API Documentation

API Documentation

August 11, 2014

Contents

1 Package pycosmicstar

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

1.1 Modules

2 Module pycosmicstar.cosmicstarformation

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

2.1 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`
___status___	Cosmic Star Formation Rate This file is part of pystar. copyright : Eduardo dos Santos Pereira pystar is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License. pystar is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details. You should have received a copy of the GNU General Public License along with Foobar. If not, see <http://www.gnu.org/licenses/>. **Value:** `'Stable'`
pyversion	**Value:** `sys.version_info(major=2, minor=7, micro=6, releaselevel=...`
___package___	**Value:** `'pycosmicstar'`

2.2 Class cosmicstarformation

pycosmicstar.structuresabstract.structuresabstract
└ pycosmicstar.structures.structures
└ **pycosmicstar.cosmicstarformation.cosmicstarformation**

```
The Cosmic Star Formation rate
The model used to develop this class was presented by the first time
in the article of Pereira and Miranda (2010) - (MNRAS, 401, 1924, 2010).

The cosmologic background model is passed as a instance parameter:
    cosmology
```

```
Keyword arguments:
    tau -- (default - 2.5) time scale, in Gyr, of the CSFR.

    eimf -- (default 1.35) exponent of the Initial Mass Function

    nsch -- (default 1) the normalization factor in the CSFR model

    imfType -- (default S - Salpeter) the Initial Mass Function Type.
               Possible values:
                   S: Salpeter
                   K: Kroupa

    lmin -- (default 6.0) log10 of the minal mass of the dark halo
                         where it is possible to have star formation.

    zmax -- (defaul 20.0) - the maximum redshift to be considered

    omegam -- (default 0.24) - The dark matter parameter

    omegab -- (default 0.04) - The barionic parameter

    omegal -- (default 0.73) - The dark energy parameter

    h -- (default 0.7) - The h of the Hubble constant (H = h * 100)

    massFunctionType -- (default "ST") The type of mass
    function of dark matter halos used. Possibles values:
         "ST" for Seth and Thormen mass function.
         "TK" for Tinker et al. mass function.
```

2.2.1 Methods

___init___(*self*, *cosmology*, *tau*=2.29, *eimf*=1.35, *nsch*=1, *lmin*=6.0, *zmax*=20.0, *imfType*='S', ***kwargs*)

Overrides: pycosmicstar.structures.structures.___init___

getIMFDict(*self*)

Return a list with keys and functions of IMF's

putIMFDict(*self*, *key*, *value*)

Put a new term in the imf Dictionary

remnant(*self*, *m*)

Return the remnant mass of the object after the colapse of the star with mass m

phi(*self*, *m*)

Return the Initial Mass Function

cosmicStarFormationRate(*self*, *z*)

Return the Cosmic Star Formation rate as a function of z

Overrides: pycosmicstar.structuresabstract.structuresabstract.cosmicStarFormationRate

gasDensityInStructures(*self*, *z*)

Return the barionic gas density into structures

Overrides: pycosmicstar.structuresabstract.structuresabstract.gasDensityInStructures

Inherited from pycosmicstar.structures.structures(Section 16.2)

abt(), fbstruc(), fstm(), getCacheDir(), getDeltaHTinker(), getmassFunctionDict(), halos_n(), massFunction(), numerical_density_halos(), setDeltaHTinker(), setMassFunctionDict(), setQBurrFunction()

3 Package pycosmicstar.cosmolib

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

3.1 Modules

- **lcdmlib**: This module 'lcdmlib' is auto-generated with f2py (version:2). *(Section 4, p. 7)*

