VOTA

a VO tool for Asteroseismology.

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Motivation

- A huge amount of data is going to be available in the near future.
  - light curves from different missions.
- We need an easy and efficient way to compare those many data with theoretical models.
  - To analyze observed objects properties.
- Previous important work: ESTA project for CoRoT mission.
  - http://www.astro.up.pt/corot/models/
  - Difficult task. Problems identified
  - Access to models, different formats, etc.

VOTA: VO Tool for Asteroseismology

- Currently 4 different codes integrated.
  - CESAM, CESAM2k structure codes.
  - FILOU, GraCo oscillation codes.
  - Different research groups interested in adapting their codes.
  - A (VO) S3 server for each code.
  - More that 500.000 models.
  - Almost 1Tb of data.
  - Growing.
- First VO Data Model for astroseismology data.
  - 17 star global properties.
  - 44 star shell variables.
  - 35 seismic properties.

VOTA: VO Tool for Asteroseismology

Granada Stellar Seismic Models

Granada Stellar Seismic Models (GSSM-VO) adapts the Granada Team numerical package outputs to be used in VO in order to perform on-line stellar seismology. This package contains the evolutionary codes CESAM and CESAM2K and two oscillation codes: GraCo and FILOU

Please, select one evolution code

Evolutionary code | CESAM2k evolutionary code
CESAM evolutionary code
CESAM2k evolutionary code
Continue

References:

- CESAM evolutionary code
- CESAM2k evolutionary code

VOTA: VO Tool for Asteroseismology

Granada Stellar Seismic Models

Granada Stellar Seismic Models (GSSM-VO) adapts the Granada Team numerical package outputs to be used in VO in order to perform on-line stellar seismology. This package contains the evolutionary codes CESAM and CESAM2K and two oscillation codes: GraCo and FILOU

CESAM2k evolutionary code

Please, select an oscillation code or 'None' if you only want to access the structure information

Oscillation code: None
- None
- GraCo oscillation code

Continue

References:

- CESAM2k evolutionary code
- GraCo oscillation code

Cesam2k: an interesting case

CESAM2k evolutionary code

You can search the database in terms of several parameters (move your mouse over the (?) symbol to see a description and the available range of values for each one).

- Please, select a range for each parameter that you want to use in the search and then click the "Search" button to retrieve a list of the available files
- Take into account that some combinations of values could correspond to no result

Structure search parameters

(?)	T_{eff}	7355	-	7505	(K)
(?)	Lum	4.51	-	5.33	(Lsun)
(?)	Log(g)	4.25	-	4.45	
(?)	Density		-		(g/cm3)
(?)	Age		-		(Myr)
(?)	[Fe/H]		-		
(?)	Z		-		
(?)	Hcent		-		
(?)	R_*	1.29	-	1.39	(Rsun)
(?)	Mass		-		(Msun)
(?)	Vrot		-		cm/s
(?)	Wrot		-		rad/s
(?)	Trot		-		sec
(?)	α_{MLT}		-		
(?)	Over.		-		

Search Reset

References:

Cesam2k: an interesting case

Granada Stellar Seismic Models

Granada Stellar Seismic Models (GSSM-VO) adapts the Granada Team numerical package outputs to be used in VO in order to perform on-line stellar seismology. This package contains the evolutionary codes CESAM and CESAM2K and two oscillation codes: GraCo and FILOU

CESAM2k evolutionary code

1939 results have been found for your search criteria.

