```

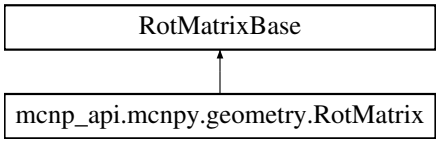
Reimplemented in mcnp_api.mcnpy.region.Complement.

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

- region.py

## 5.138 mcnp_api.mcnpy.geometry.RotMatrix Class Reference

Inheritance diagram for mcnp_api.mcnpy.geometry.RotMatrix:



### Public Attributes

- **xx**
- **yx**
- **zx**
- **xy**
- **yy**
- **zy**
- **xz**
- **yz**
- **zz**
- **matrix**
- **m**

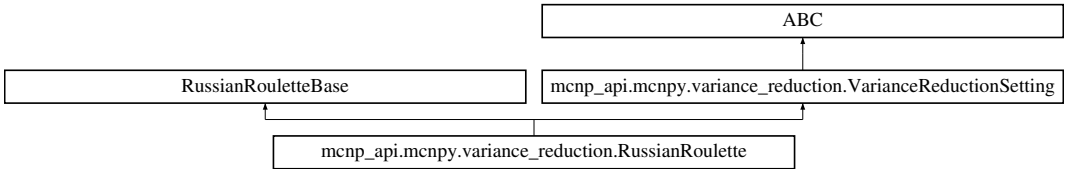
The documentation for this class was generated from the following file:

- geometry.py

## 5.139 mcnp_api.mcnpy.variance_reduction.RussianRoulette Class Reference

VAR RR.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.RussianRoulette:




### 5.139.1 Detailed Description

VAR RR.

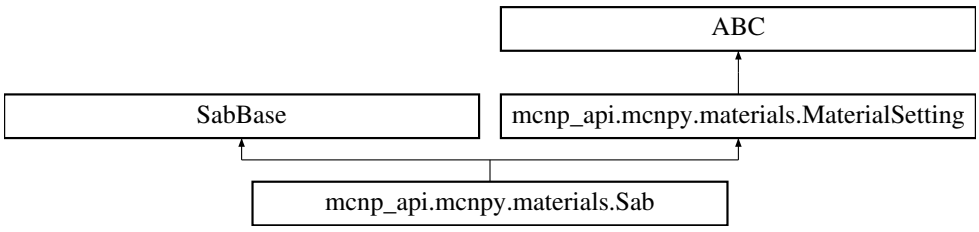
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.140 mcnp_api.mcnpy.materials.Sab Class Reference

MT.

Inheritance diagram for mcnp_api.mcnpy.materials.Sab:



### Public Attributes

- **material**
- **libraries**

### 5.140.1 Detailed Description

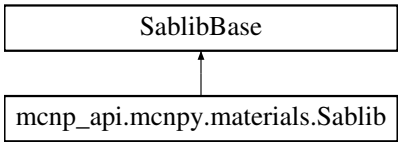
MT.

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

- materials.py

## 5.141 mcnp_api.mcnpy.materials.Sablib Class Reference

Inheritance diagram for mcnp_api.mcnpy.materials.Sablib:




### Public Attributes

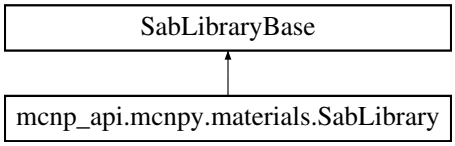
- **lib**
- **t**

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

- materials.py

## 5.142 mcnp_api.mcnpy.materials.SabLibrary Class Reference

Inheritance diagram for mcnp_api.mcnpy.materials.SabLibrary:



### Public Attributes

- **nuclide**
- **library**

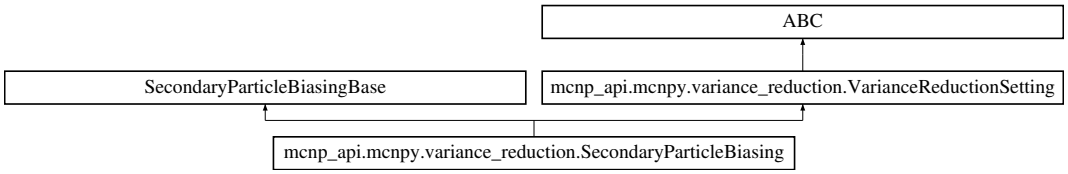
The documentation for this class was generated from the following file:

- materials.py

## 5.143 mcnp_api.mcnpy.variance_reduction.SecondaryParticleBiasing Class Reference

SPABI.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.SecondaryParticleBiasing:




### 5.143.1 Detailed Description

SPABI.

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

- variance_reduction.py

## 5.144 mcnp_api.mcnpy.java_server.Server Class Reference

### Public Member Functions

- def **__init__** (self)
- def **restart** (self)
- def **kill** (self)

### Public Attributes

- **cmd**
- **proc**

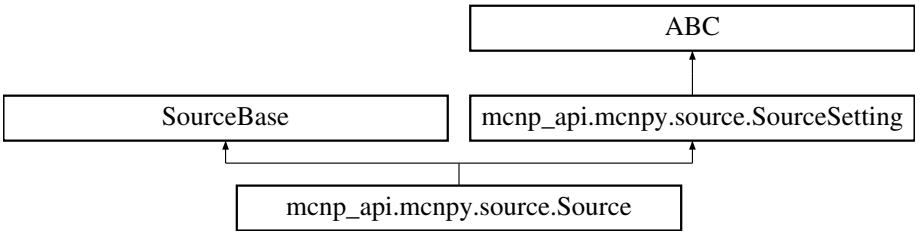
The documentation for this class was generated from the following file:

- java_server.py

## 5.145 mcnp_api.mcnpy.source.Source Class Reference

SDEF.

Inheritance diagram for mcnp_api.mcnpy.source.Source:




### Public Attributes

- **lattitude**
- **longitude**
- **altitude**
- **area**
- **axis**
- **x_beam_emittance**
- **y_beam_emittance**
- **beam_distance**
- **cells**
- **cookie_cutter_cell**
- **cosine**
- **month**
- **day**
- **year**
- **direction**
- **energy**
- **extent**
- **particle**
- **position**
- **radial_distance**
- **rejection_efficiency**
- **surface**
- **time**
- **transformation**
- **x_beam_aperature**
- **y_beam_aperature**
- **u**
- **vector**
- **weight**
- **x_coord**
- **y_coord**
- **z_coord**
- **normal**

### 5.145.1 Detailed Description

SDEF.

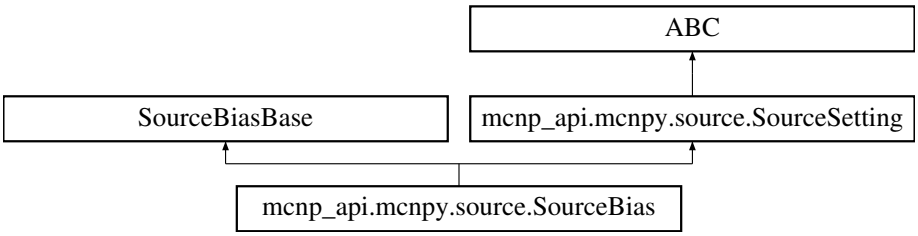
The documentation for this class was generated from the following file:

- source.py

## 5.146 mcnp_api.mcnpy.source.SourceBias Class Reference

SB.

Inheritance diagram for mcnp_api.mcnpy.source.SourceBias:




### 5.146.1 Detailed Description

SB.

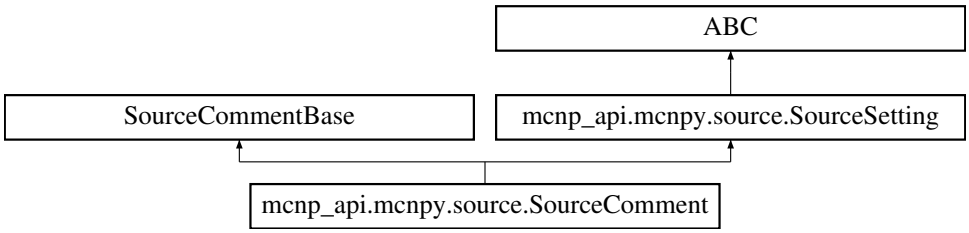
The documentation for this class was generated from the following file:

- source.py

## 5.147 mcnp_api.mcnpy.source.SourceComment Class Reference

SC.

Inheritance diagram for mcnp_api.mcnpy.source.SourceComment:



### 5.147.1 Detailed Description

SC.

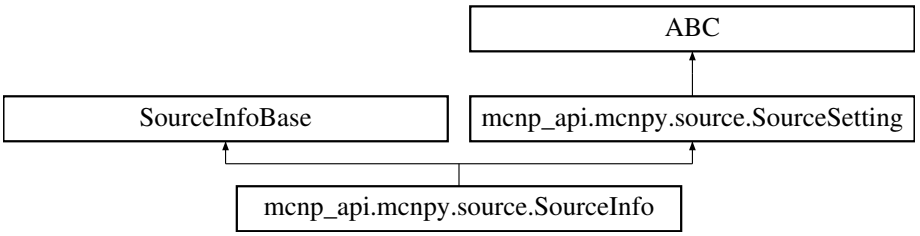
The documentation for this class was generated from the following file:

- source.py

## 5.148 mcnp_api.mcnpy.source.SourceInfo Class Reference

SI.

Inheritance diagram for mcnp_api.mcnpy.source.SourceInfo:




### 5.148.1 Detailed Description

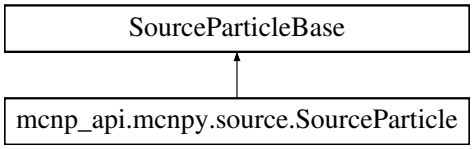
SI.

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

- source.py

## 5.149 mcnp_api.mcnpy.source.SourceParticle Class Reference

Inheritance diagram for mcnp_api.mcnpy.source.SourceParticle:




### Public Member Functions

- def **__str__** (self)
- def **__repr__** (self)

### Public Attributes

- **particle**
- **ion**

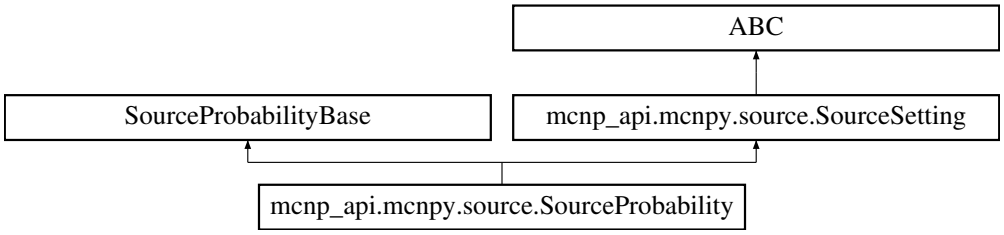
The documentation for this class was generated from the following file:

- source.py

## 5.150 mcnp_api.mcnpy.source.SourceProbability Class Reference

SP.

Inheritance diagram for mcnp_api.mcnpy.source.SourceProbability:




### 5.150.1 Detailed Description

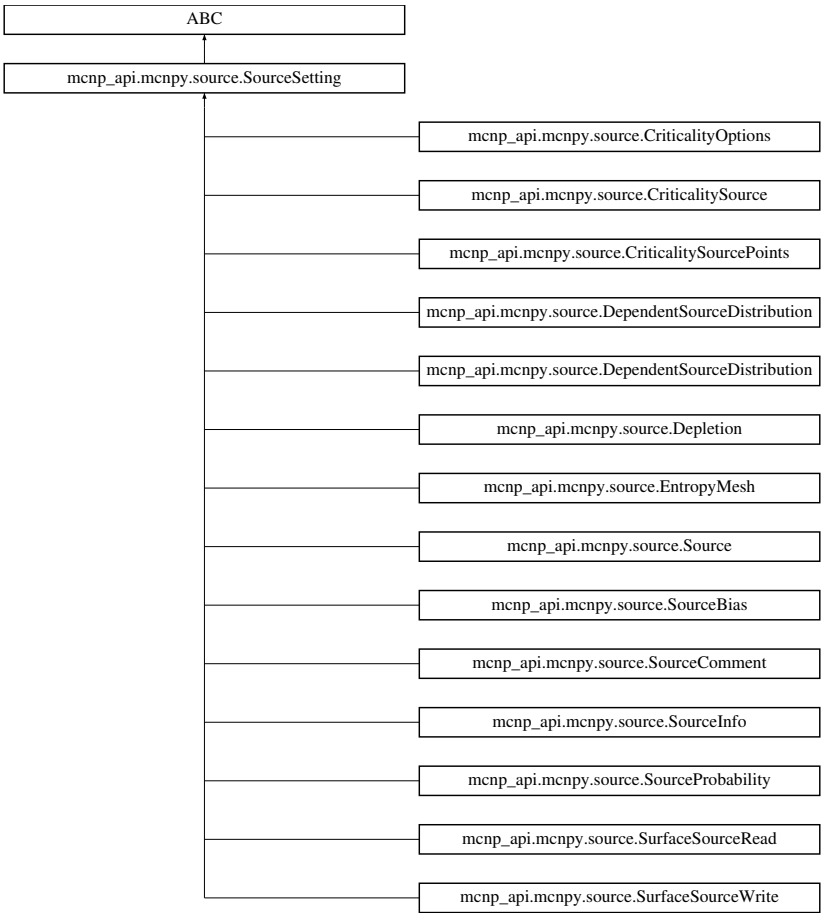
SP.

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

- source.py

## 5.151 mcnp_api.mcnpy.source.SourceSetting Class Reference

Inheritance diagram for mcnp_api.mcnpy.source.SourceSetting:



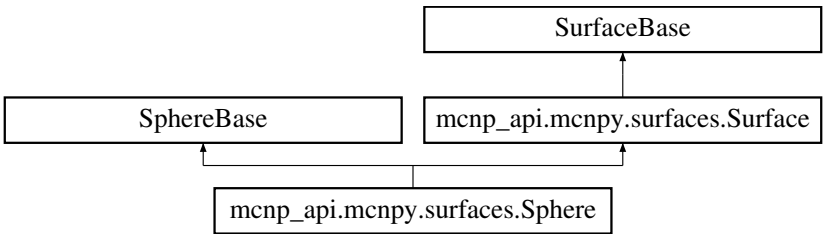

The documentation for this class was generated from the following file:

- source.py

## 5.152 mcnp_api.mcnpy.surfaces.Sphere Class Reference

Sphere defined by origin `(x0, y0, z0)` and radius `r`.