4 Module pycosmicstar.cosmolib.lcdmlib

```
This module 'lcdmlib' is auto-generated with f2py (version:2).
Functions:
  about()
  init(omegab1,omegam1,omegal1,h1)
  dtdz = dtdz(z)
  rz = rz(z)
  g = g(z)
  dr_dz = dr_dz(z)
  dv_dz = dv_dz(z)
  age = age(z)
  km,sg = sigma(anorm,alfa1,beta1,gama1,ct2,kmass)
  dsigma2_dk = dsigma2_dk(kl)
  grow = grow(z)
  rhodmz = rhodm(rhodm0,z)
  rhobrz = rhobr(rhob0,z)
  yarray = rk4_int(fun,y,harray,xarray,fun_extra_args=())
  res = romberg(func,a,b,tol,func_extra_args=())
  r = richardson(r,k)
  lnew = trapezoid(func,a,b,iold,k,func_extra_args=())
  jl = locate(xx,x)
  dfridr = dfridr(func,x,h,err,func_extra_args=())
COMMON blocks:
  /cparam/ omegab,omegam,omegal,h
  /dados/ escala,alfa,beta,gama
.
```

Version: $Revision: $

4.1 Variables

Name	Description
__package__	**Value:** `None`
about	**Value:** `<fortran object>`
age	**Value:** `<fortran age>`
cparam	**Value:** `<fortran object>`
dados	**Value:** `<fortran object>`
dfridr	**Value:** `<fortran dfridr>`
dr_dz	**Value:** `<fortran dr_dz>`
dsigma2_dk	**Value:** `<fortran dsigma2_dk>`
dtdz	**Value:** `<fortran dtdz>`
dv_dz	**Value:** `<fortran dv_dz>`

continued on next page

Name	Description
g	**Value:** `<fortran g>`
grow	**Value:** `<fortran grow>`
init	**Value:** `<fortran object>`
locate	**Value:** `<fortran object>`
rhobr	**Value:** `<fortran object>`
rhodm	**Value:** `<fortran object>`
richardson	**Value:** `<fortran object>`
rk4_int	**Value:** `<fortran object>`
romberg	**Value:** `<fortran object>`
rz	**Value:** `<fortran rz>`
sigma	**Value:** `<fortran object>`
trapezoid	**Value:** `<fortran object>`

5 Module pycosmicstar.cosmology

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

5.1 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`
___status___	Abstract Class of cosmological models. This file is part of pystar. copyright : Eduardo dos Santos Pereira pystar is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License. pystar is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details. You should have received a copy of the GNU General Public License along with Foobar. If not, see <http://www.gnu.org/licenses/>. **Value:** `'Stable'`
___package___	**Value:** `None`

5.2 Class cosmology

Known Subclasses: pycosmicstar.lcdmcosmology.lcdmcosmology

5.2.1 Methods

dt_dz(*self*, *z*)

Return the relation between the cosmic time and the redshift

dr_dz(*self*, *z*)

Return the comove-radii

dV_dz(*self*, *z*)

Return the comove volume

rodm(*self*, *z*)

Return the Dark Matter Density

robr(*self*, *z*)

Return the Barionic Matter Density

H(*self*, *z*)

Return the Hubble Parameter

dgrowth_dt(*self*, *z*)

Return the derivative of growth function of the primordial perturbations

growthFunction(*self*, *z*)

Return the growth function of the primordial perturbations

dsigma2_dk(*self*, *kl*)

"Return the integrating of sigma(M,z) for a top-hat filtering. In z = 0 return sigma_8, for z > 0 return sigma(M,z)

sigma(*self*)

Return the variance of the linear density field. As pointed out by Jenkis et al. (2001), this definition of the mass function has the advantage that it does not explicitly depend on redshift, power spectrum or cosmology.

age(*self*, *z*)

Return the age of the Universe for a given z

setCosmologicalParameter(*self*)

getCosmologicalParameter(*self*)

getTilt(*self*)

getRobr0(*self*)

getRodm0(*self*)

6 Module pycosmicstar.csfrfromfit

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

6.1 Functions

rho_starF(z, h)

Return CSFR by the work of Fardal et al. (MNRAS, 379,985,2007) MNRAS, 339,312,2003.

rho_starHB(z, h)

Return CSFR by the work of Hopkins e Beacom, Apj, 651, 142, 2006.

rho_starSH(z)

Return CSFR by the work of Volker, Springel, Lars and Hernquist MNRAS, 339,312,2003.