Summary table

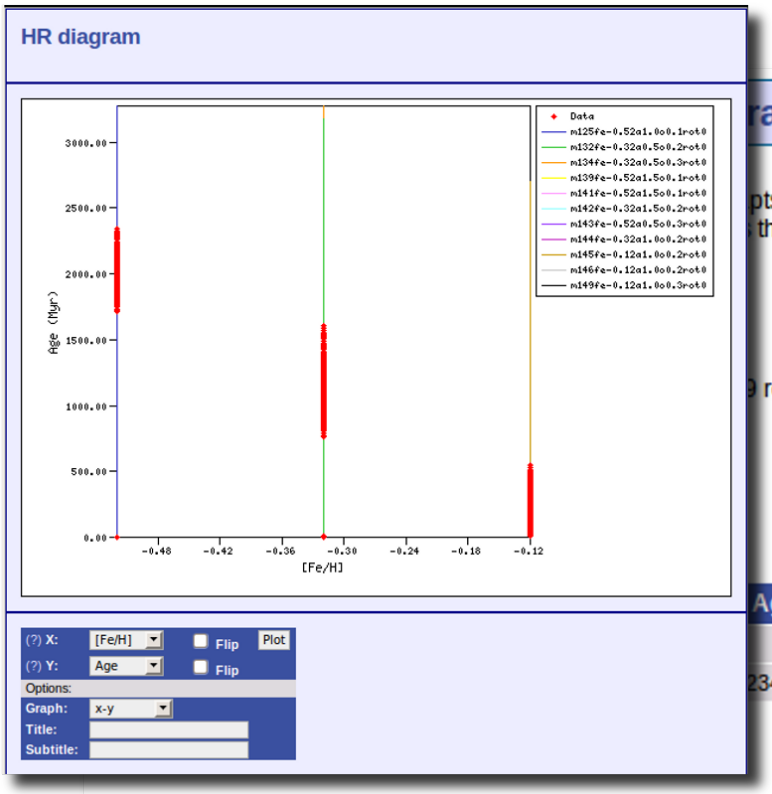
Show Results | HR diag | New Search

	T_{eff}	Lum	Log(g)	Density	Age	[Fe/H]	Z	Hcent	R_*	Mass	Vrot	Wrot	Trot	α_{MLT}	Over.
Min	7355.0000	4.5114	4.2506	0.6605	0	-0.5200	0.0055	0.7221	1.2901	1.2502	0	0	0	0.5000	0.1000
Max	7504.9000	5.3293	4.3585	0.9057	2345.9000	-0.1200	0.0134	0.7473	1.3899	1.4902				1.5000	0.3000

References:

- CESAM2k evolutionary code

Cesam2k: an interesting case



ranada Stellar Seismic Models

pts the Granada Team numerical package outputs to be used in VO in order to perform
the evolutionary codes CESAM and CESAM2K and two oscillation codes: GraCo and FILOU

CESAM2k evolutionary code

9 results have been found for your search criteria.