Inheritance diagram for mcnp_api.mcnpy.surfaces.Sphere:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **x0**
- **y0**
- **z0**
- **r**
- **boundary_type**
- **comment**

### 5.152.1 Detailed Description

Sphere defined by origin `(x0, y0, z0)` and radius `r`.

### 5.152.2 Member Function Documentation

#### 5.152.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.Sphere.get_coefficients (
            self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

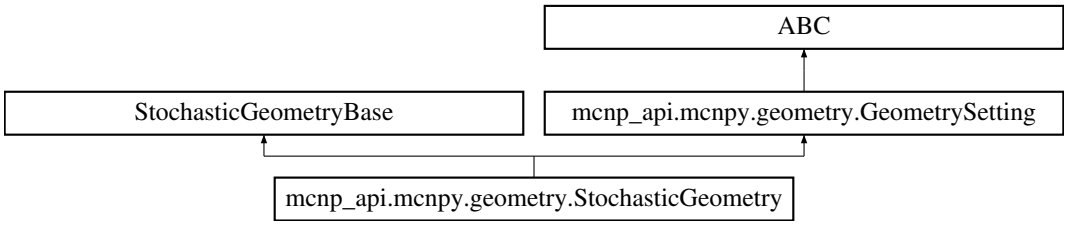
The documentation for this class was generated from the following file:

- surfaces.py

## 5.153 mcnp_api.mcnpy.geometry.StochasticGeometry Class Reference

URAN.

Inheritance diagram for mcnp_api.mcnpy.geometry.StochasticGeometry:



### 5.153.1 Detailed Description

URAN.

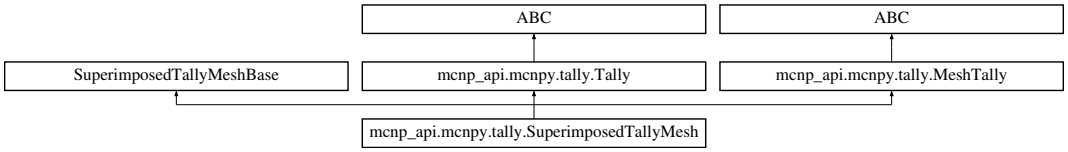
The documentation for this class was generated from the following file:

- geometry.py

## 5.154 mcnp_api.mcnpy.tally.SuperimposedTallyMesh Class Reference

TMESH.

Inheritance diagram for mcnp_api.mcnpy.tally.SuperimposedTallyMesh:




### 5.154.1 Detailed Description

TMESH.

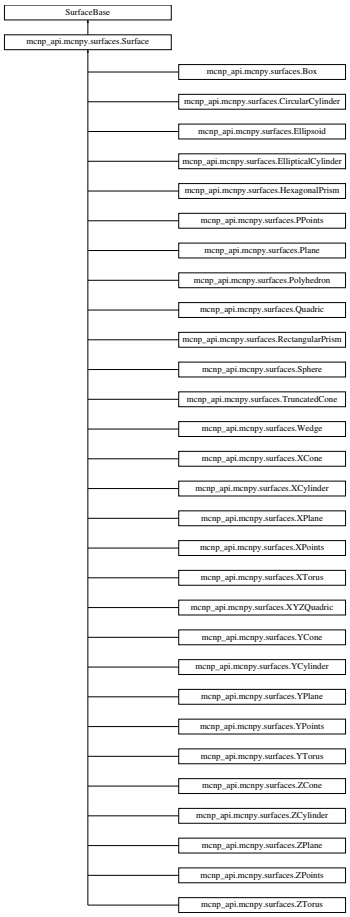
The documentation for this class was generated from the following file:

- tally.py

## 5.155 mcnp_api.mcnpy.surfaces.Surface Class Reference

My custom surface class.

Inheritance diagram for mcnp_api.mcnpy.surfaces.Surface:




## Public Member Functions

- def **__pos__** (self)
- def **__neg__** (self)
- def **get_coefficients** (self)
- def **print_surface** (self)

## Public Attributes

- **name**
- **comment**
- **boundary_type**
- **coefficients**

### 5.155.1 Detailed Description

My custom surface class.

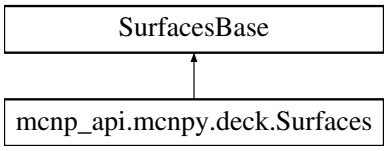
The documentation for this class was generated from the following file:

- surfaces.py

## 5.156 mcnp_api.mcnpy.deck.Surfaces Class Reference

My custom surfaces class.

Inheritance diagram for mcnp_api.mcnpy.deck.Surfaces:




### Public Attributes

- **surfaces**

### 5.156.1 Detailed Description

My custom surfaces class.

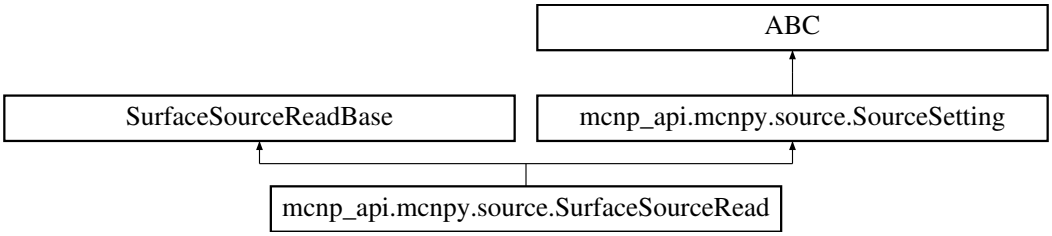
The documentation for this class was generated from the following file:

- deck.py

## 5.157 mcnp_api.mcnpy.source.SurfaceSourceRead Class Reference

SSR.

Inheritance diagram for mcnp_api.mcnpy.source.SurfaceSourceRead:




### 5.157.1 Detailed Description

SSR.

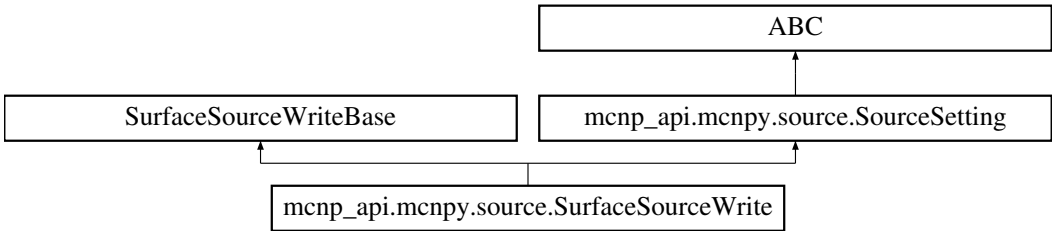
The documentation for this class was generated from the following file:

- source.py

## 5.158 mcnp_api.mcnpy.source.SurfaceSourceWrite Class Reference

SSW.

Inheritance diagram for mcnp_api.mcnpy.source.SurfaceSourceWrite:




### 5.158.1 Detailed Description

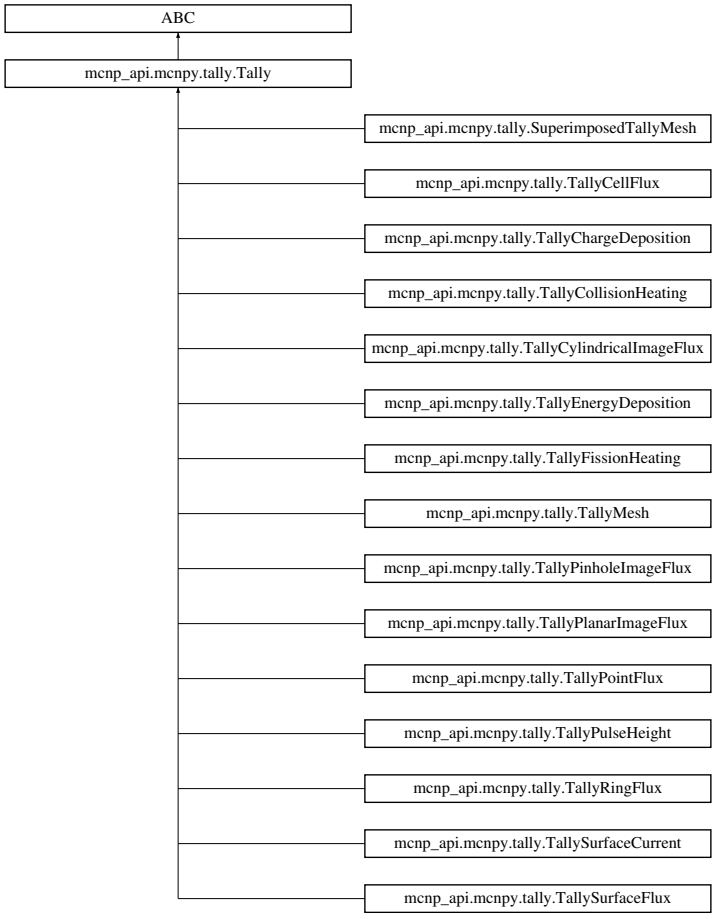
SSW.

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

- source.py

## 5.159 mcnp_api.mcnpy.tally.Tally Class Reference

Inheritance diagram for mcnp_api.mcnpy.tally.Tally:



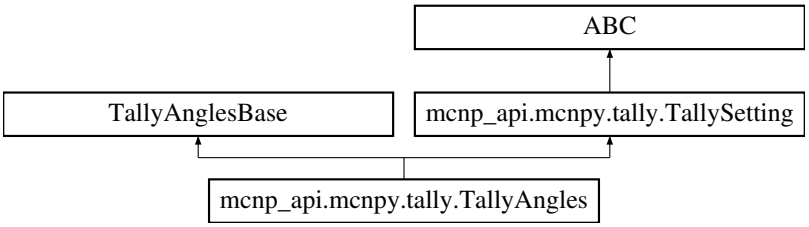
The documentation for this class was generated from the following file:

- tally.py

## 5.160 mcnp_api.mcnpy.tally.TallyAngles Class Reference

C.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyAngles:




### 5.160.1 Detailed Description

C.

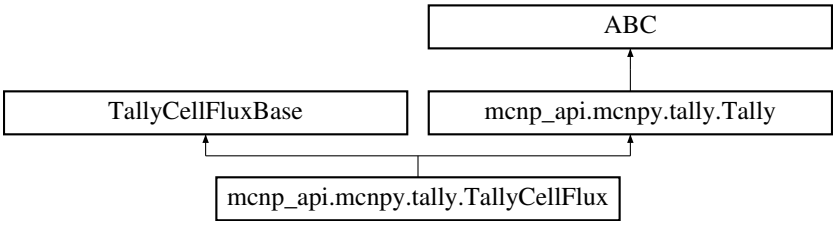
The documentation for this class was generated from the following file:

- tally.py

## 5.161 mcnp_api.mcnpy.tally.TallyCellFlux Class Reference

F4.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyCellFlux:




### 5.161.1 Detailed Description

F4.

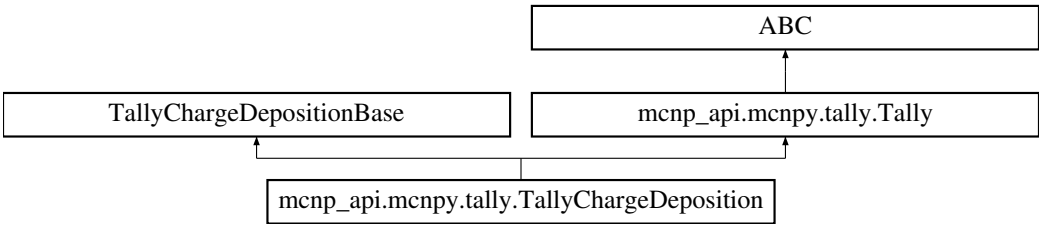
The documentation for this class was generated from the following file:

- tally.py

## 5.162 mcnp_api.mcnpy.tally.TallyChargeDeposition Class Reference

+F8

Inheritance diagram for mcnp_api.mcnpy.tally.TallyChargeDeposition:




### 5.162.1 Detailed Description

+F8

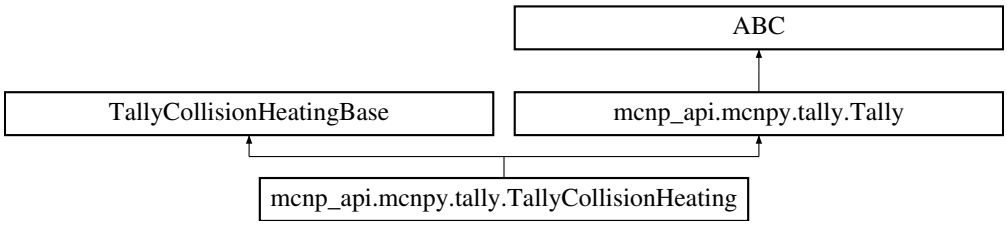
The documentation for this class was generated from the following file:

- tally.py

## 5.163 mcnp_api.mcnpy.tally.TallyCollisionHeating Class Reference

+F6

Inheritance diagram for mcnp_api.mcnpy.tally.TallyCollisionHeating:




### 5.163.1 Detailed Description

+F6

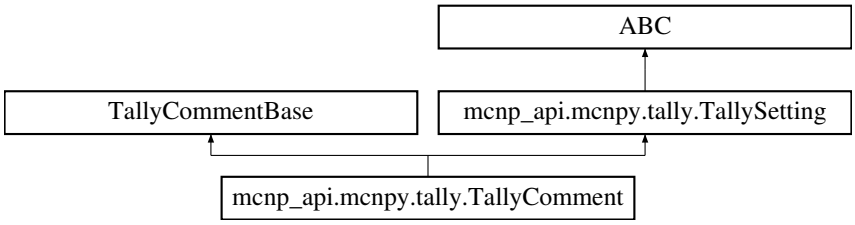
The documentation for this class was generated from the following file:

- tally.py

## 5.164 mcnp_api.mcnpy.tally.TallyComment Class Reference

TC.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyComment:




### 5.164.1 Detailed Description

TC.

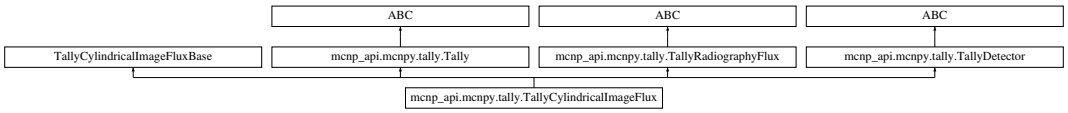
The documentation for this class was generated from the following file:

- tally.py

## 5.165 mcnp_api.mcnpy.tally.TallyCylindricalImageFlux Class Reference

FIC.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyCylindricalImageFlux:




### 5.165.1 Detailed Description

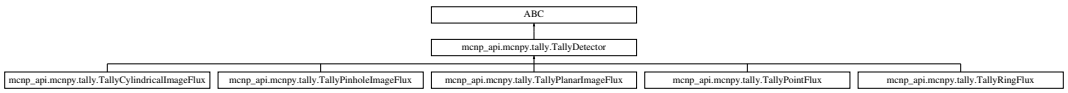
FIC.

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

- tally.py

## 5.166 mcnp_api.mcnpy.tally.TallyDetector Class Reference

Inheritance diagram for mcnp_api.mcnpy.tally.TallyDetector:



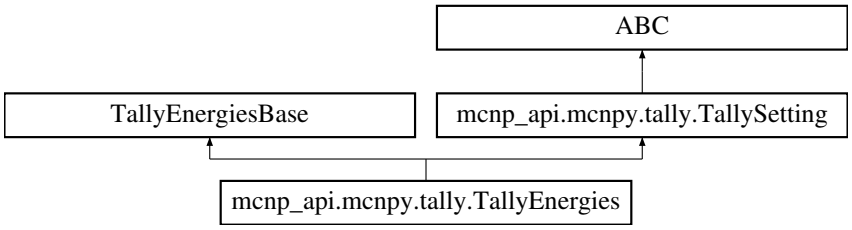

The documentation for this class was generated from the following file:

- tally.py

## 5.167 mcnp_api.mcnpy.tally.TallyEnergies Class Reference

E.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyEnergies:




