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# **extinctions Documentation**

***Release 0.1.11***

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**Aug 09, 2017**



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## Contents

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**Warning:** Package under development



### extinctions

Python package including different extinction laws and dust maps. Useful to

- get  $E(B-V)$  for a set of coordinates (or list of coordinates) from different
  - distant sources (IRSA, NED)
  - local maps (SFD98, Schlafly 2014, Planck 2013, Green 2015)
- compute the ISM transmission for different extinction laws
  - CCM89: Cardelli, Clayton and Mathis (<http://adsabs.harvard.edu/abs/1989ApJ...345..245C>)
  - OD94: O'Donnell (<http://adsabs.harvard.edu/abs/1994ApJ...422..158O>)
  - FM98: Fitzpatrick & Massa (1998)
  - G08: Goobar (<http://adsabs.harvard.edu/abs/2008ApJ...686L.103G>)

### Installation

To install:

```
git clone https://github.com/nicolaschotard/extinctions.git
pip install extinctions/
```

To install in a local directory mypath, use:

```
pip install --prefix='mypath' extinctions/
```

and do not forget to add it to your PYTHONPATH.

To upgrade to a new version (after a `git pull` or a local modification), use:

```
pip install --upgrade (--prefix='mypath') extinctions/
```

To install a release version (no release version available yet):

```
pip install http://github.com/nicolaschotard/extinctions/archive/v0.1.tar.gz
```

Also works with the master:

```
pip install (--upgrade) https://github.com/nicolaschotard/extinctions/archive/master.  
→ zip
```

In the future, release versions will be listed at this [location](#).

## Dependencies

*extinctions* has a few python dependencies listed in the requirements file. To install them all, use:

```
pip install -r requirements.txt
```

Requirements are:

- numpy==1.11.2
- scipy==0.17.1
- matplotlib==1.5.1
- seaborn==0.7.0
- pyyaml==3.11
- astropy==1.2.1
- requests==2.10.0
- astroquery==0.3.1
- wget==2.2
- healpy==1.9.1

## Dust map setup

You can automatically download the dust maps listed in the `maps.yaml` file using the script `get_maps.py`. It will, by default, put them in `$HOME/.extinction/maps`, but other locations are of course possible (option `-outdir`). If you choose to store them in an other directory, you must set a `$MAPSDIR` environment variable pointing to it. Already existing maps in the output directory will not be downloaded again.

The available dust maps are:

- [SFD98](#), full sky Healpy format
- SFD98 [north](#) and [south](#) dust maps
- [Planck](#)
- [Schlafly 2014](#)
- [Green 2015](#)



## Download the maps

To download the extinction maps listed above, use the script `get_maps.py`. The following options are available:

```
get_maps.py -h
usage: get_maps.py [-h] [--outdir OUTDIR] [--update] [--list]
                  [--select SELECT] [--exclude EXCLUDE]

optional arguments:
  -h, --help            show this help message and exit
  --outdir OUTDIR       Output directory in where to put the dust maps
  --update              Update the maps directory in case of changes of maps.yaml
  --list                List of available maps and exit
  --select SELECT       Select maps to download (coma separated)
  --exclude EXCLUDE     Exclude map(s) (coma separated). If the select option is
                        used, the exclude option will be ignored.
```

## Usage

### Get E(B-V)

Here is an example of how to get the value of E(B-V) for a set of coordinates (RA,DEC):

```
In [1]: ra, dec = 340.83, -9.59 # could also be arrays or list of ra/dec
In [2]: from extinctions import reddening
In [3]: red = reddening.Reddening(ra, dec) # ra dec can also be lists of coordinates
INFO: Loading the maps from local directory /home/chotard/.extinction/maps/
- green is loaded
- schlafly is loaded
- sfd is loaded
- planck is loaded
```

You can then get E(B-V) from different sources:

```
# from the local maps
In [4]: red.query_local_map(dustmap='sfd')
Out[4]: 0.047723956233310674
In [5]: red.query_local_map(dustmap='schlafly')
Out[5]: 0.062566755984547445
In [6]: red.query_local_map(dustmap='planck')
Out[6]: 0.052058338535565914
In [7]: red.query_local_map(dustmap='green')
Out[7]: 0.035786284169101318

# from the SFD98 north/south maps using `sncosmo`
In [8]: red.from_sncosmo()
Out[8]: array([ 0.0473752])

# Using astroquery
In [9]: red.from_astroquery()
Downloading http://irsa.ipac.caltech.edu//workspace/TMP_XG1Joz_30445/DUST/340.8300_-9.
↪5900.v0001/extinction.tbl
=====
↪4.3k/4.3k (100.00%) 0s
```

```
Out [9]: [0.047377326565143825]
```

## Make some plots

To have a look at the different extinction laws and dust maps, you can use the script *extinction\_plots.py*.

## CHAPTER 2

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### Figures

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## **extinction package**

### **Subpackages**

**extinction.extern package**

### **Submodules**

**extinction.extern.argonaut module**

**extinction.extern.others module**

**extinction.extern.snfactory module**

## Module contents

### Submodules

`extinction.extinction module`

`extinction.reddening module`

`extinction.utils module`

## Module contents

## Indices and tables

- [genindex](#)
- [modindex](#)
- [search](#)