Summary table

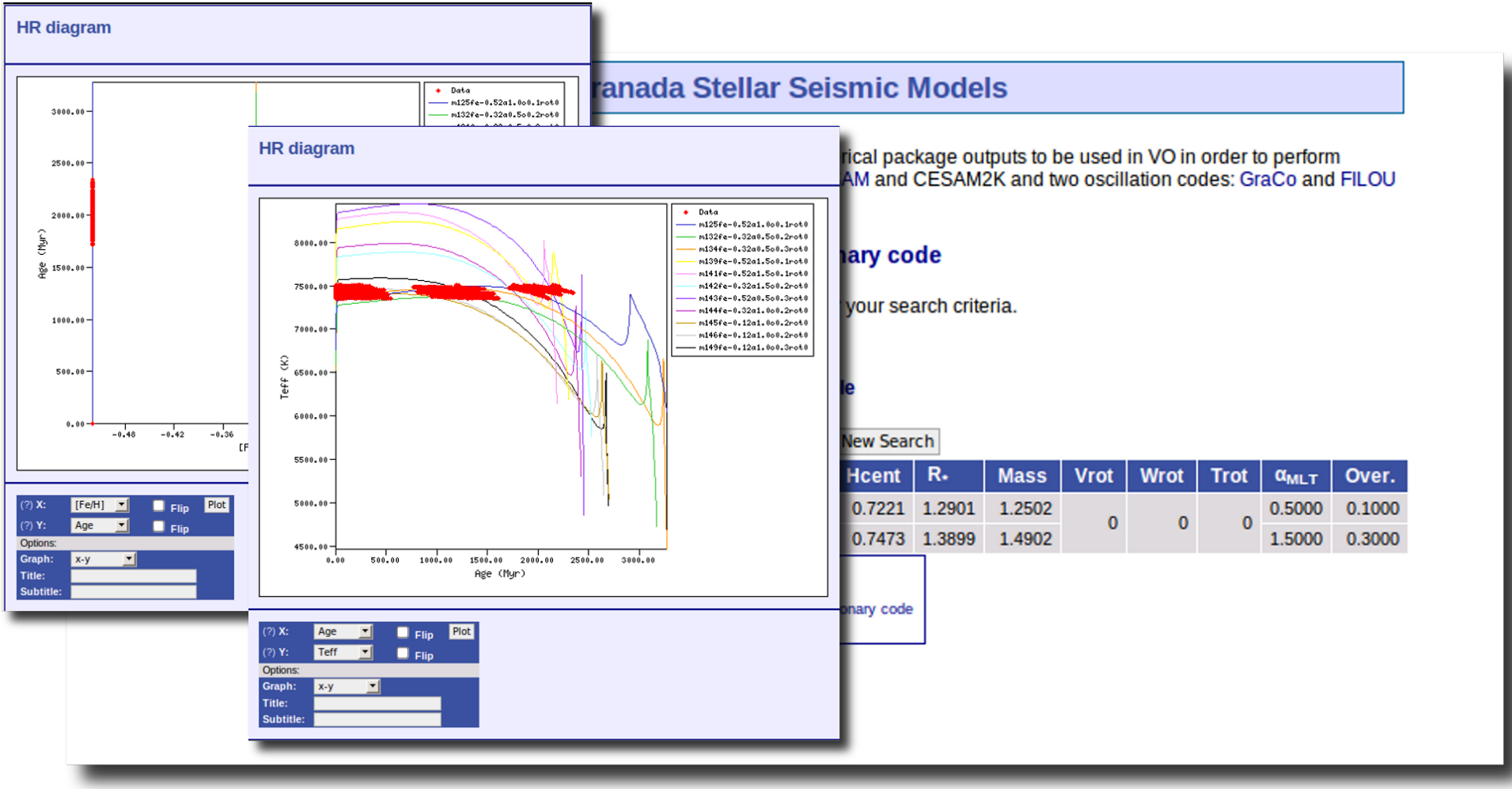
Show Results | HR diag | New Search

Age	[Fe/H]	Z	Hcent	R*	Mass	Vrot	Wrot	Trot	α_{MLT}	Over.
0	-0.5200	0.0055	0.7221	1.2901	1.2502	0	0	0	0.5000	0.1000
2345.9000	-0.1200	0.0134	0.7473	1.3899	1.4902				1.5000	0.3000

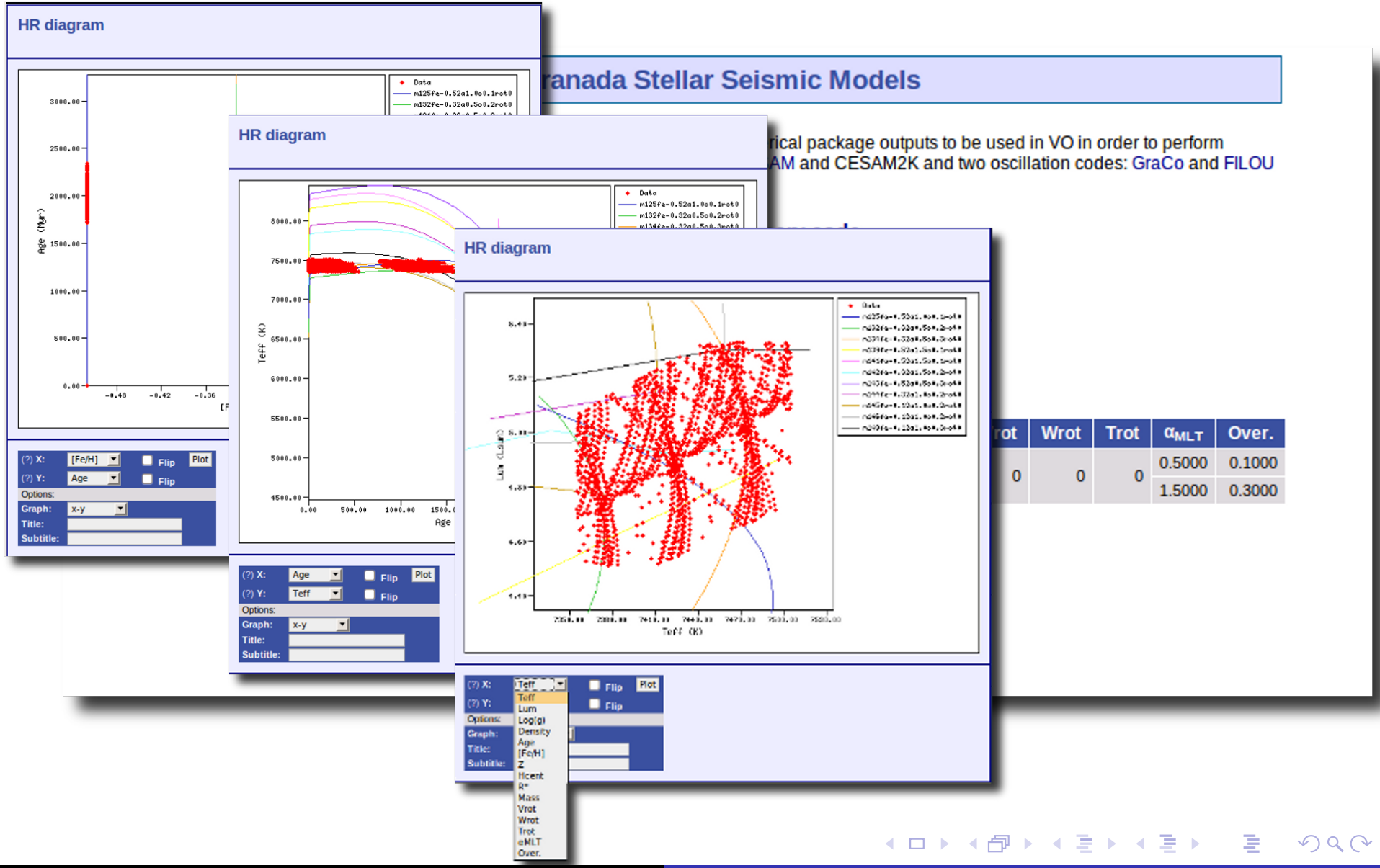
References:

