ASTR400B Leach

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This is documentation for code written during course ASTR 400B, Theoretical Astrophysics, running at the University of Arizona's Steward Observatory, Spring 2020.

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GitHub: https://github.com/colinleach/400B_Leach

GALAXY CLASS

This will read in a data file for a given galaxy and snap, returning the data in a variety of formats.

class galaxy.galaxy.**Galaxy**(*name*, *snap=0*, *datadir=None*)

> **Args:**
>
> > **name (str):** short name used in filename of type 'name_000.txt', eg 'MW', 'M31'.
>
> **Kwargs:**
>
> > **snap (int):** Snap number, equivalent to time elapsed. Zero is starting conditions.
> >
> > **datadir (str):** Directory to search first for the required file. Optional, and a default list of locations will be searched.
>
> **Class attributes:**
>
> > **path (*pathlib.Path* object):** directory containing the data file
> >
> > **filename (str):** in *name_snap.txt* format, something like 'MW_000.txt'
> >
> > **data (np.ndarray):** type, mass, position_xyz, velocity_xyz for each particle
>
> A class to find, read and manipulate files for a single galaxy.
>
> **get_filepath**(*datadir*)
>
> > **Args:** datadir (str): path to search first for the required file
> >
> > **Returns:** *pathlib.Path* object. A directory containing the file.
> >
> > **Raises:** FileNotFoundError
> >
> > Pretty boring housekeeping code, but may make things more resilient.
>
> **read_file**()
>
> > Read in a datafile in np.ndarray format, store in *self.data*.
> >
> > **Requires:** *self.path* and *self.filename* are already set.
> >
> > **Returns:** nothing
>
> **filter_by_type**(*type*, *dataset=None*)
>
> > **Args:** type (int): for particles, 1=DM, 2=disk, 3=bulge
> >
> > **Kwargs:** dataset (np.ndarray): a starting dataset other than self.data
> >
> > **Returns:** np.ndarray: subset data
>
> **single_particle_properties**(*type=None*, *particle_num=0*)
>
> > **Kwargs:**

> > **type (int):** a subset of the data filtered by 1=DM, 2=disk, 3=bulge
>
> > **particle_num (int):** zero-based index to an array of particles
>
> **returns:**
>
> > **3-tuple of** Euclidean distance from CoM (kpc), Euclidean velocity magnitude (km/s), particle mass (M_sun)

all_particle_properties(*type=None*)

> **Kwargs:**
>
> > **type (int):** a subset of the data filtered by 1=DM, 2=disk, 3=bulge
>
> **Returns:** QTable: The full list with units, optionally filtered by type.

get_array()

> **Returns:** data in *np.ndarray* format
>
> Pretty superfluous in Python (which has no private class members)

get_df()
> Returns: data as pandas dataframe

get_qtable()
> Returns: data as astropy QTable, with units

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