### 5.167.1 Detailed Description

E.

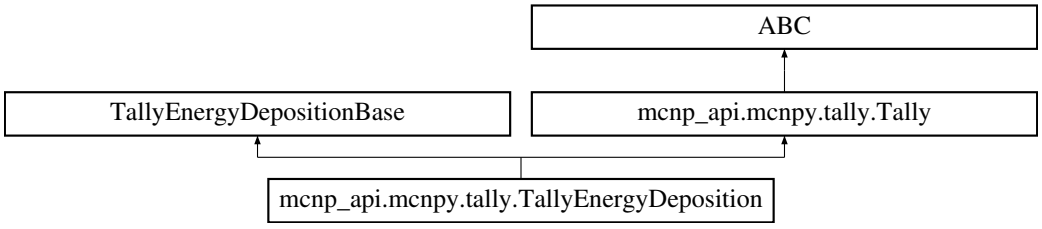
The documentation for this class was generated from the following file:

- tally.py

## 5.168 mcnp_api.mcnpy.tally.TallyEnergyDeposition Class Reference

F6.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyEnergyDeposition:



### 5.168.1 Detailed Description

F6.

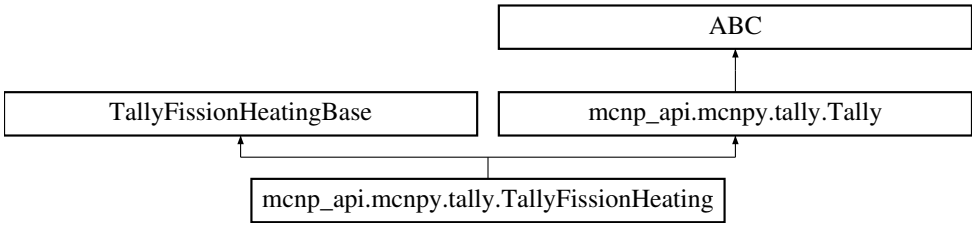
The documentation for this class was generated from the following file:

- tally.py

## 5.169 mcnp_api.mcnpy.tally.TallyFissionHeating Class Reference

F7.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyFissionHeating:




### 5.169.1 Detailed Description

F7.

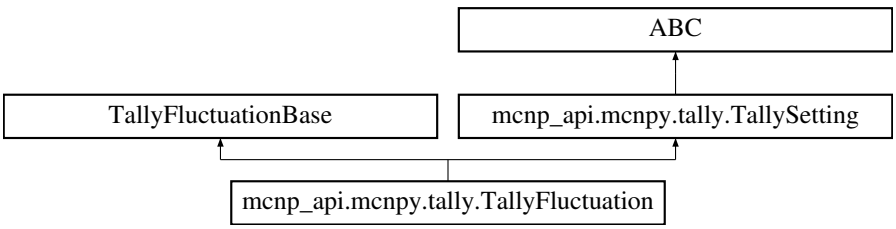
The documentation for this class was generated from the following file:

- tally.py

## 5.170 mcnp_api.mcnpy.tally.TallyFluctuation Class Reference

FT.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyFluctuation:



### 5.170.1 Detailed Description

FT.

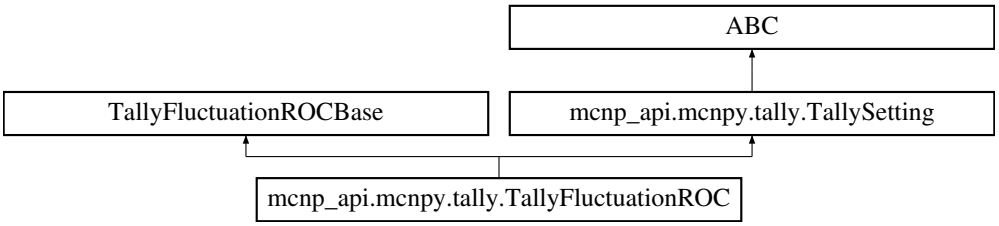
The documentation for this class was generated from the following file:

- tally.py

## 5.171 mcnp_api.mcnpy.tally.TallyFluctuationROC Class Reference

FT.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyFluctuationROC:




### 5.171.1 Detailed Description

FT.

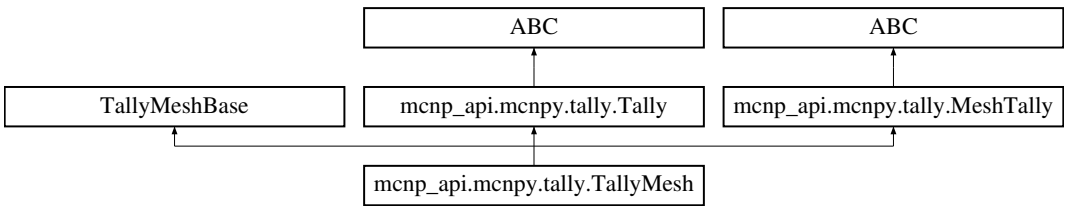
The documentation for this class was generated from the following file:

- tally.py

## 5.172 mcnp_api.mcnpy.tally.TallyMesh Class Reference

FMESH.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyMesh:



### 5.172.1 Detailed Description

FMESH.

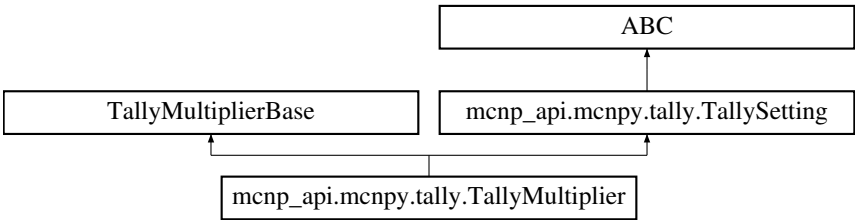
The documentation for this class was generated from the following file:

- tally.py

## 5.173 mcnp_api.mcnpy.tally.TallyMultiplier Class Reference

FM.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyMultiplier:




### 5.173.1 Detailed Description

FM.

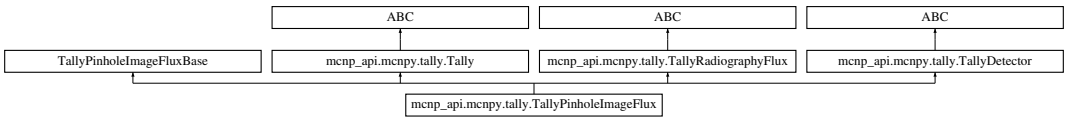
The documentation for this class was generated from the following file:

- tally.py

## 5.174 mcnp_api.mcnpy.tally.TallyPinholeImageFlux Class Reference

FIP.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyPinholeImageFlux:




### 5.174.1 Detailed Description

FIP.

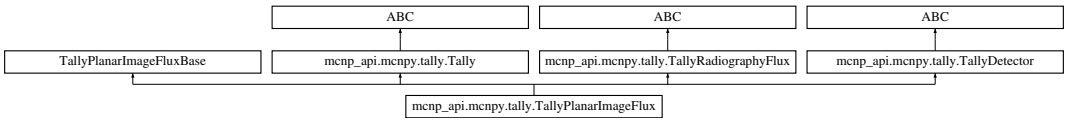
The documentation for this class was generated from the following file:

- tally.py

## 5.175 mcnp_api.mcnpy.tally.TallyPlanarImageFlux Class Reference

FIR.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyPlanarImageFlux:




### 5.175.1 Detailed Description

FIR.

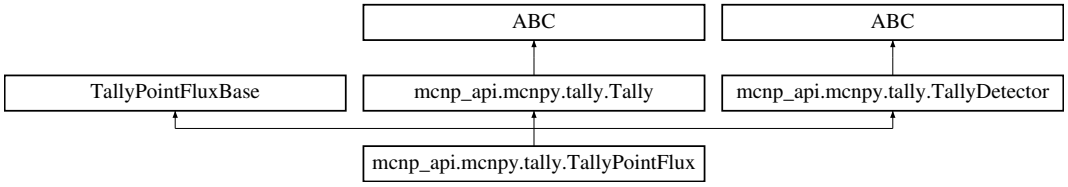
The documentation for this class was generated from the following file:

- tally.py

## 5.176 mcnp_api.mcnpy.tally.TallyPointFlux Class Reference

F5.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyPointFlux:




### 5.176.1 Detailed Description

F5.

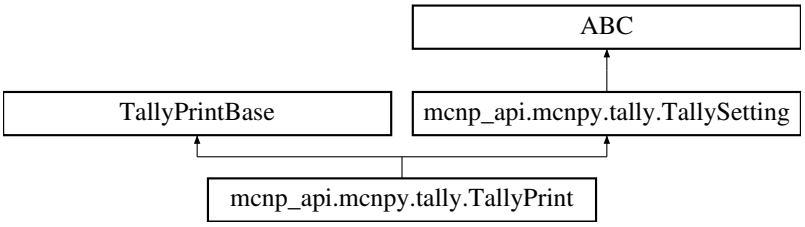
The documentation for this class was generated from the following file:

- tally.py

## 5.177 mcnp_api.mcnpy.tally.TallyPrint Class Reference

FQ.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyPrint:




### 5.177.1 Detailed Description

FQ.

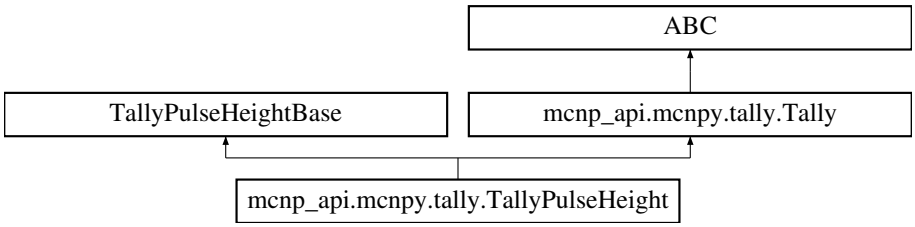
The documentation for this class was generated from the following file:

- tally.py

## 5.178 mcnp_api.mcnpy.tally.TallyPulseHeight Class Reference

F8.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyPulseHeight:




### 5.178.1 Detailed Description

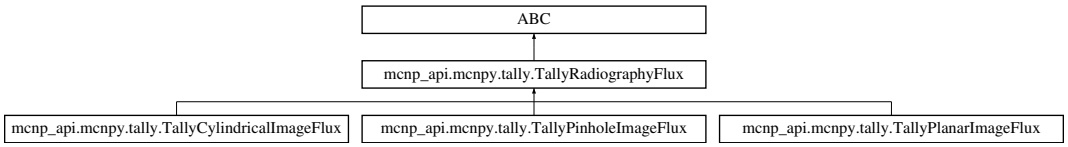
F8.

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

- tally.py

## 5.179 mcnp_api.mcnpy.tally.TallyRadiographyFlux Class Reference

Inheritance diagram for mcnp_api.mcnpy.tally.TallyRadiographyFlux:



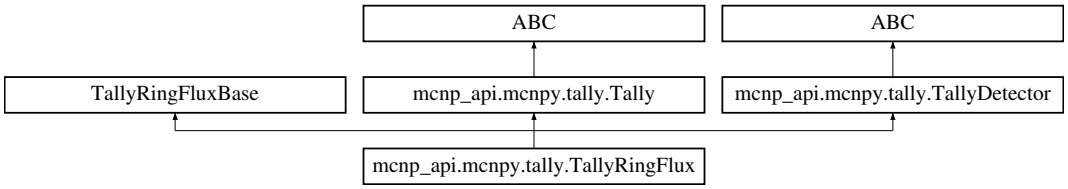

The documentation for this class was generated from the following file:

- tally.py

## 5.180 mcnp_api.mcnpy.tally.TallyRingFlux Class Reference

F5.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyRingFlux:




### 5.180.1 Detailed Description

F5.

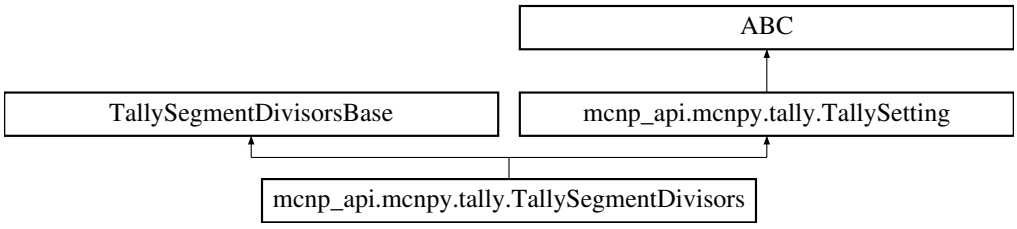
The documentation for this class was generated from the following file:

- tally.py

## 5.181 mcnp_api.mcnpy.tally.TallySegmentDivisors Class Reference

SD.

Inheritance diagram for mcnp_api.mcnpy.tally.TallySegmentDivisors:



### 5.181.1 Detailed Description

SD.

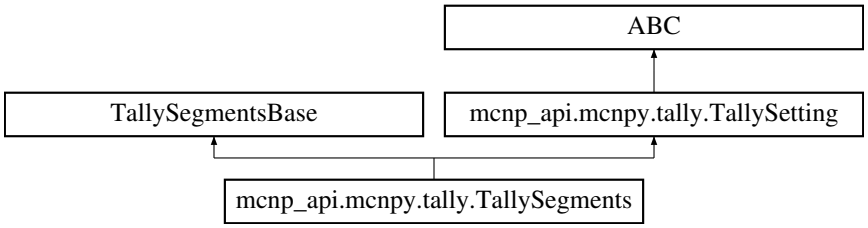
The documentation for this class was generated from the following file:

- tally.py

## 5.182 mcnp_api.mcnpy.tally.TallySegments Class Reference

FS.

Inheritance diagram for mcnp_api.mcnpy.tally.TallySegments:




### 5.182.1 Detailed Description

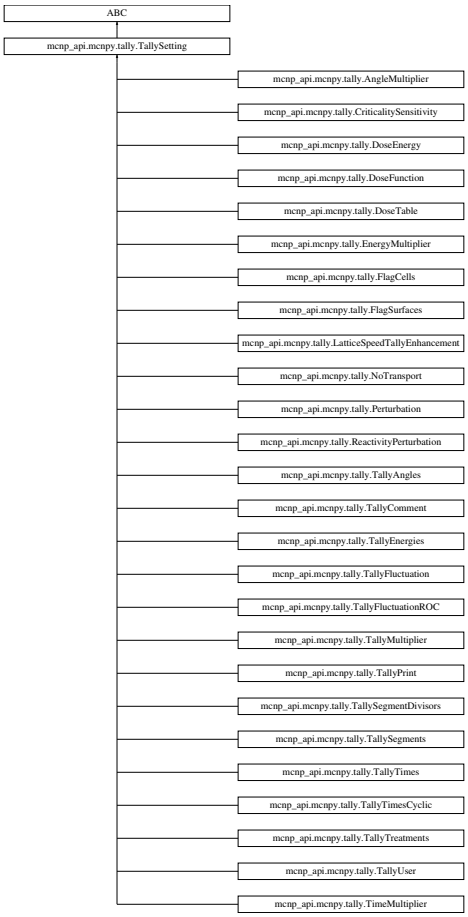
FS.

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

- tally.py

## 5.183 mcnp_api.mcnpy.tally.TallySetting Class Reference

Inheritance diagram for mcnp_api.mcnpy.tally.TallySetting:



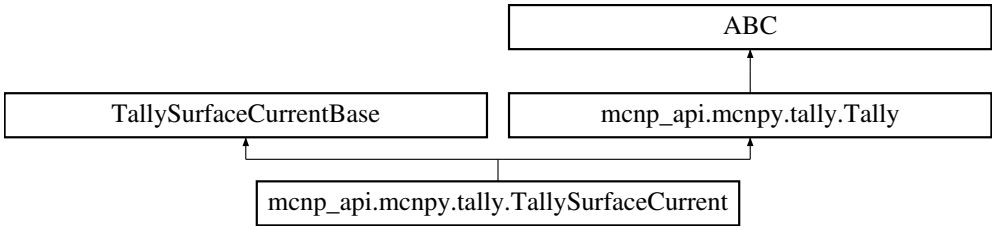

The documentation for this class was generated from the following file:

- tally.py

## 5.184 mcnp_api.mcnpy.tally.TallySurfaceCurrent Class Reference

F1.

Inheritance diagram for mcnp_api.mcnpy.tally.TallySurfaceCurrent:




### 5.184.1 Detailed Description

F1.

