My Project

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Chapter 1

Namespace Index

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Chapter 4

Namespace Documentation

4.1 openbu.passlist Namespace Reference

Classes

- class Neg_decay
- class Neg_xs
- class Nuc_xs_not_found
- class Passlist

4.1.1 Detailed Description

```
Create list of passport, set mass, decay and xs
```

4.2 openbu.passport Namespace Reference

Classes

- class Incorrect_nuc_id
- class No_fission_XS
- class Not_a_Fission_Product
- class Nuc_xs_not_found
- class Passport
- class XS_not_yet_set

4.2.1 Detailed Description

```
This module defines the Python class passport used in Open-Burnup
```

4.3 openbu.salameche.cram Namespace Reference

Functions

4.3.1 Detailed Description

Compute the solution of the matricial depletion equation using the CRAM method

4.3.2 Function Documentation

4.3.2.1 CRAM16()

```
def openbu.salameche.cram.CRAM16 (
              At,
              N_0 )
```

CRAM uses the Chebishev rational approximation method to compute the solution of the matricial depletion equat

4.4 openbu.salameche.mat_builder Namespace Reference

Functions

4.4.1 Detailed Description

Uses the passport list to build the transmutation matrix

4.4.2 Function Documentation

4.4.2.1 _get_decay_mat()

```
def openbu.salameche.mat_builder._get_decay_mat (
              passlist )  [private]
```

Build the cross section matrix

4.4.2.2 _get_xs_mat()

```
def openbu.salameche.mat_builder._get_xs_mat (
              passlist )  [private]
```

Build the cross section matrix

4.5 openbu.utils.reactions_class Namespace Reference

Classes

- class decay_lib
- class Empty_data
- class fy_lib
- class xs_lib

4.5.1 Detailed Description

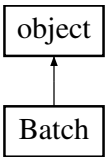
This module defines multiple Python class that are designed to be used by the user when using the Python environment to define and launch an OpenBU calculation

Chapter 5

Class Documentation

5.1 Batch Class Reference

Inheritance diagram for Batch:



Public Member Functions

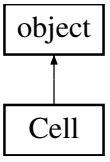
Private Attributes

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

- nax/functions.py

5.2 Cell Class Reference

Inheritance diagram for Cell:



Public Member Functions

Public Attributes

Static Public Attributes

Private Member Functions

Private Attributes

Static Private Attributes

5.2.1 Member Function Documentation

5.2.1.1 bu_sec_conv_factor()

```
def bu_sec_conv_factor (
              self )
```

```
Returns the absolute values of the decay constant of the nuclide
```

5.2.1.2 ihm()

```
def ihm (
              self )
```

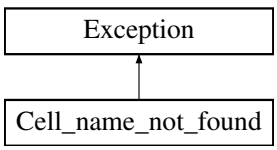
```
Returns the absolute values of the decay constant of the nuclide
```

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

- cell.py

5.3 Cell_name_not_found Class Reference

Inheritance diagram for Cell_name_not_found:

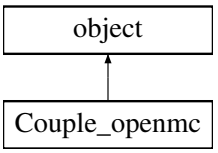


The documentation for this class was generated from the following file:

- system.py

5.4 Couple_openmc Class Reference

Inheritance diagram for Couple_openmc:



Public Member Functions

Public Attributes

Static Public Attributes

Private Member Functions

Private Attributes

5.4.1 Member Data Documentation

5.4.1.1 _initial_summary

`_initial_summary [private]`

OpenMC Summary src does not close the hdf5 file it opens When OpenBU tries to shutil.rmtree the pre_run folder, it can't because a stream to summary.h5 is still open We therefore close it here !!!! This should be modified in OpenMC at some points ##########.

!!!! This should be modified in OpenMC at some points ##########

5.4.1.2 _updated_summary

`_updated_summary [private]`

OpenMC Summary src does not close the hdf5 file it opens When OpenBU tries to shutil.rmtree the pre_run folder, it can't because a stream to summary.h5 is still open We therefore close it here !!!! This should be modified in OpenMC at some points ##########.