6.2 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`

___status___	`This module contain the Cosmic Star Formation Rate (CSFR) c`
	`of:`
	`Fardal et al. (MNRAS, 379,985,2007) MNRAS, 339,312,200`
	`Hopkins and Beacom, Apj, 651, 142, 2006.`
	`Volker, Springel, Lars, Hernquist, MNRAS, 339,312,2003`
	Value: `'Stable'`

___package___	**Value:** `None`

7 Module pycosmicstar.diferencial

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

7.1 Functions

locate(*xx*, *n*, *x*)

Localiza a posicao de dado ponto a partir de dois adjacentes.

argumentos: func — funcao ou tabela de entrada xx — tabela de entrada n — numero de pontos da tabela x — valor de x que se deseja determinar y j — posicao de saida

dfridr(*func*, *x*, *h*, *err*)

```
Fornece a derivada de y em relacao a x.
argumentos:  func --- funcao a ser integrada
             x    --- dlog10 m ou z
             h    --- passo para a diferencicao
             err  --- parametro interno de erro da function
```

7.2 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`

continued on next page

Name	Description
___status___	This file is part of pystar. copyright : Eduardo dos Santos Pereira 31 mar. 2011. pystar is free software: you can redistribute it and/o it under the terms of the GNU General Public License as the Free Software Foundation, either version 3 of the pystar is distributed in the hope that it will be usefu but WITHOUT ANY WARRANTY; without even the implied war MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. GNU General Public License for more details. You should have received a copy of the GNU General Publ along with Foobar. If not, see <http://www.gnu.org/li Fornce as funcoes locate(xx,n,x), dfridr(func,x,h,err) e int_simples(func,a,b,dx =0.001) **Value:** 'Stable'
___package___	**Value:** None

8 Module pycosmicstar.filedict

filedict.py a Persistent Dictionary in Python

Author: Erez Shinan Date : 31-May-2009

8.1 Class Solutions

8.1.1 Class Variables

Name	Description
Sqlite3	**Value:** `0`

8.2 Class FileDict

collections.UserDict
└ **pycosmicstar.filedict.FileDict**

```
A dictionary that stores its data persistantly in a file

Options:
    filename - which file to use
    connection - use an existing connection instead of a filename (overrides filename)
    table - which table name to use for storing data (default: 'dict')
```

8.2.1 Methods

___init___(*self*, *filename*=`None`, *solution*=`Solutions.Sqlite3`, ***options*)

___getitem___(*self*, *key*)

___setitem___(*self*, *key*, *value*)

___delitem___(*self*, *key*)

update(*self*, *d*)

___iter___(*self*)

keys(*self*)

values(*self*)

items(*self*)

___contains___(*self*, *key*)

___len___(*self*)

___del___(*self*)

batch(*self*)

9 Module pycosmicstar.filedict_old

filedict.py a Persistent Dictionary in Python

Author: Erez Shinan Date : 24-May-2009

9.1 Variables

Name	Description
___package___	**Value:** `'pycosmicstar'`

9.2 Class DefaultArg

9.3 Class Solutions

9.3.1 Class Variables

Name	Description
Sqlite3	**Value:** `0`

9.4 Class FileDict

object
└
pycosmicstar.filedict_old.FileDict

A dictionary that stores its data persistantly in a file

9.4.1 Methods

___init___(*self*, *solution*=`0`, ***options*)

x.___init___(...) initializes x; see help(type(x)) for signature

Overrides: object.___init___ extit(inherited documentation)

get(*self*, *key*, *default*=`None`)