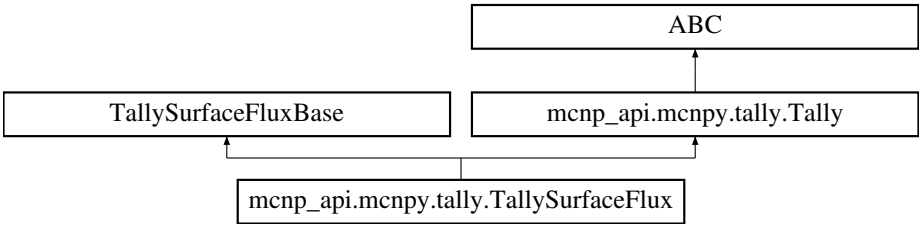
The documentation for this class was generated from the following file:

- tally.py

## 5.185 mcnp_api.mcnpy.tally.TallySurfaceFlux Class Reference

F2.

Inheritance diagram for mcnp_api.mcnpy.tally.TallySurfaceFlux:




### 5.185.1 Detailed Description

F2.

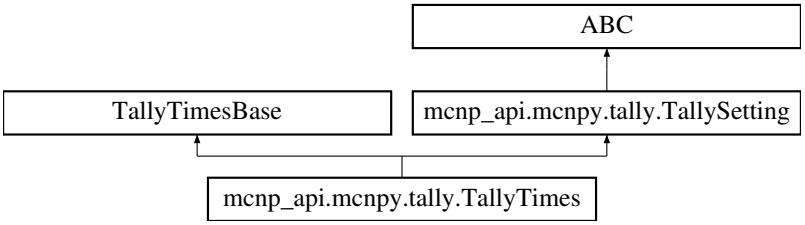
The documentation for this class was generated from the following file:

- tally.py

## 5.186 mcnp_api.mcnpy.tally.TallyTimes Class Reference

T.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyTimes:




### 5.186.1 Detailed Description

T.

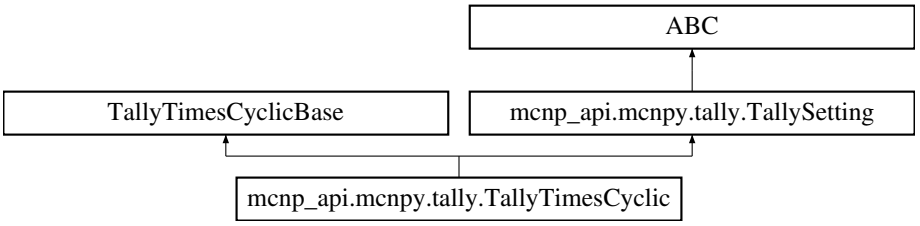
The documentation for this class was generated from the following file:

- tally.py

## 5.187 mcnp_api.mcnpy.tally.TallyTimesCyclic Class Reference

T.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyTimesCyclic:




### 5.187.1 Detailed Description

T.

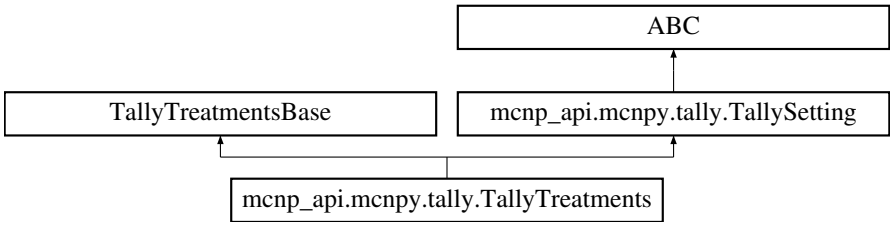
The documentation for this class was generated from the following file:

- tally.py

## 5.188 mcnp_api.mcnpy.tally.TallyTreatments Class Reference

FT.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyTreatments:




### 5.188.1 Detailed Description

FT.

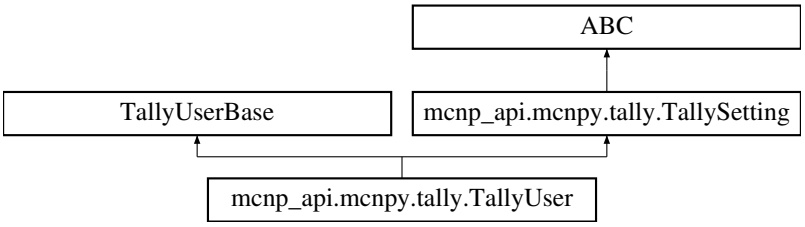
The documentation for this class was generated from the following file:

- tally.py

## 5.189 mcnp_api.mcnpy.tally.TallyUser Class Reference

FU.

Inheritance diagram for mcnp_api.mcnpy.tally.TallyUser:




### 5.189.1 Detailed Description

FU.

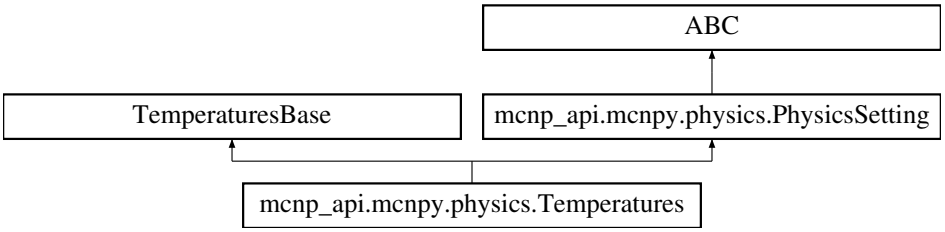
The documentation for this class was generated from the following file:

- tally.py

## 5.190 mcnp_api.mcnpy.physics.Temperatures Class Reference

TMP.

Inheritance diagram for mcnp_api.mcnpy.physics.Temperatures:




### 5.190.1 Detailed Description

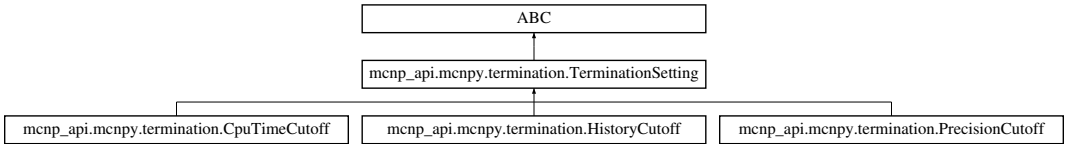
TMP.

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

- physics.py

## 5.191 mcnp_api.mcnpy.termination.TerminationSetting Class Reference

Inheritance diagram for mcnp_api.mcnpy.termination.TerminationSetting:



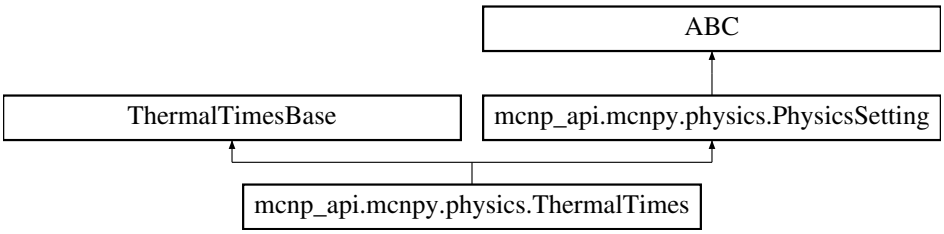

The documentation for this class was generated from the following file:

- termination.py

## 5.192 mcnp_api.mcnpy.physics.ThermalTimes Class Reference

THTME.

Inheritance diagram for mcnp_api.mcnpy.physics.ThermalTimes:




### 5.192.1 Detailed Description

THTME.

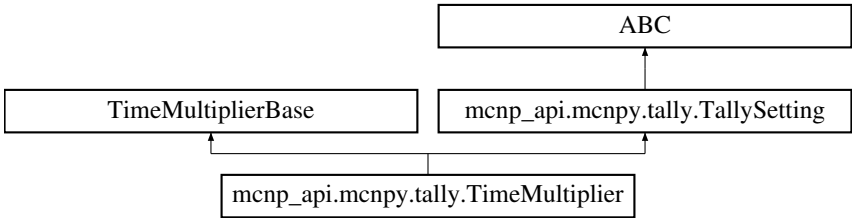
The documentation for this class was generated from the following file:

- physics.py

## 5.193 mcnp_api.mcnpy.tally.TimeMultiplier Class Reference

TM.

Inheritance diagram for mcnp_api.mcnpy.tally.TimeMultiplier:



### 5.193.1 Detailed Description

TM.

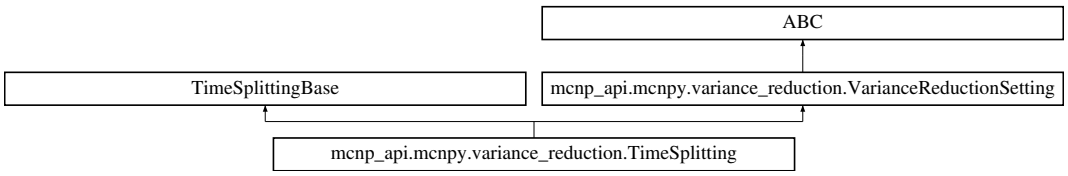
The documentation for this class was generated from the following file:

- tally.py

## 5.194 mcnp_api.mcnpy.variance_reduction.TimeSplitting Class Reference

TSPLT.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.TimeSplitting:




### 5.194.1 Detailed Description

TSPLT.

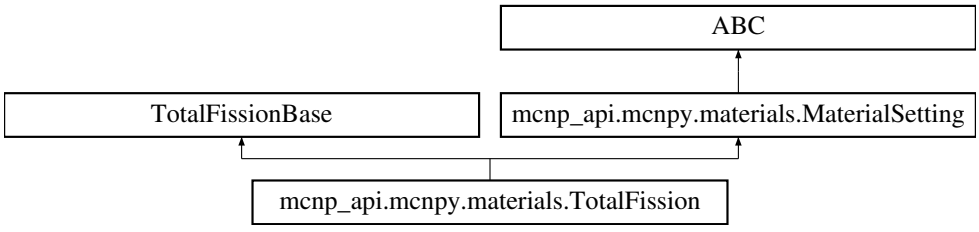
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.195 mcnp_api.mcnpy.materials.TotalFission Class Reference

TOTNU.

Inheritance diagram for mcnp_api.mcnpy.materials.TotalFission:



### 5.195.1 Detailed Description

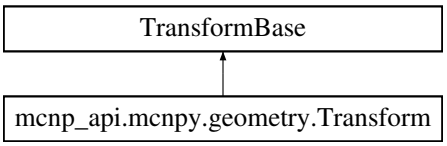
TOTNU.

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

- materials.py

## 5.196 mcnp_api.mcnpy.geometry.Transform Class Reference

Inheritance diagram for mcnp_api.mcnpy.geometry.Transform:




### Public Attributes

- **disp1**
- **disp2**
- **disp3**
- **displacement**
- **rotation**

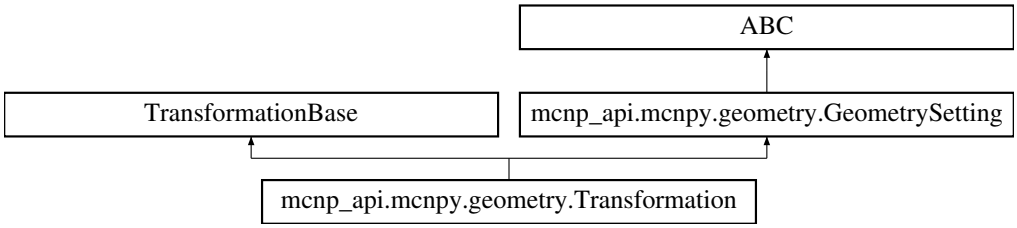
The documentation for this class was generated from the following file:

- geometry.py

## 5.197 mcnp_api.mcnpy.geometry.Transformation Class Reference

TR.

Inheritance diagram for mcnp_api.mcnpy.geometry.Transformation:



### Public Attributes

- **name**
- **transformation**
- **unit**

### 5.197.1 Detailed Description

TR.

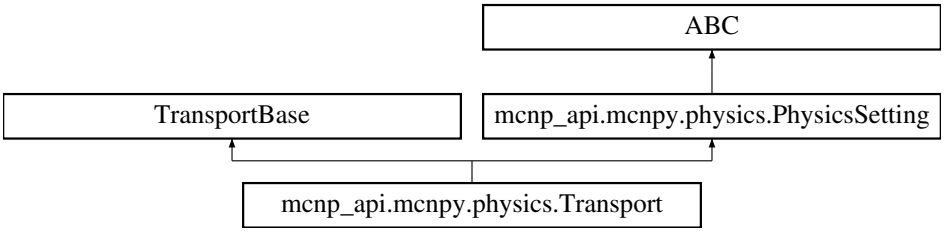
The documentation for this class was generated from the following file:

- geometry.py

## 5.198 mcnp_api.mcnpy.physics.Transport Class Reference

TROPT.

Inheritance diagram for mcnp_api.mcnpy.physics.Transport:




### 5.198.1 Detailed Description

TROPT.

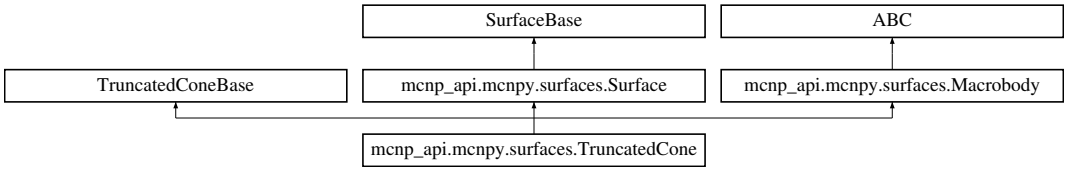
The documentation for this class was generated from the following file:

- physics.py

## 5.199 mcnp_api.mcnpy.surfaces.TruncatedCone Class Reference

Truncated Right Angle Cone defined by a `base` point, `axis` height vector, radius of the lower cone `r0`, and radius of the upper cone `r1`.

Inheritance diagram for mcnp_api.mcnpy.surfaces.TruncatedCone:



### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **base**
- **axis**
- **r0**
- **r1**
- **boundary_type**
- **comment**

### 5.199.1 Detailed Description

Truncated Right Angle Cone defined by a `base` point, `axis` height vector, radius of the lower cone `r0`, and radius of the upper cone `r1`.

### 5.199.2 Member Function Documentation

#### 5.199.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.TruncatedCone.get_coefficients (
              self )
```