- CESAM2k evolutionary code

Cesam2k: an interesting case



Cesam2k: an interesting case



Including seismology

CESAM2k evolutionary code + GraCo oscillation code

You can search the database in terms of several parameters (move your mouse over the (?) symbol to see a description and the available range of values for each one).

- Please, select a range for each parameter that you want to use in the search and then click the "Search" button to retrieve a list of the available files.
- Take into account that some combinations of values could correspond to no result.

Structure search parameters

(?)	T_{eff}	-		(K)
(?)	Lum	-		(Lsun)
(?)	Log(g)	-		
(?)	Density	-		(g/cm3)
(?)	Age	-		(Myr)
(?)	[Fe/H]	-		
(?)	Z	-		
(?)	Hcent	-		
(?)	R_*	-		(Rsun)
(?)	Mass	-		(Msun)
(?)	Vrot	-		cm/s
(?)	Wrot	-		rad/s
(?)	Trot	-		sec
(?)	α_{MLT}	-		
(?)	Over.	-		

Sismology search parameters

(?)	F0	-		(muHz)
(?)	F1	-		(muHz)
(?)	F0/F1	-		
(?)	Δ(ν)	-		(muHz)
(?)	δ(ν)	-		(muHz)
(?)	[ν]	-		(muHz)
(?)	[l]	-		
(?)	[n]	-		
(?)	Sta.	all modes		
(?)	ν_{Sta}	-		(muHz)

Search Reset

Including seismology

CESAM2k evolutionary code + GraCo oscillation code

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- Please, select a range for each parameter that you want to use in the search and then click the "Search" button to retrieve a list of the available files.
- Take into account that some combinations of values could correspond to no result.

Structure search parameters

(?)	T_{eff}		-	(K)
(?)	Age		-	(Myr)
(?)	[Fe/H]		-	
(?)	Z		-	
(?)	Hcent		-	
(?)	R*		-	(Rsun)
(?)	Mass		-	(Msun)
(?)	Vrot		-	cm/s
(?)	Wrot		-	rad/s
(?)	Trot		-	sec
(?)	α_{MLT}		-	
(?)	Over.		-	

T_{eff}

Effective temperature

Valid range of values ~ (3836.80 , 9899.73) (K)

Sismology search parameters

(?)	F0		-	(muHz)
(?)	F1		-	(muHz)
(?)	F0/F1		-	
(?)	Δ(ν)		-	(muHz)
(?)	δ(ν)		-	(muHz)
(?)	[ν]		-	(muHz)
(?)	[l]		-	
(?)	[n]		-	
(?)	Sta.	all modes		
(?)	ν_{Sta}		-	(muHz)

Search Reset

Including seismology

CESAM2k evolutionary code + GraCo oscillation code

You can search the database in terms of several parameters (move your mouse over the (?) symbol to see a description and the available range of values for each one).