___getitem___(*self*, *key*)

___setitem___(*self*, *key*, *value*)

___delitem___(*self*, *key*)

update(*self*, *d*)

pop(*self*, *key*, *default*=<class pycosmicstar.filedict_old.DefaultArg at 0x7f5e62b4...>)

keys(*self*)

values(*self*)

items(*self*)

iterkeys(*self*)

itervalues(*self*)

iteritems(*self*)

has_key(*self*, *key*)

___contains___(*self*, *key*)

___len___(*self*)

___del___(*self*)

Inherited from object

___delattr___(), ___format___(), ___getattribute___(), ___hash___(), ___new___(), ___reduce___(), ___reduce_ex___(), ___repr___(), ___setattr___(), ___sizeof___(), ___str___(), ___subclasshook___()

9.4.2 Properties

Name	Description
batch	
Inherited from object	

continued on next page

Name	Description
___class___	

10 Module pycosmicstar.lcdmcosmology

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

10.1 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`

continued on next page

Name	Description
___status___	The Cold Dark Matter plus Cosmological constant Module (LCDM) Na atual versao usamos a normalizacao do WMAP (sem ondas gravitacionais) a expressao foi adaptada de Eisenstein e Hu (ApJ 511, 5, 1999) de forma a fornecer sigma_8 = 0,84. A fracao de massa dos halos e obtida de Sheth e Tormen (MNRAS 308, 119, 1999) Todos os modelos consideram Omega_Total = Omega_M + Omega_L = 1,0 "Best Fit" do WMAP-3: omega_m = 0,238, omega_b = 0,042, omega_l = 0,762, h = 0,734, sigma_8 = 0,744 Veja que sigma_8 pelo WMAP e' obtido atraves da recombinacao. Outras estimativas (p.e. aglomerados de galaxias) fornecem sigma_8 = 0,84. Conjunto de dados: WMAP-3: omega_m = 0,238, omega_b = 0,042, omega_l = 0,762 h = 0,734, sigma_8 = 0,84 WMAP-1: omega_m = 0,29, omega_b = 0,44, omega_l = 0,71 h = 0,72, sigma_8 = 0,9 This file is part of pystar. copyright : Eduardo dos Santos Pereira pystar is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License. pystar is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details. You should have received a copy of the GNU General Public License along with Foobar. If not, see <http://www.gnu.org/licenses/>. **Value:** `'Stable'`
cosmolibImportStatus	**Value:** `True`
___package___	**Value:** `'pycosmicstar'`

10.2 Class lcdmcosmology

pycosmicstar.cosmology.cosmology
└
pycosmicstar.lcdmcosmology.lcdmcosmology

```
The Cold Dark Matter (CDM) plus Cosmolocical Constan (Lambda) -  lcdm

Keyword arguments:
    omegam -- (default 0.24) - The dark matter parameter

    omegab -- (default 0.04) - The barionic parameter

    omegal -- (default 0.73) - The dark energy parameter

    h -- (default 0.7) - The h of the Hubble constant (H = h * 100)
```

10.2.1 Methods

___init___(*self*, *omegam*=0.24, *omegab*=0.04, *omegal*=0.73, *h*=0.7)

dt_dz(*self*, *z*)

Return the relation between the cosmic time and the redshift

Overrides: pycosmicstar.cosmology.cosmology.dt_dz extit(inherited documentation)

dr_dz(*self*, *z*)

Return the comove-radii

Overrides: pycosmicstar.cosmology.cosmology.dr_dz extit(inherited documentation)

H(*self*, *z*)

```
Return the Hubble parameter as a function of z.

Keyword arguments:
    z -- redshift
```

Overrides: pycosmicstar.cosmology.cosmology.H

dV_dz(*self*, *z*)

```
Return the comove volume variation.

Keyword arguments:
    z -- redshift
```

Overrides: pycosmicstar.cosmology.cosmology.dV_dz

dgrowth_dt(*self*, *z*)

```
Return the derivative of the growth function with
respect to  time.

Keyword arguments:
    z -- redshift
```