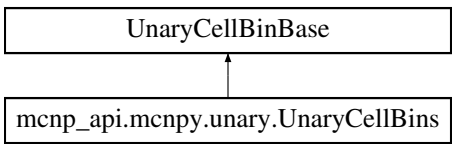
Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

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

- surfaces.py

## 5.200 mcnp_api.mcnpy.unary.UnaryCellBins Class Reference

Inheritance diagram for mcnp_api.mcnpy.unary.UnaryCellBins:



### Public Member Functions

- def **__str__** (self)

### Public Attributes

- **cell**
- **index**
- **universe**

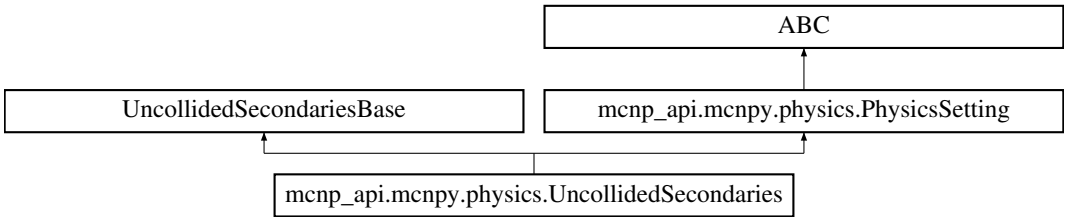
The documentation for this class was generated from the following file:

- unary.py

## 5.201 mcnp_api.mcnpy.physics.UncollidedSecondaries Class Reference

UNC.

Inheritance diagram for mcnp_api.mcnpy.physics.UncollidedSecondaries:




### 5.201.1 Detailed Description

UNC.

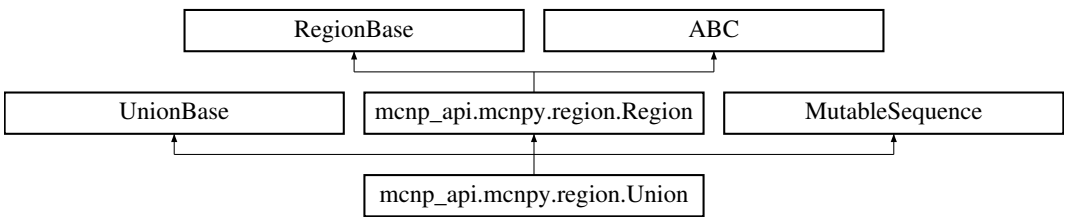
The documentation for this class was generated from the following file:

- physics.py

## 5.202 mcnp_api.mcnpy.region.Union Class Reference

My custom union class.