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Structure search parameters

(?)	T_{eff}	-	(K)	
(?)	Lum	-	(Lsun)	
(?)	Log(g)	-		
(?)	Density	-	(g/cm3)	
(?)	Age	-	(Myr)	
(?)	[Fe/H]	-		
(?)	Z	-		
(?)	Hcent	-		
(?)	R*	-	(Rsun)	
(?)	Mass	-	(Msun)	
(?)	Vrot	-	cm/s	
(?)	Wrot	-	rad/s	
(?)	Trot	-	sec	
(?)	α_{MLT}	-		
(?)	Over.	-		

Sismology search parameters

(?)	F0	-	(muHz)	
(?)	F1	-	(muHz)	
(?)	F0/F1	-		
(?)	Δ(v)	-	(muHz)	
(?)				
(?)				
(?)				
(?)				
(?)				
(?)	ν_{Sta}	-	(muHz)	

Δ(v)

Large separation

Δ(v) = freq (n, l, m=0) - freq (n-1, l, m=0)

The large separation is computed as an average of the average values of Delta(nu) for the oscillation modes with Frequency and a mode degree in the range requested by the user (muHz)

Search Reset

Including seismology

- Please, select a range for each parameter that you want to use in the search and then click the "Search" button to retrieve a list of the availa files.
- Take into account that some combinations of values could correspond to no result.

Structure search parameters

(?)	T_{eff}	4000	-	5000	(K)
(?)	Lum		-		(Lsun)
(?)	Log(g)		-		
(?)	Density		-		(g/cm3)
(?)	Age		-		(Myr)
(?)	[Fe/H]		-		
(?)	Z		-		
(?)	Hcent		-		
(?)	R•		-		(Rsun)
(?)	Mass		-		(Msun)
(?)	Vrot		-		cm/s
(?)	Wrot		-		rad/s
(?)	Trot		-		sec
(?)	α_{MLT}		-		
(?)	Over.		-		

Sismology search parameters

(?)	F0		-		(muHz)
(?)	F1		-		(muHz)
(?)	F0/F1		-		
(?)	Δ(v)	20	-	25	(muHz)
(?)	δ(v)		-		(muHz)
(?)	[v]		-		(muHz)
(?)	[l]		-		
(?)	[n]		-		
(?)	Sta.	all modes			
(?)	v_{Sta}		-		(muHz)

Search Reset

References:

- CESAM2k evolutionary code
- GraCo oscillation code

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CESAM2k evolutionary code + GraCo oscillation code

156 results have been found for your search criteria.