Overrides: pycosmicstar.cosmology.cosmology.dgrowth_dt

growthFunction(*self*, *z*)

```
Return the growth function

Keyword arguments:
    z -- redshift
```

Overrides: pycosmicstar.cosmology.cosmology.growthFunction

sigma(*self*, *kmass*)

```
Return the sigma.

Keyword arguments:
    kmass -- mass scale
```

Overrides: pycosmicstar.cosmology.cosmology.sigma

dsigma2_dk(*self*, *kl*)

"Return the integrating of sigma(M,z) for a top-hat filtering. In z = 0 return sigma_8, for z > 0 return sigma(M,z)

Overrides: pycosmicstar.cosmology.cosmology.dsigma2_dk

rodm(*self*, *z*)

```
Return the dark matter density

Keyword arguments:
    z -- redshift
```

Overrides: pycosmicstar.cosmology.cosmology.rodm

robr(*self*, *z*)

```
Return the barionic density.

Keyword arguments:
    z -- redshift
```

Overrides: pycosmicstar.cosmology.cosmology.robr

age(*self*, *z*)

```
Return the age of the Universe for some redshift.

Keyword arguments:
    z -- redshift
```

Overrides: pycosmicstar.cosmology.cosmology.age

setCosmologicalParameter(*self*, *omegam*, *omegab*, *omegal*, *h*)

Set the cosmological parameters

Overrides: pycosmicstar.cosmology.cosmology.setCosmologicalParameter

getCosmologicalParameter(*self*)

Return the cosmological parameter

Overrides: pycosmicstar.cosmology.cosmology.getCosmologicalParameter

getDeltaC(*self*)

Return the critical density

getTilt(*self*)

Overrides: pycosmicstar.cosmology.cosmology.getTilt

getRobr0(*self*)

Return the barionic matter density at the present day.

Overrides: pycosmicstar.cosmology.cosmology.getRobr0

getRodm0(*self*)

Return the dark matter density at the present day.

Overrides: pycosmicstar.cosmology.cosmology.getRodm0

11 Module pycosmicstar.observationalCSFR

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

11.1 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`
___status___	Observational Cosmic Star Formation Rate This file is part of pystar. copyright : Eduardo dos Santos Pereira pystar is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License. pystar is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details. You should have received a copy of the GNU General Public License along with Foobar. If not, see <http://www.gnu.org/licenses/>. **Value:** `'Stable'`
___package___	**Value:** `None`

11.2 Class ObservationalCSFR

11.2.1 Methods

___init___(*self*)

csfredshift(*self*)

Return the redshift and the CSFR from observational data

errorData(*self*)

Return the asymetric errors in the redshif and CSFR respectively

12 Module pycosmicstar.parallellistcompreension

12.1 Functions

pool_map_seq(*func*, *iterable*, *chunksize*=`None`, *njobs*=`None`)

pool_zipped_map_seq(*func*, *iterable*, *chunksize*=`None`, *njobs*=`None`)

pool_sequentialize(*iterable*, *njobs*=`None`)

pool_map(*func*, *iterable*, *chunksize*=`None`, *njobs*=`None`)

func must be an unary function

pool_zipped_map(*func*, *iterable*, *chunksize*=`None`, *njobs*=`None`)

func can be of variable arity and each element in iterable should be a tuple of the same length as func's arity

pool_parallelize(*iterable*, *njobs*=`None`)

delayed(*func*)

parallelized(*func*)

12.2 Variables

Name	Description
___package___	**Value:** `None`

13 Module pycosmicstar.paralleloverlist

Version: 1.0.1

Date: 09/12/2013

Author: Eduardo dos Santos Pereira

License: GPLV3

13.1 Functions

parallel_list(*func*, *x*)

13.2 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`
___status___	**Value:** `'Stable'`
___date___	**Value:** `'09/12/2013'`
func	**Value:** `lambda x:`
tP	**Value:** `array(tP)`
tS	**Value:** `array(tS)`
___package___	**Value:** `None`

13.3 Class paralleloverlist

ppvector: Parallel Processing Vector This program is used to calculate, in parallel, by python module multiprocessing, points in vector.