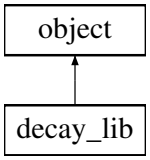
!!!! This should be modified in OpenMC at some points ##########

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

- couple/couple_openmc.py

5.5 decay_lib Class Reference

Inheritance diagram for decay_lib:



Public Member Functions

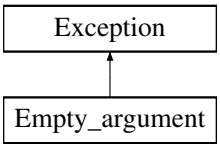
Private Attributes

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

- utils/reactions_class.py

5.6 Empty_argument Class Reference

Inheritance diagram for Empty_argument:



5.6.1 Detailed Description

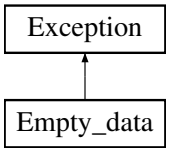
```
Raise when the user calls decay_halflife_conv without entering any argument
```

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

- utils/functions.py

5.7 Empty_data Class Reference

Inheritance diagram for Empty_data:



5.7.1 Detailed Description

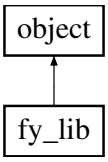
```
Raise when the user does not enter any data while add_data has been called for a nuclide
```

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

- utils/reactions_class.py

5.8 fy_lib Class Reference

Inheritance diagram for fy_lib:



Public Member Functions

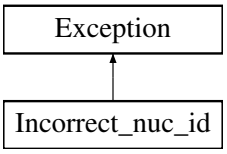
Private Attributes

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

- utils/reactions_class.py

5.9 Incorrect_nuc_id Class Reference

Inheritance diagram for Incorrect_nuc_id:



5.9.1 Detailed Description

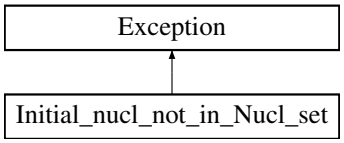
```
Raise when the id input format in passport instantiation is incorrect
```

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

- passport.py

5.10 Initial_nucl_not_in_Nucl_set Class Reference

Inheritance diagram for Initial_nucl_not_in_Nucl_set:



5.10.1 Detailed Description

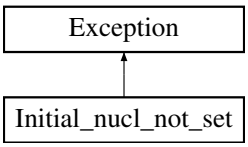
```
Raise when the user forgot to set the initial nuclide of the cell and tries to burn cell
```

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

- cell.py

5.11 Initial_nucl_not_set Class Reference

Inheritance diagram for Initial_nucl_not_set:



5.11.1 Detailed Description

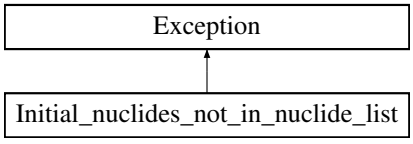
```
Raise when the user forgot to set the initial nuclide of the cell and tries to burn cell
```

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

- cell.py

5.12 Initial_nuclides_not_in_nuclide_list Class Reference

Inheritance diagram for Initial_nuclides_not_in_nuclide_list:



5.12.1 Detailed Description

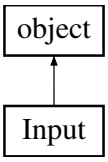
```
Raise when some initial nuclides are not included in nucl_list
```

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

- couple/couple_openmc.py

5.13 Input Class Reference

Inheritance diagram for Input:



Public Member Functions

Public Attributes

Private Member Functions

Private Attributes

Static Private Attributes

5.13.1 Detailed Description

```
input reads, stores and process the input data in the input file provided by the user
```

5.13.2 Member Function Documentation

5.13.2.1 cell_id_list()

```
def cell_id_list (
              self )
```

```
Returns the absolute values of the decay constant of the nuclide
```

5.13.2.2 cells()

```
def cells (
              self )
```

Returns the absolute values of the decay constant of the nuclide

5.13.2.3 lib()

```
def lib (
              self )
```

Returns the absolute values of the decay constant of the nuclide

5.13.2.4 mode()

```
def mode (
              self )
```

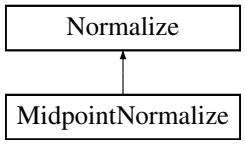
Returns the absolute values of the decay constant of the nuclide

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

- input.py

5.14 MidpointNormalize Class Reference

Inheritance diagram for MidpointNormalize:



Public Member Functions

Public Attributes

5.14.1 Detailed Description

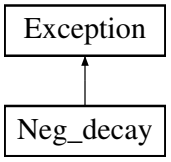
```
Normalise the colorbar so that diverging bars work there way either side from a prescribed midpoint value)
e.g. im=ax1.imshow(array, norm=MidpointNormalize(midpoint=0.,vmin=-100, vmax=100))
```