Inheritance diagram for mcnp_api.mcnpy.region.Union:



### Public Member Functions

- def __or__ (self, other)
- def **__ior__** (self, other)
- def **__getitem__** (self, key)
- def **__setitem__** (self, key, value)
- def **__delitem__** (self, key)
- def **__len__** (self)
- def **insert** (self, index, value)
- def **__str__** (self)

### Public Attributes

- **nodes**

### 5.202.1 Detailed Description

My custom union class.

### 5.202.2 Member Function Documentation

#### 5.202.2.1 __or__()

```
def mcnp_api.mcnpy.region.Union.__or__ (
              self,
              other )
```

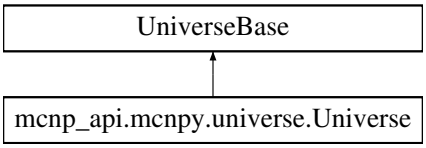
Reimplemented from mcnp_api.mcnpy.region.Region.

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

- region.py

## 5.203 mcnp_api.mcnpy.universe.Universe Class Reference

Inheritance diagram for mcnp_api.mcnpy.universe.Universe:



### Public Member Functions

- def **__str__** (self)
- def **__repr__** (self)

### Public Attributes

- **name**

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

- universe.py

## 5.204 mcnp_api.mcnpy.universe.UniverseList Class Reference

`Universe` containing a list of `Cell` objects.

### Public Member Functions

- def **__init__** (self, name, cells=None, sign=None)
- def **apply_to_cell** (self, cell)
- def **add** (self, cell)
- def **add_all** (self, cells)
- def **remove** (self, cell)
- def **remove_all** (self, cells)
- def **add_only** (self, cell)

### Public Attributes

- **name**
- **cells**
- **sign**

### 5.204.1 Detailed Description

`Universe` containing a list of `Cell` objects.

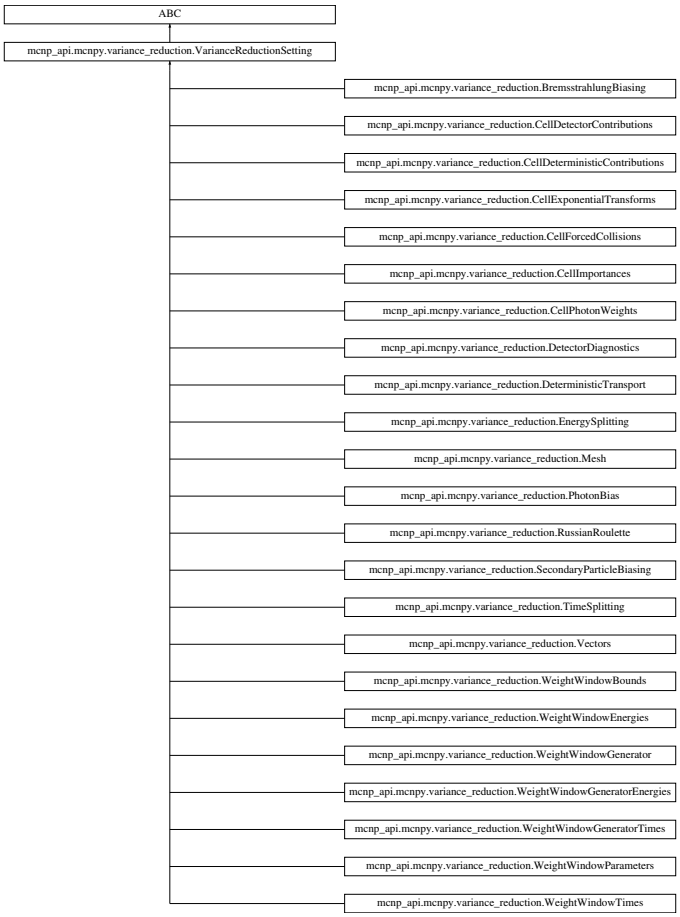
Handles assigning `Universe` IDs to each MCNP `Cell`.

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

- universe.py

## 5.205 mcnp_api.mcnpy.variance_reduction.VarianceReductionSetting Class Reference

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.VarianceReductionSetting:



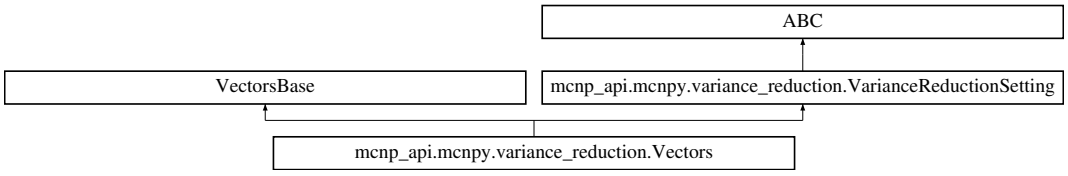

The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.206 mcnp_api.mcnpy.variance_reduction.Vectors Class Reference

VECT.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.Vectors:



### 5.206.1 Detailed Description

VECT.

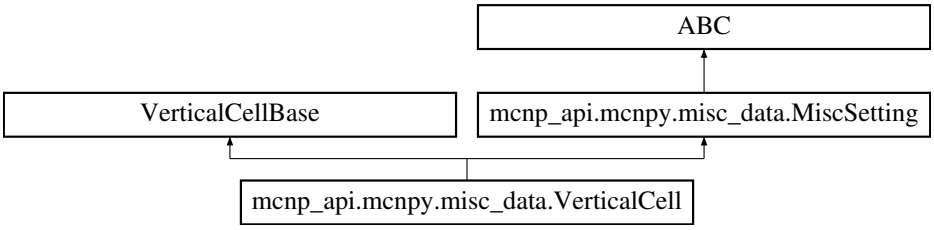
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.207 mcnp_api.mcnpy.misc_data.VerticalCell Class Reference

#

Inheritance diagram for mcnp_api.mcnpy.misc_data.VerticalCell:




### 5.207.1 Detailed Description

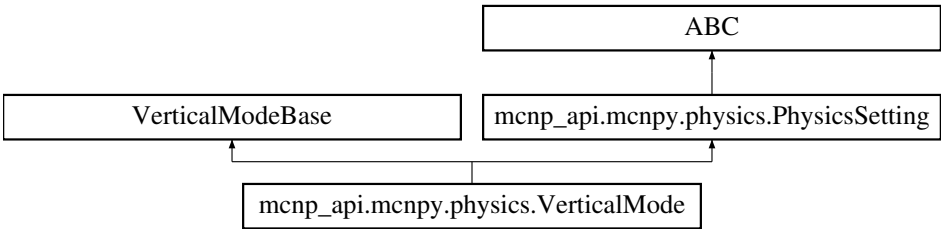
#

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

- misc_data.py

## 5.208 mcnp_api.mcnpy.physics.VerticalMode Class Reference

Inheritance diagram for mcnp_api.mcnpy.physics.VerticalMode:

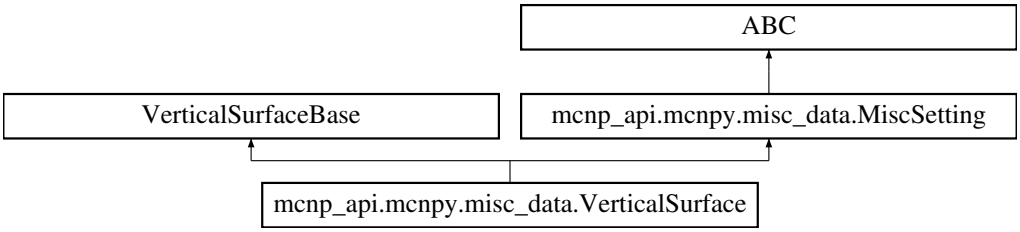



The documentation for this class was generated from the following file:

- physics.py

## 5.209 mcnp_api.mcnpy.misc_data.VerticalSurface Class Reference

Inheritance diagram for mcnp_api.mcnpy.misc_data.VerticalSurface:




### 5.209.1 Detailed Description

### 5.209.2 ARA

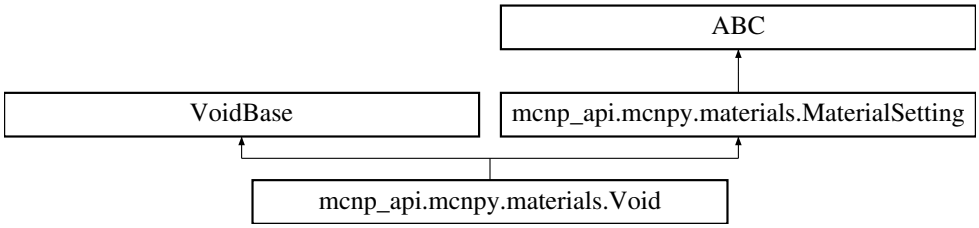
The documentation for this class was generated from the following file:

- misc_data.py

## 5.210 mcnp_api.mcnpy.materials.Void Class Reference

VOID.

Inheritance diagram for mcnp_api.mcnpy.materials.Void:




### 5.210.1 Detailed Description

VOID.

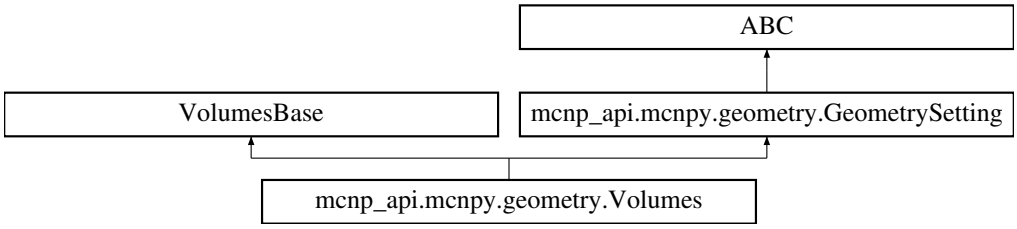
The documentation for this class was generated from the following file:

- materials.py

## 5.211 mcnp_api.mcnpy.geometry.Volumes Class Reference

VOL.

Inheritance diagram for mcnp_api.mcnpy.geometry.Volumes:




### 5.211.1 Detailed Description

VOL.

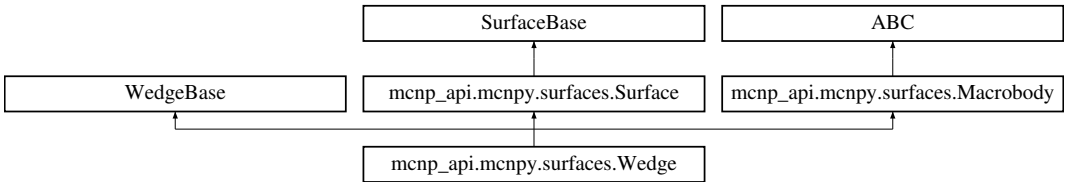
The documentation for this class was generated from the following file:

- geometry.py

## 5.212 mcnp_api.mcnpy.surfaces.Wedge Class Reference

A Wedge defined by a `vertex`, 2 `vectors` for sides of the triangular base, and an `axis` height vector.

Inheritance diagram for mcnp_api.mcnpy.surfaces.Wedge:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **vertex**
- **axis**
- **vectors**
- **boundary_type**
- **comment**

### 5.212.1 Detailed Description

A Wedge defined by a `vertex`, 2 `vectors` for sides of the triangular base, and an `axis` height vector.

### 5.212.2 Member Function Documentation

#### 5.212.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.Wedge.get_coefficients (
            self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

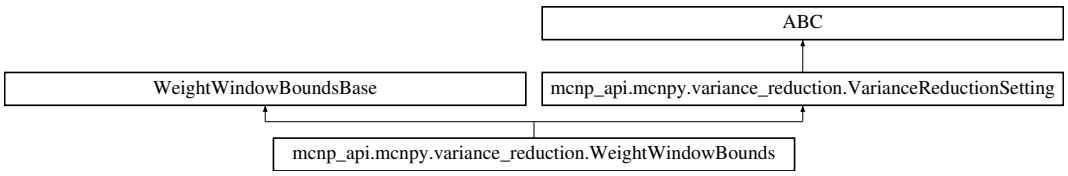
The documentation for this class was generated from the following file:

- surfaces.py

## 5.213 mcnp_api.mcnpy.variance_reduction.WeightWindowBounds Class Reference

WWN.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.WeightWindowBounds:




### 5.213.1 Detailed Description

WWN.