13.3.1 Methods

___init___(*self*, *func*, *inputArray*)

Dmatiz: The dimension of the vector func: function that will run in parallel

getResult(*self*)

___call___(*self*)

14 Module pycosmicstar.pylcdmlib

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

14.1 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`
___status___	**Value:** `'Stable'`
___package___	**Value:** `None`

15 Module pycosmicstar.run_kut4

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

15.1 Functions

rk4_int(*F*, *x*, *y*, *xStop*, *h*)

15.2 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`

continued on next page

Name	Description
___status___	4th-order Runge-Kutta method for solving the initial value X,Y = integrate(F,x,y,xStop,h). 4th-order Runge-Kutta method for solving the initial value problem { y} ’ = { F(x,{ y})} , where { y} = { y[0],y[1],...y[n-1]} . x,y = initial conditions. xStop = terminal value of x. h = increment of x used in integration. F = user-supplied function that returns the array F(x,y) = { y’[0],y’[1],...,y’[n-1]} . This file is part of pystar. copyright : Eduardo dos Santos Pereira pystar is free software: you can redistribute it and/or mo it under the terms of the GNU General Public License as pu the Free Software Foundation, either version 3 of the Lice pystar is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warrant MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See GNU General Public License for more details. You should have received a copy of the GNU General Public along with Foobar. If not, see <http://www.gnu.org/licens **Value:** ’Stable’
___package___	**Value:** None

16 Module pycosmicstar.structures

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

16.1 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`

continued on next page

Name	Description
___status___	Cosmological Dark Halos History From the formalism of Reed et al (MNRAS, 346, 565-572, 2003) it is calculated the mass fraction of dark matter halos. The code obtain the mass density of dark halos and the fraction of brions into structures as a function of the time. Here is used the Transfer function from Efstathiou, Bond & White – (MNRAS, 258, 1P, 1992). The current version it is assumed the normalization of WMAP (withou gravitational waves) adapted from Eisenstein e Hu (ApJ 511, 5, 1999) that in the way that return sigma_8 = 0,84. The fraction of mass of dark halos is obtained by the work of Sheth e Tormen (MNRAS 308, 119, 1999). All models consider Omega_Total = Omega_M + Omega_L = 1,0 This file is part of pystar. copyright : Eduardo dos Santos Pereira pystar is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License. pystar is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details. You should have received a copy of the GNU General Public License along with Foobar. If not, see <http://www.gnu.org/licenses/>. **Value:** `'Stable'`
pyversion	**Value:** `sys.version_info(major=2, minor=7, micro=6, releaselevel=...`
___package___	**Value:** `'pycosmicstar'`

16.2 Class structures

pycosmicstar.structuresabstract.structuresabstract ┐

pycosmicstar.structures.structures

Known Subclasses: pycosmicstar.cosmicstarformation.cosmicstarformation

```
This class was contructed based in the like Press-Schechter formalism
that provides characteristis like numerical density of dark matter halos
into the range m_h, m_h + dm_h, the fraction of barionic matter,
and,  the accretion rate of barions into structures and the total number
of dark halos.

The models used to develop this class was presented for the first time
in the article of Pereira and Miranda (2010) - (MNRAS, 401, 1924, 2010).

The cosmologic background model is passed as a instance parameter:
    cosmology

Keyword arguments:
    lmin -- (default 6.0) log10 of the minal mass of the dark halo
                         where it is possible to have star formation.

    zmax -- (defaul 20.0) - the maximum redshift to be considered

    omegam -- (default 0.24) - The dark matter parameter

    omegab -- (default 0.04) - The barionic parameter

    omegal -- (default 0.73) - The dark energy parameter

    h -- (default 0.7) - The h of the Hubble constant (H = h * 100)

    massFunctionType:
        (Dark Haloes Mass Function)
        default 'ST' - Sheth et al. (2001) - z=[0,2]
        'TK' - Tinker et al. (2008) - z=[0,2.5]
        'PS' - Press and Schechter (1974) - z=-
        'JK' - Jenkins et al. (2001) z=[0,5]
        'W' - Warren et al. (2006) z=0
        'WT1' - Watson et al. (2013) - Tinker Modified - z=[0,30]
        'WT2' - Watson et al. (2013) - Gamma times times Tinker Modified
                                              z=[0,30]
        'B' - Burr Distribuction. Marassi and Lima (2006) - Press Schechter
                               modified.
    qBurr:
        (default 1) - The q value of Burr Distribuction.
```