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

- utils/functions.py

5.15 Neg_decay Class Reference

Inheritance diagram for Neg_decay:



5.15.1 Detailed Description

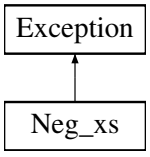
```
Raise when a negative decay constant is found
```

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

- passlist.py

5.16 Neg_xs Class Reference

Inheritance diagram for Neg_xs:



5.16.1 Detailed Description

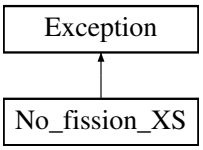
```
Raise when a negative cross-section is found
```

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

- passlist.py

5.17 No_fission_XS Class Reference

Inheritance diagram for No_fission_XS:



5.17.1 Detailed Description

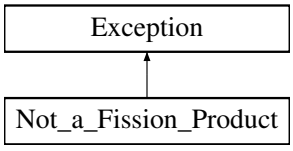
```
Raise when the user tries to access fission XS for a nuclide which fission XS have not been set yet
```

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

- passport.py

5.18 Not_a_Fission_Product Class Reference

Inheritance diagram for Not_a_Fission_Product:



5.18.1 Detailed Description

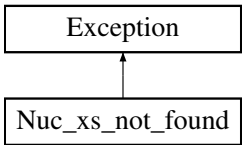
```
Raise when the user tries to set fission yields for a non fission product nuclide
```

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

- passport.py

5.19 Nuc_xs_not_found Class Reference

Inheritance diagram for Nuc_xs_not_found:



5.19.1 Detailed Description

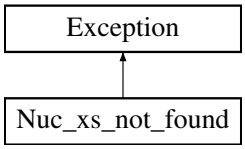
```
Raise when the user requests a cross-sections of a nuclide that is not in the nuclide set
```

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

- passport.py

5.20 Nuc_xs_not_found Class Reference

Inheritance diagram for Nuc_xs_not_found:



5.20.1 Detailed Description

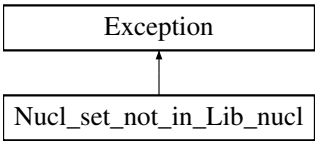
```
Raise when the user requests a cross-sections of a nuclide that is not in the nuclide set
```

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

- passlist.py

5.21 Nucl_set_not_in_Lib_nucl Class Reference

Inheritance diagram for Nucl_set_not_in_Lib_nucl:



5.21.1 Detailed Description

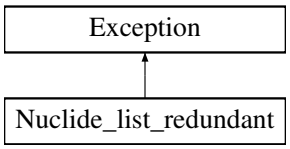
```
Raise when the user forgot to set the initial nuclide of the cell and tries to burn cell
```

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

- cell.py

5.22 Nuclide_list_redundant Class Reference

Inheritance diagram for Nuclide_list_redundant:

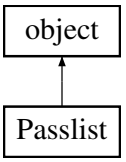


The documentation for this class was generated from the following file:

- cell.py

5.23 Passlist Class Reference

Inheritance diagram for Passlist:



Public Member Functions

Private Member Functions

Private Attributes

5.23.1 Member Function Documentation

5.23.1.1 _get_name_passport_dict()

```
def _get_name_passport_dict (
              self )  [private]
```

Convert the list of passport into a dictionnary of passports where entries are the zamid of the nuclides

5.23.1.2 _get_zamid_passport_dict()

```
def _get_zamid_passport_dict (
              self )  [private]
```

Convert the list of passport into a dictionnary of passports where entries are the zamid of the nuclides

5.23.1.3 _overwrite_xs()

```
def _overwrite_xs (
              self,
              xs_dict )  [private]
```

Read and set the cross sections for each nuclide in the passports list

5.23.1.4 _set_decay()

```
def _set_decay (
              self,
              decay_lib_b,
              decay_lib_a )  [private]
```

Read and set the decay constants for each nuclide in the passports list

5.23.1.5 _set_fy()

```
def _set_fy (
              self,
              fy_dict )  [private]
```

Read and set the fission yields for fission products in the passports list

5.23.1.6 _set_mass()

```
def _set_mass (
              self,
              passport_list )  [private]
```