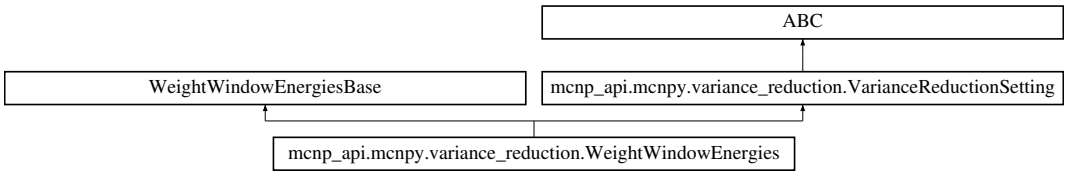
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.214 mcnp_api.mcnpy.variance_reduction.WeightWindowEnergies Class Reference

WWE.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.WeightWindowEnergies:




### 5.214.1 Detailed Description

WWE.

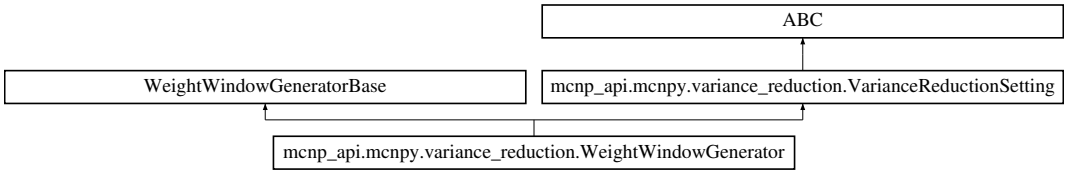
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.215 mcnp_api.mcnpy.variance_reduction.WeightWindowGenerator Class Reference

WWG.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.WeightWindowGenerator:




### 5.215.1 Detailed Description

WWG.

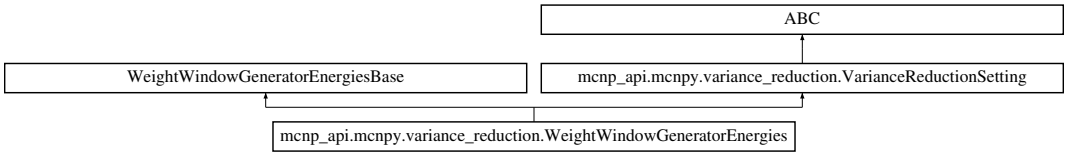
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.216 mcnp_api.mcnpy.variance_reduction.WeightWindowGeneratorEnergies Class Reference

WWGE.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.WeightWindowGeneratorEnergies:




### 5.216.1 Detailed Description

WWGE.

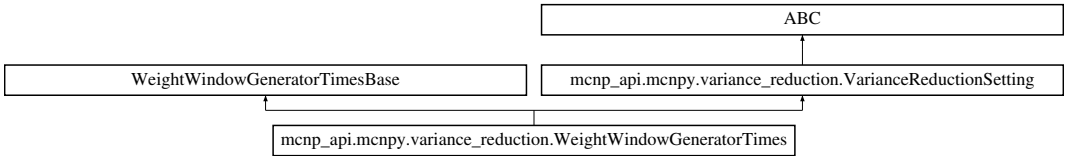
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.217 mcnp_api.mcnpy.variance_reduction.WeightWindowGeneratorTimes Class Reference

WWGT.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.WeightWindowGeneratorTimes:




### 5.217.1 Detailed Description

WWGT.

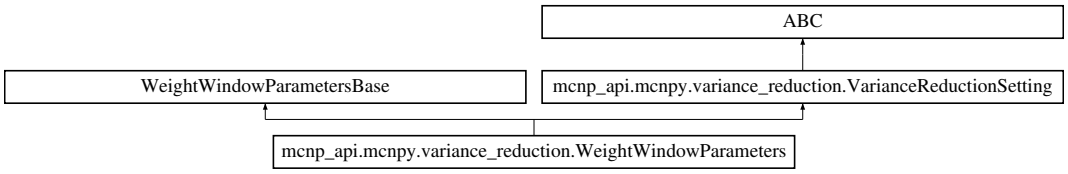
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.218 mcnp_api.mcnpy.variance_reduction.WeightWindowParameters Class Reference

WWP.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.WeightWindowParameters:




### 5.218.1 Detailed Description

WWP.

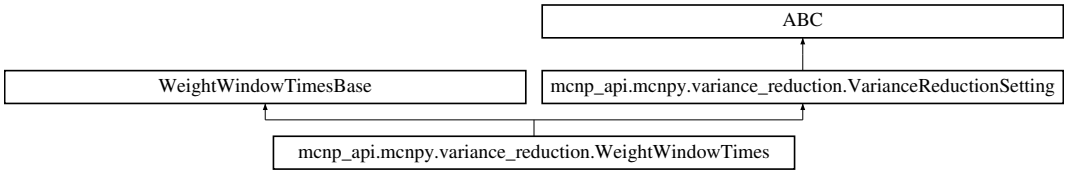
The documentation for this class was generated from the following file:

- variance_reduction.py

## 5.219 mcnp_api.mcnpy.variance_reduction.WeightWindowTimes Class Reference

WWT.

Inheritance diagram for mcnp_api.mcnpy.variance_reduction.WeightWindowTimes:




### 5.219.1 Detailed Description

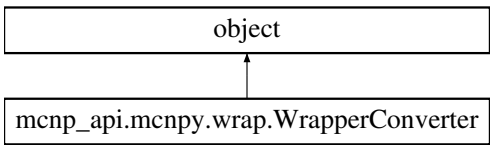
WWT.

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

- variance_reduction.py

## 5.220 mcnp_api.mcnpy.wrap.WrapperConverter Class Reference

Inheritance diagram for mcnp_api.mcnpy.wrap.WrapperConverter:




### Public Member Functions

- def **can_convert** (self, object)
- def **convert** (self, object, gateway_client)

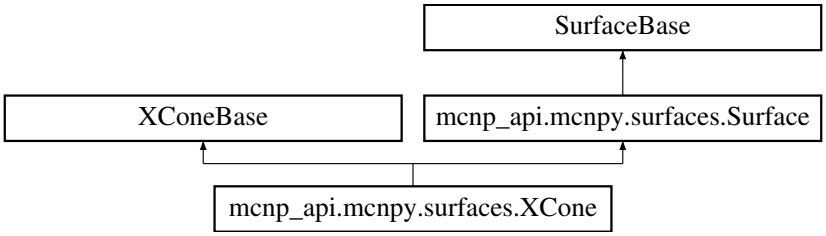
The documentation for this class was generated from the following file:

- wrap.py

## 5.221 mcnp_api.mcnpy.surfaces.XCone Class Reference

A cone parallel to the x-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.XCone:




### Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

### Public Attributes

- **name**
- **x0**
- **y0**
- **z0**
- **r2**
- **boundary_type**
- **comment**
- **sheet**

### 5.221.1 Detailed Description

A cone parallel to the x-axis.

`sheet` can be `+/-1`.

### 5.221.2 Member Function Documentation

#### 5.221.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.XCone.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.221.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.XCone.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

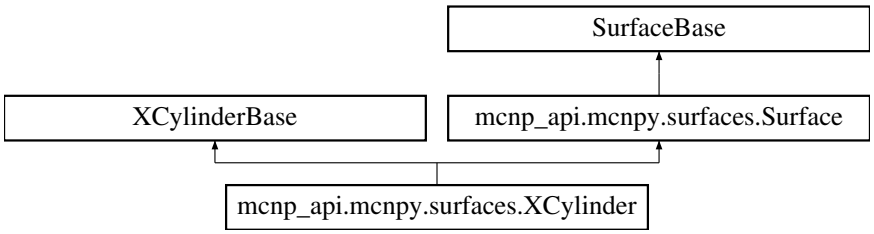
The documentation for this class was generated from the following file:

- surfaces.py

## 5.222 mcnp_api.mcnpy.surfaces.XCylinder Class Reference

A cylinder parallel to the x-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.XCylinder:



## Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

## Public Attributes

- **name**
- **y0**
- **z0**
- **r**
- **boundary_type**
- **comment**

### 5.222.1 Detailed Description

A cylinder parallel to the x-axis.

### 5.222.2 Member Function Documentation

#### 5.222.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.XCylinder.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.222.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.XCylinder.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

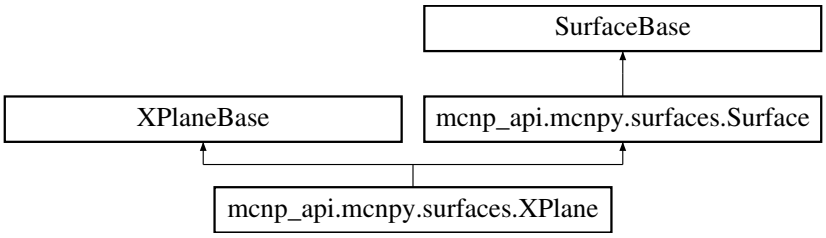
The documentation for this class was generated from the following file:

- surfaces.py

# 5.223 mcnp_api.mcnpy.surfaces.XPlane Class Reference

A plane defined by x - x0 = 0.

Inheritance diagram for mcnp_api.mcnpy.surfaces.XPlane:




## Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

## Public Attributes

- **name**
- **x0**
- **boundary_type**
- **comment**

## 5.223.1 Detailed Description

A plane defined by x - x0 = 0.

## 5.223.2 Member Function Documentation

### 5.223.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.XPlane.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.223.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.XPlane.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

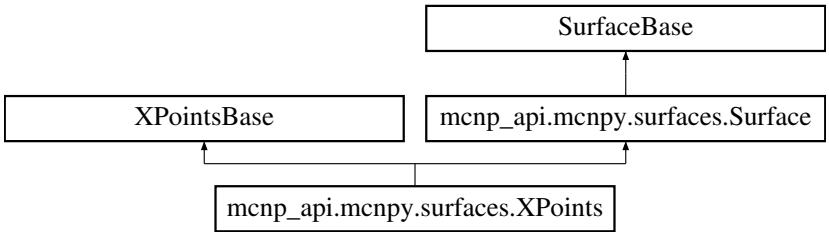
The documentation for this class was generated from the following file:

- surfaces.py

## 5.224 mcnp_api.mcnpy.surfaces.XPoints Class Reference

X symmetric surface defined by points.

Inheritance diagram for mcnp_api.mcnpy.surfaces.XPoints:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **points**
- **boundary_type**
- **comment**

### 5.224.1 Detailed Description

X symmetric surface defined by points.

### 5.224.2 Member Function Documentation

#### 5.224.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.XPoints.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

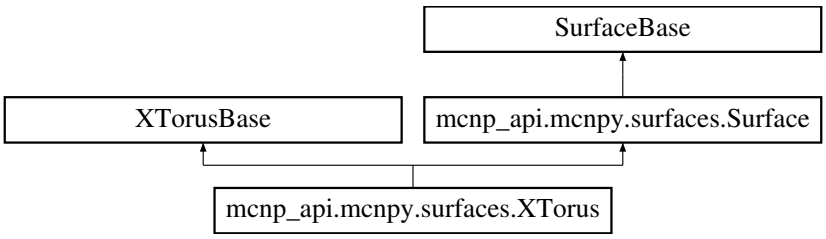
The documentation for this class was generated from the following file:

- surfaces.py

## 5.225 mcnp_api.mcnpy.surfaces.XTorus Class Reference

Torus parallel to x-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.XTorus:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **x0**
- **y0**
- **z0**
- **a**
- **b**
- **c**
- **boundary_type**
- **comment**

### 5.225.1 Detailed Description

Torus parallel to x-axis.

### 5.225.2 Member Function Documentation

#### 5.225.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.XTorus.get_coefficients (
            self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

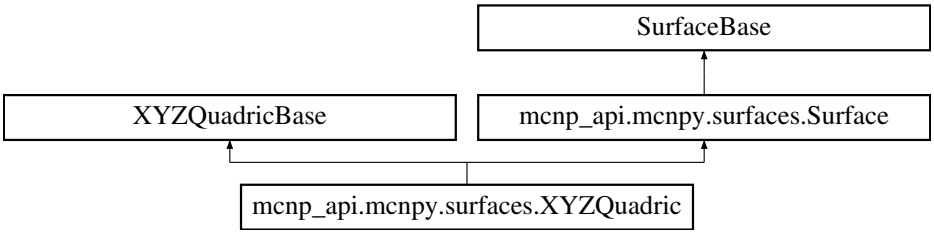
The documentation for this class was generated from the following file:

- surfaces.py

## 5.226 mcnp_api.mcnpy.surfaces.XYZQuadric Class Reference

Quadric (SQ) with axes parallel to x-, y-, or z-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.XYZQuadric:




### Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

### Public Attributes

- **name**
- **a**
- **b**
- **c**
- **d**
- **e**
- **f**
- **g**
- **x**
- **y**
- **z**
- **boundary_type**
- **comment**

### 5.226.1 Detailed Description

Quadric (SQ) with axes parallel to x-, y-, or z-axis.