16.2.1 Methods

___init___(*self*, *cosmology*, ***kwargs*)

abt(*self*, *a*)

```
Return the accretion rate of barionic matter, as
a function of scala factor, into strutures.

Keyword arguments:
    a -- scala factor (1.0 / (1.0 + z))
```

Overrides: pycosmicstar.structuresabstract.structuresabstract.abt

fbstruc(*self*, *z*)

```
Return the faction of barions into structures

Keyword arguments:
    z -- redshift
```

Overrides: pycosmicstar.structuresabstract.structuresabstract.fbstruc

fstm(*self*, *lm*)

```
Numerical function that return the value of sigm that
will be used by dfridr to calculate d_sigma_dlog10(m).

Keyword arguments:
    lm -- log10 of the mass of dark halo
```

Overrides: pycosmicstar.structuresabstract.structuresabstract.fstm

getCacheDir(*self*)

Return True and cache name if the cache directory existe and false else.

Overrides: pycosmicstar.structuresabstract.structuresabstract.getCacheDir

getDeltaHTinker(*self*)

getmassFunctionDict(*self*)

Return a list with key and function of implemented dark haloes mass function

halos_n(*self*, *z*)

```
Return the integral of the mass function of dark halos multiplied
by mass in the range of log(M_min) a log(M_max)

Keyword arguments:
    z -- redshift
```

Overrides: pycosmicstar.structuresabstract.structuresabstract.halos_n

massFunction(*self*, *lm*, *z*)

```
Return the mass function of dark halos.

Keyword arguments:
    lm -- log10 of the mass of the dark halo
    z -- redshift
```

Overrides: pycosmicstar.structuresabstract.structuresabstract.massFunction

numerical_density_halos(*self*, *z*)

```
Return the numerial density of dark halos
within the comove volume

Keyword arguments:
    z- redshift
```

Overrides: pycosmicstar.structuresabstract.structuresabstract.numerical_density_halos

setDeltaHTinker(*self*, *delta_halo*)

setMassFunctionDict(*self*, *key*, *function*)

Add a new key and function in the dark haloes mass function dictionary

setQBurrFunction(*self*, *q*)

Set the q value of dark haloes mass function derived from Burr distribuction.

Inherited from pycosmicstar.structuresabstract.structuresabstract(Section 17.2)

cosmicStarFormationRate(), gasDensityInStructures()

17 Module pycosmicstar.structuresabstract

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

17.1 Variables

Name	Description
___email___	**Value:** `'pereira.somoza@gmail.com'`
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`
___status___	Abstract Class of like Press-Schechter formalism This file is part of pystar. copyright : Eduardo dos Santos Pereira pystar is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License. pystar is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details. You should have received a copy of the GNU General Public License along with Foobar. If not, see <http://www.gnu.org/licenses/>. **Value:** `'Stable'`
___package___	**Value:** `None`

17.2 Class structuresabstract

Known Subclasses: pycosmicstar.structures.structures

17.2.1 Methods

massFunction(*self*, *lm*, *z*)

Return the mass function of dark halos

fstm(*self*, *lm*)