Read and set the atomic mass for each nuclide in the passports list

5.23.1.7 _set_xs()

```
def _set_xs (
              self,
              xs_dict )  [private]
```

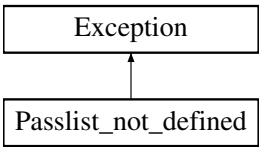
Read and set the cross sections for each nuclide in the passports list

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

- passlist.py

5.24 Passlist_not_defined Class Reference

Inheritance diagram for Passlist_not_defined:



5.24.1 Detailed Description

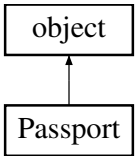
Raise when the user forgot to defined passlist for a cell

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

- cell.py

5.25 Passport Class Reference

Inheritance diagram for Passport:



Public Member Functions

Public Attributes

Private Member Functions

Private Attributes

Static Private Attributes

5.25.1 Detailed Description

```
passport stores all the relevant data of indivudual nuclides and offers methods to extract information on them

   The passport class is individually instantiated for each nuclide. It contains two types of information: con
   Constant data, such as the atomic mass, decay constant or the element's family (actinide, fission product)
   Variable data such as cross sections or fission yields do vary during a simulation and need thus to be upda
   Some of the data are created at the time of the instantiation of the class for a nuclide such as the elemen
   neutron reaction daughters. Other type of data, typically large in size such as cross sections and decay co
   A setter method will enable any script that reads the data source to set this data for the passport of a sp
   the code of Open-Burnup to set the data for a list of passports. The other way to explicitly set the data i
   go to the data source itself, read the data and set it for the passport of a specific nuclide. This method
   user-friendly way to get information on individual nuclides.

   Attributes:
       * **decay_a:** returns the absolute value of the decay constants of the nuclide
       * **decay_b:** returns the percent fraction value of the decay constants of the nuclide
       * **fy:** returns the value of fission yields in percent
       * **mass:** returns the atomic mass of the nuclide
       * **xs:** returns the absolute value of cross sections for the nuclide
       * **FAM:** returns the family group name of the nuclide
       * **xs_relatives:** returns neutron reaction's daughter nuclides' id
       * **decay_relatives:** returns decay reaction's daughter nuclides' id

   Methods:
       * **set_mass():** set the atomic mass of the nuclide
       * **set_decay():** set the decay constants (both absolute values and percent fractions) of the nuclide
       * **set_xs():** set the cross sections of the nuclide
       * **set_fy():** set the fission yields of the nuclide
       * **load_mass():** load the atomic mass of the nuclide
       * **load_decay():** load the decay constants (both absolute values and percent fractions) of the nuclid
       * **load_mass():** load the cross sections of the nuclide
       * **load_mass():** load the fission yields of the nuclide
       * **get__zamid():** returns the zzaaam id of the nuclide
       * **get_nuc_name():** returns the name of the nuclide
```

5.25.2 Member Function Documentation

5.25.2.1 _set_initial_dens()

```
def _set_initial_dens (
              self,
              new_dens )  [private]
```

set new dens to current dens and append to dens_seqor

5.25.2.2 _set_state()

```
def _set_state (
              self )  [private]
```

Returns the state of the nuclide (excited or ground state)

5.25.2.3 current_dens() [1/2]

```
def current_dens (
              self )
```

Returns the density of the nuclide in atom per cm^3

5.25.2.4 current_dens() [2/2]

```
def current_dens (
              self,
              new_dens )
```

set the density of the nuclide in atom per cm^3

5.25.2.5 current_xs()

```
def current_xs (
              self )
```

Returns the cross sections data of the nuclide

5.25.2.6 decay_a()

```
def decay_a (
              self )
```

Returns the absolute values of the decay constant of the nuclide

5.25.2.7 decay_b()

```
def decay_b (
              self )
```

Returns the fraction percent values of the decay constant of the nuclide

5.25.2.8 decay_child()

```
def decay_child (
              self )
```

Returns the decay reactions' daughter products

5.25.2.9 decay_parent()

```
def decay_parent (
              self )
```

Returns the decay reactions' daughter products

5.25.2.10 fy()

```
def fy (
              self )
```

Returns the fission yields data in percent

5.25.2.11 get_a()

```
def get_a (
              self )
```

Returns the mass number of the nuclide

5.25.2.12 get_z()

```
def get_z (
              self )
```

Returns the atomic number of the nuclide

5.25.2.13 load_decay()

```
def load_decay (
              self )
```

Load the decay constant value of the nuclide

This method directly fetches the decay constant values from the source data and automatically set of the passport object