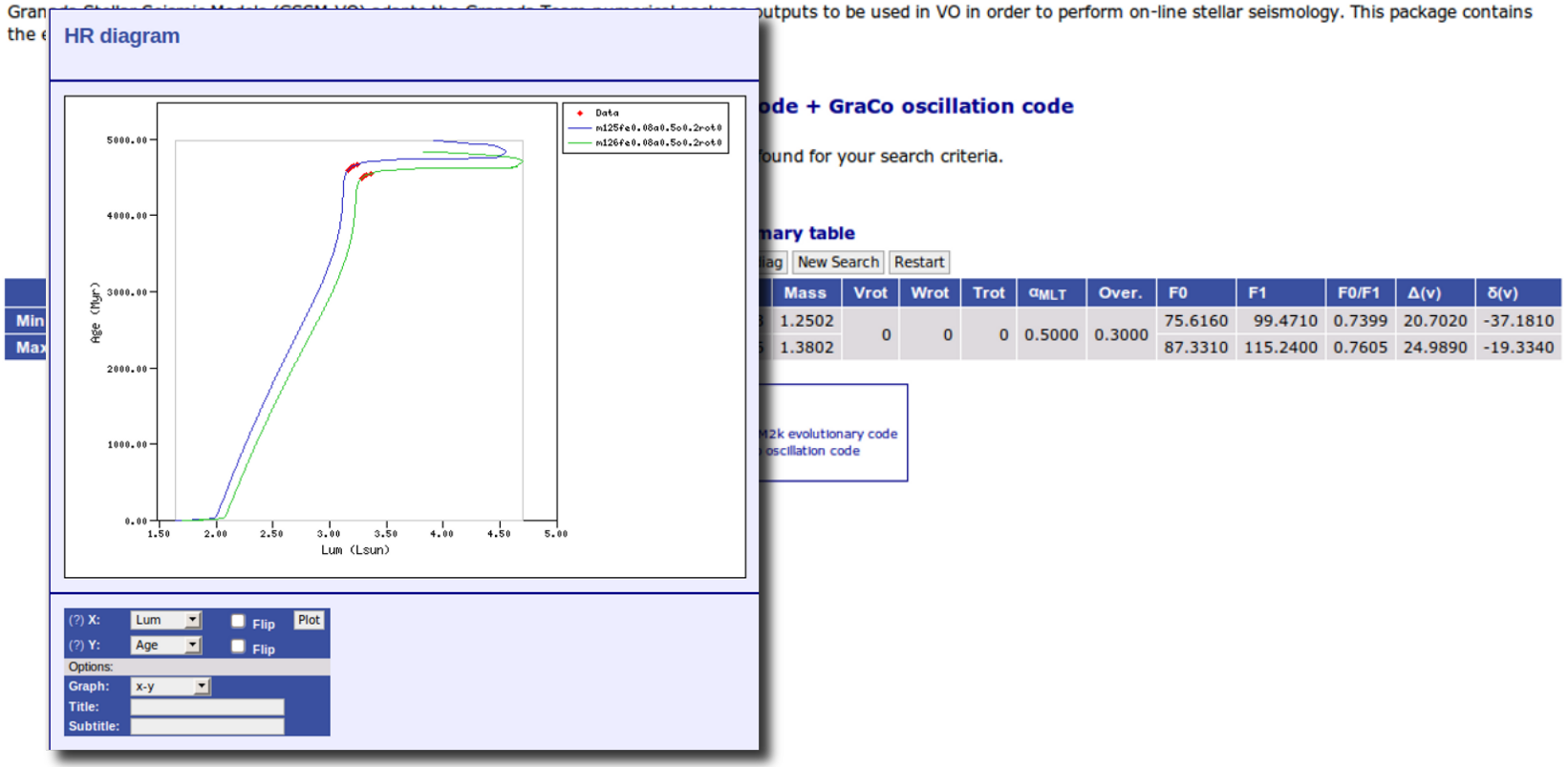
Summary table

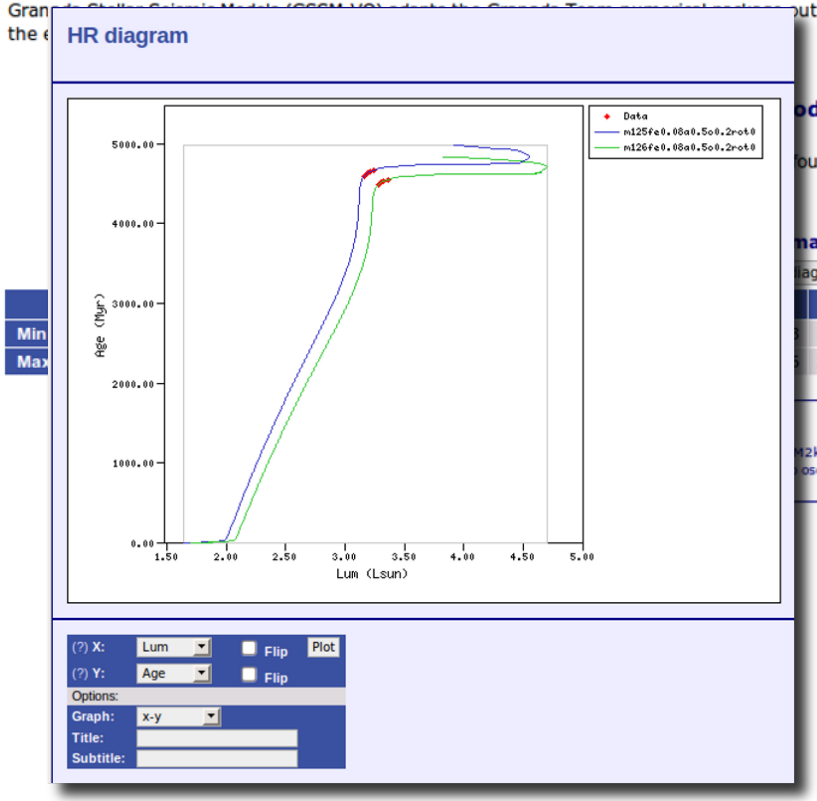
Show Results | HR diag | New Search | Restart