Numerical function that return the value of sigm that will be used by dfridr to calculate d_sigma_dlog10(m).

halos_n(*self*, *z*)

Return the integral of the mass function of dark halos multiplied by mass in the range of log(M_min) a log(M_max)

fbstruc(*self*, *z*)

Return the faction of barions into structures

numerical_density_halos(*self*, *z*)

Return the numerial density of dark halos within the comove volume

abt(*self*, *a*)

Return the accretion rate of barionic matter into strutures

cosmicStarFormationRate(*self*, *z*)

gasDensityInStructures(*self*, *z*)

getCacheDir(*self*)

Return True if the cache directory existe and false else.

18 Module pycosmicstar.test_all

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

18.1 Functions

main()

18.2 Variables

Name	Description
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___email___	**Value:** `'pereira.somoza@gmail.com'`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`
___package___	**Value:** `'pycosmicstar'`
___status___	**Value:** `'Stable'`

19 Module pycosmicstar.test_cosmology

Version: 1.0.1

Author: Eduardo dos Santos Pereira

License: GPLV3

19.1 Variables

Name	Description
___credits___	**Value:** `['Eduardo dos Santos Pereira']`
___email___	**Value:** `'pereira.somoza@gmail.com'`
___maintainer___	**Value:** `'Eduardo dos Santos Pereira'`
___package___	**Value:** `'pycosmicstar'`
___status___	**Value:** `'Stable'`

19.2 Class test_lcdmcosmology

object
└ unittest.case.TestCase
  └ **pycosmicstar.test_cosmology.test_lcdmcosmology**

19.2.1 Methods

test_H(*self*)

test_age(*self*)

test_dV_dz(*self*)

test_dgrowth_dt(*self*)

test_drdz(*self*)

test_dtdz(*self*)

test_getCosmologicalParameter(*self*)

test_getDeltaC(*self*)

test_getRobr0(*self*)

test_getTilt(*self*)

test_growthFunction(*self*)

test_robr(*self*)

test_rodm(*self*)

test_setCosmologicalParameter(*self*)

Inherited from unittest.case.TestCase

__call__(), __eq__(), __hash__(), __init__(), __ne__(), __repr__(), __str__(), addCleanup(), addTypeEqualityFunc(), assertAlmostEqual(), assertAlmostEquals(), assertDictContainsSubset(), assertDictEqual(), assertEqual(), assertEquals(), assertFalse(), assertGreater(), assertGreaterEqual(), assertIn(), assertIs(), assertIsInstance(), assertIsNone(), assertIsNot(), assertIsNotNone(), assertItemsEqual(), assertLess(), assertLessEqual(), assertListEqual(), assertMultiLineEqual(), assertNotAlmostEqual(), assertNotAlmostEquals(), assertNotEqual(), assertNotEquals(), assertNotIn(), assertNotIsInstance(), assertNotRegexpMatches(), assertRaises(), assertRaisesRegexp(), assertRegexpMatches(), assertSequenceEqual(), assertSetEqual(), assertTrue(), assertTupleEqual(), assert_(), countTestCases(), debug(), defaultTestResult(), doCleanups(), fail(), failIf(), failIfAlmostEqual(), failIfEqual(), failUnless(), failUnlessAlmostEqual(), failUnlessEqual(), failUnlessRaises(), id(), run(), setUp(), setUpClass(), shortDescription(), skipTest(), tearDown(), tearDownClass()

Inherited from object

__delattr__(), __format__(), __getattribute__(), __new__(), __reduce__(), __reduce_ex__(), __setattr__(), __sizeof__(), __subclasshook__()

19.2.2 Properties

Name	Description
Inherited from object	
__class__	

continued on next page

Name	Description

19.2.3 Class Variables

Name	Description
myUniverse	**Value:** `<pycosmicstar.lcdmcosmology.lcdmcosmology instance at 0x7...`
Inherited from unittest.case.TestCase longMessage, maxDiff	

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