### 5.226.2 Member Function Documentation

#### 5.226.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.XYZQuadric.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.226.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.XYZQuadric.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

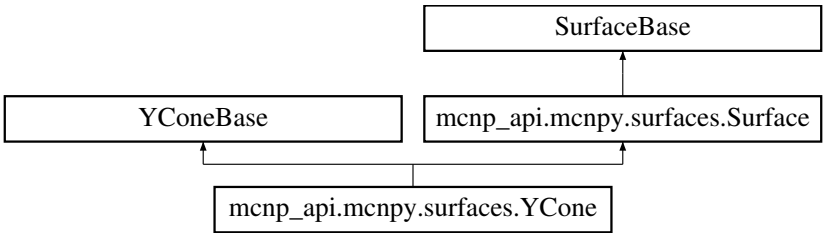
The documentation for this class was generated from the following file:

- surfaces.py

## 5.227 mcnp_api.mcnpy.surfaces.YCone Class Reference

A cone parallel to the y-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.YCone:




### Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

### Public Attributes

- **name**
- **x0**
- **y0**
- **z0**
- **r2**
- **boundary_type**
- **comment**
- **sheet**

## 5.227.1 Detailed Description

A cone parallel to the y-axis.

`sheet` can be `+/-1`.

## 5.227.2 Member Function Documentation

### 5.227.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.YCone.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

### 5.227.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.YCone.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

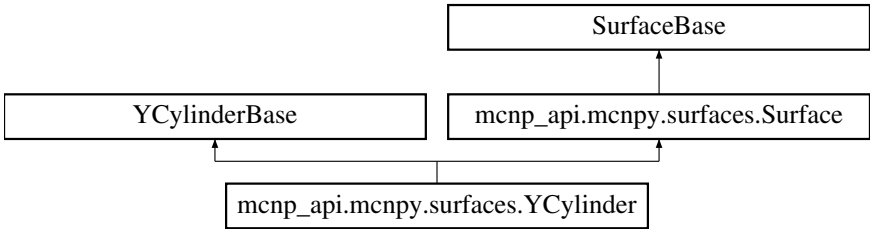
The documentation for this class was generated from the following file:

- surfaces.py

# 5.228 mcnp_api.mcnpy.surfaces.YCylinder Class Reference

A cylinder parallel to the y-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.YCylinder:




## Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

## Public Attributes

- **name**
- **x0**
- **z0**
- **r**
- **boundary_type**
- **comment**

## 5.228.1 Detailed Description

A cylinder parallel to the y-axis.

## 5.228.2 Member Function Documentation

### 5.228.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.YCylinder.get_base_coefficients (
            self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.228.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.YCylinder.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

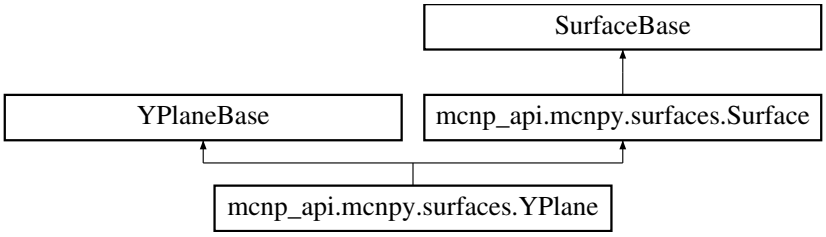
The documentation for this class was generated from the following file:

- surfaces.py

## 5.229 mcnp_api.mcnpy.surfaces.YPlane Class Reference

A plane defined by y - y0 = 0.

Inheritance diagram for mcnp_api.mcnpy.surfaces.YPlane:




### Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

### Public Attributes

- **name**
- **y0**
- **boundary_type**
- **comment**

### 5.229.1 Detailed Description

A plane defined by y - y0 = 0.

### 5.229.2 Member Function Documentation

#### 5.229.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.YPlane.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.229.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.YPlane.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

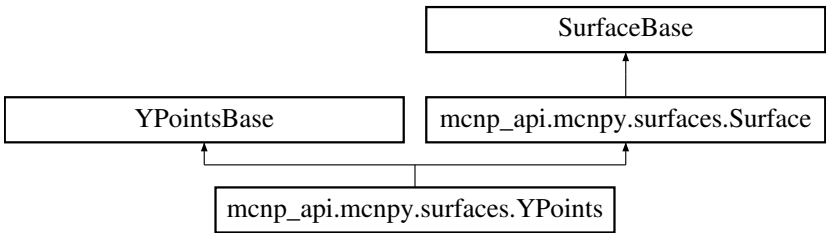
The documentation for this class was generated from the following file:

- surfaces.py

## 5.230 mcnp_api.mcnpy.surfaces.YPoints Class Reference

Y symmetric surface defined by points.

Inheritance diagram for mcnp_api.mcnpy.surfaces.YPoints:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **points**
- **boundary_type**
- **comment**

### 5.230.1 Detailed Description

Y symmetric surface defined by points.

### 5.230.2 Member Function Documentation

#### 5.230.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.YPoints.get_coefficients (
            self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

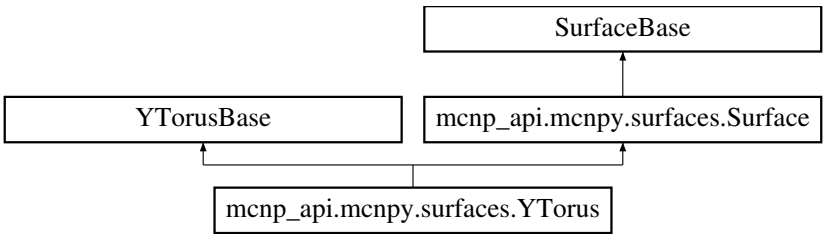
The documentation for this class was generated from the following file:

- surfaces.py

## 5.231 mcnp_api.mcnpy.surfaces.YTorus Class Reference

Torus parallel to y-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.YTorus:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **x0**
- **y0**
- **z0**
- **a**
- **b**
- **c**
- **boundary_type**
- **comment**

### 5.231.1 Detailed Description

Torus parallel to y-axis.

### 5.231.2 Member Function Documentation

#### 5.231.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.YTorus.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

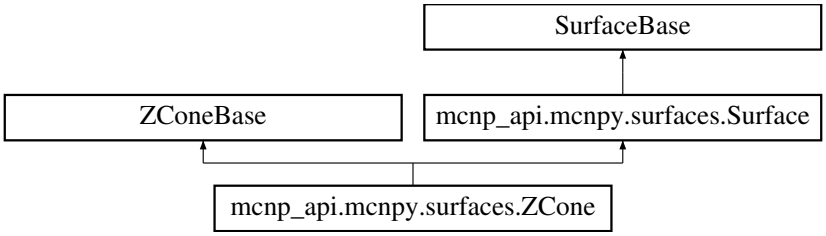
The documentation for this class was generated from the following file:

- surfaces.py

## 5.232 mcnp_api.mcnpy.surfaces.ZCone Class Reference

A cone parallel to the z-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.ZCone:




### Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

### Public Attributes

- **name**
- **x0**
- **y0**
- **z0**
- **r2**
- **boundary_type**
- **comment**
- **sheet**

### 5.232.1 Detailed Description

A cone parallel to the z-axis.

`sheet` can be `+/-1`.

### 5.232.2 Member Function Documentation

#### 5.232.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.ZCone.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.232.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.ZCone.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

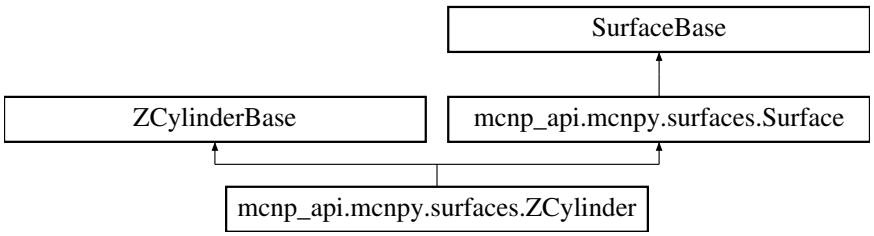
The documentation for this class was generated from the following file:

- surfaces.py

## 5.233 mcnp_api.mcnpy.surfaces.ZCylinder Class Reference

A cylinder parallel to the z-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.ZCylinder:



## Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

## Public Attributes

- **name**
- **x0**
- **y0**
- **r**
- **boundary_type**
- **comment**

### 5.233.1 Detailed Description

A cylinder parallel to the z-axis.

### 5.233.2 Member Function Documentation

#### 5.233.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.ZCylinder.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.233.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.ZCylinder.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

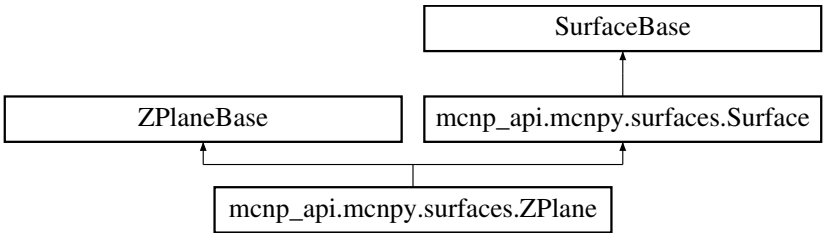
The documentation for this class was generated from the following file:

- surfaces.py

## 5.234 mcnp_api.mcnpy.surfaces.ZPlane Class Reference

A plane defined by z - z0 = 0.

Inheritance diagram for mcnp_api.mcnpy.surfaces.ZPlane:




### Public Member Functions

- def get_coefficients (self)
- def get_base_coefficients (self)

  *Returns coefficients for general quadric (GQ).*
- def **__str__** (self)

### Public Attributes

- **name**
- **z0**
- **boundary_type**
- **comment**

### 5.234.1 Detailed Description

A plane defined by z - z0 = 0.

### 5.234.2 Member Function Documentation

#### 5.234.2.1 get_base_coefficients()

```
def mcnp_api.mcnpy.surfaces.ZPlane.get_base_coefficients (
              self )
```

Returns coefficients for general quadric (GQ).

Used for transformations.

#### 5.234.2.2 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.ZPlane.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

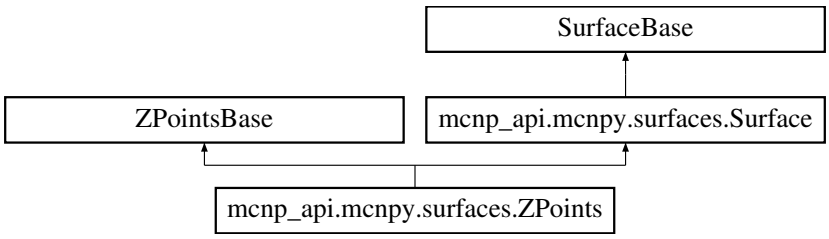
The documentation for this class was generated from the following file:

- surfaces.py

## 5.235 mcnp_api.mcnpy.surfaces.ZPoints Class Reference

Z symmetric surface defined by points.

Inheritance diagram for mcnp_api.mcnpy.surfaces.ZPoints:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **points**
- **boundary_type**
- **comment**

### 5.235.1 Detailed Description

Z symmetric surface defined by points.

### 5.235.2 Member Function Documentation

#### 5.235.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.ZPoints.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

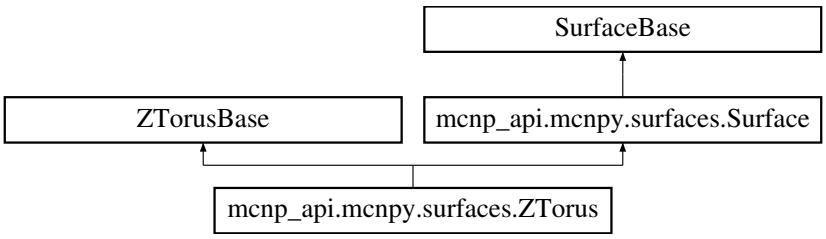
The documentation for this class was generated from the following file:

- surfaces.py

## 5.236 mcnp_api.mcnpy.surfaces.ZTorus Class Reference

Torus parallel to z-axis.

Inheritance diagram for mcnp_api.mcnpy.surfaces.ZTorus:




### Public Member Functions

- def get_coefficients (self)
- def **__str__** (self)

### Public Attributes

- **name**
- **x0**
- **y0**
- **z0**
- **a**
- **b**
- **c**
- **boundary_type**
- **comment**

### 5.236.1 Detailed Description

Torus parallel to z-axis.

## 5.236.2 Member Function Documentation

### 5.236.2.1 get_coefficients()

```
def mcnp_api.mcnpy.surfaces.ZTorus.get_coefficients (
              self )
```

Reimplemented from mcnp_api.mcnpy.surfaces.Surface.

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

- surfaces.py

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