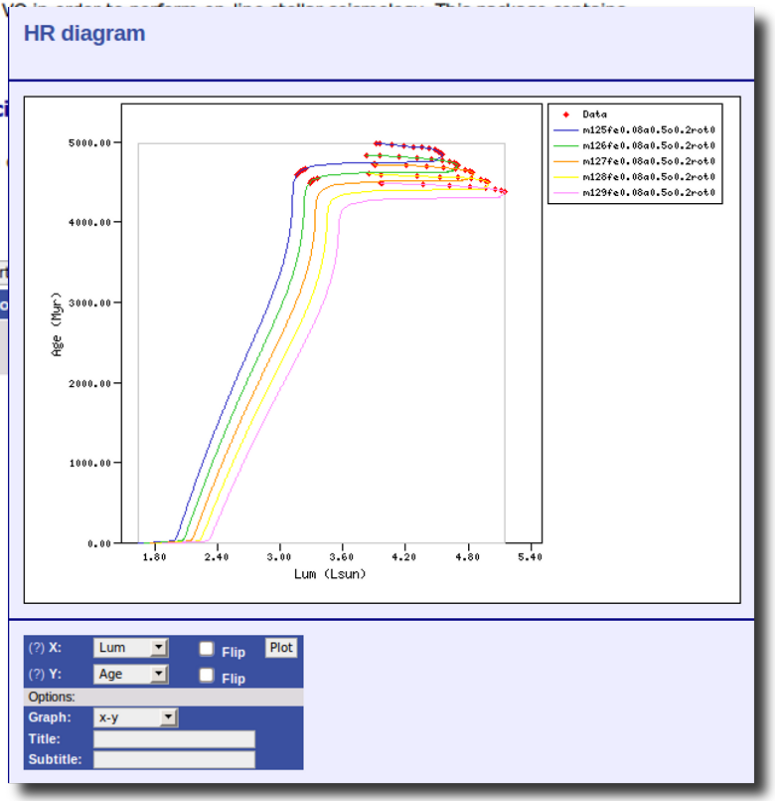
	T_{eff}	Lum	Log(g)	Density	Age	[Fe/H]	Z	Hcent	$R_\odot$	Mass	Vrot	Wrot	Trot	α_{MLT}	Over.	F0	F1	F0/F1	Δ(v)	δ(v)
Min	4824.8000	3.4518	3.6176	0.0706	3793.0000	0.0800	0.0206	0.0033	2.6433	1.2502	0	0	0	0.5000	0.3000	75.6160	99.4710	0.7399	20.7020	-37.1810
Max	4999.7000	5.1089	3.6908	0.0955	5261.3000			0.0732	3.0216	1.3802						87.3310	115.2400	0.7605	24.9890	-19.3340