5.25.2.14 load_fy()

```
def load_fy (
              self )
```

Load the fission yields data of the nuclide

This method directly fetches the fission yields data from the source data and automatically set of the passport object

If the nuclide for which the fission yields data are being loaded is not a fission product, the error *Not_a_Fission_Product* will be raised

5.25.2.15 load_mass()

```
def load_mass (
              self )
```

Load the atomic mass of the nuclide in gram

This method directly fetches the atomic mass from the source data and automatically set
of the passport object

5.25.2.16 load_xs()

```
def load_xs (
              self )
```

Load the cross sections data of the nuclide

This method directly fetches the cross sections data from the source data and automatically set
of the passport object

5.25.2.17 mass()

```
def mass (
              self )
```

Return the atomic mass of the nuclide in gram

5.25.2.18 set_decay()

```
def set_decay (
              self,
              decay_a,
              decay_b )
```

Set the absolute and fracional values of the decay constant of the nuclide

5.25.2.19 xs_child()

```
def xs_child (
              self )
```

Returns the neutron reactions' daughter products

5.25.2.20 xs_parent()

```
def xs_parent (
              self )
```

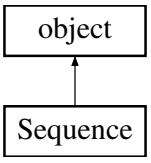
Returns the neutron reactions' daughter products

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

- passport.py

5.26 Sequence Class Reference

Inheritance diagram for Sequence:



Public Member Functions

Public Attributes

Private Member Functions

Private Attributes

5.26.1 Member Function Documentation

5.26.1.1 _set_initial_flux()

```
def _set_initial_flux (
              self,
              new_flux )  [private]
```

set new new_flux to current flux and append to flux sequence

5.26.1.2 _set_initial_pow_dens()

```
def _set_initial_pow_dens (
              self,
              new_pow_dens )  [private]
```

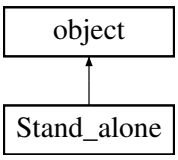
set new new_pow_dens to current pow_dens and append to pow_dens sequence

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

- sequence.py

5.27 Stand_alone Class Reference

Inheritance diagram for Stand_alone:



Public Member Functions

Public Attributes

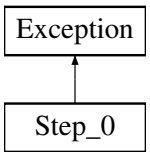
Private Attributes

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

- standalone.py

5.28 Step_0 Class Reference

Inheritance diagram for Step_0:



5.28.1 Detailed Description

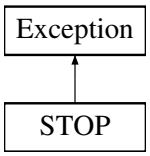
`Raise when the user try to access subinterval for the first step`

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

- sequence.py

5.29 STOP Class Reference

Inheritance diagram for STOP:



5.29.1 Detailed Description

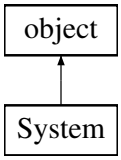
`Just a way to stop the code`

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

- couple/couple_openmc.py

5.30 System Class Reference

Inheritance diagram for System:



Public Member Functions

Public Attributes

Private Member Functions

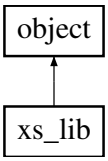
Private Attributes

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

- system.py

5.31 xs_lib Class Reference

Inheritance diagram for xs_lib:



Public Member Functions

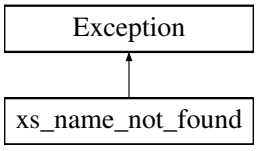
Private Attributes

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

- utils/reactions_class.py

5.32 xs_name_not_found Class Reference

Inheritance diagram for xs_name_not_found:



5.32.1 Detailed Description

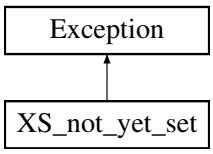
```
Raise when the user tries to access fission XS for a nuclide which fission XS have not been set yet
```

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

- utils/data_processor.py

5.33 XS_not_yet_set Class Reference

Inheritance diagram for XS_not_yet_set:



5.33.1 Detailed Description

```
Raise when the user tries to access XS for a nuclide which XS have not been set yet
```

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

- passport.py

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