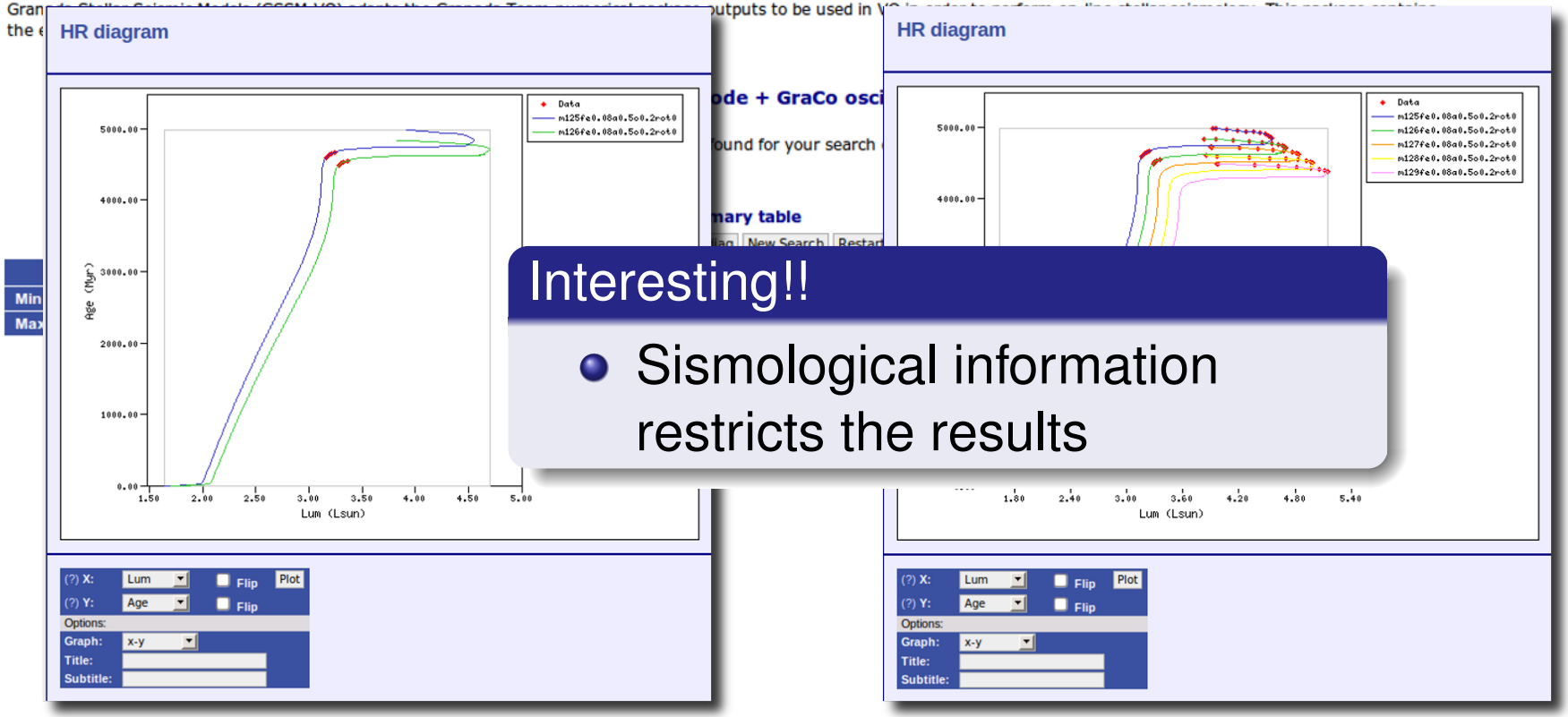
References:

- CESAM2k evolutionary code
- GraCo oscillation code


HR diagram
Data
m125fe0.08a0.5o0.2rot0
m126fe0.08a0.5o0.2rot0
Age (Myr)
Lum (Lsun)
(?) X: Lum
Flip
Plot
(?) Y: Age
Flip
Options:
Graph: x-y
Title:
Subtitle:
ode + GraCo oscillation code
ound for your search criteria.
nary table
New Search
Restart
Mass
Vrot
Wrot
Trot
αMLT
Over.
F0
F1
F0/F1
Δ(ν)
δ(ν)
1.2502
1.3802
0
0
0
0.5000
0.3000
75.6160
87.3310
99.4710
115.2400
0.7399
0.7605
20.7020
24.9890
-37.1810
-19.3340
M2k evolutionary code
oscillation code


HR diagram
Data
m125fe0.08a0.5o0.2rot0
m126fe0.08a0.5o0.2rot0
Age (Myr)
Lum (Lsun)
(?) X: Lum
Flip
Plot
(?) Y: Age
Flip
Options:
Graph: x-y
Title:
Subtitle:
ode + GraCo osci
ound for your search
nary table
New Search
Restart
Mass
Vrot
1.2502
1.3802
0
M2k evolutionary code
oscillation code


HR diagram
Data
m125fe0.08a0.5o0.2rot0
m126fe0.08a0.5o0.2rot0
m127fe0.08a0.5o0.2rot0
m128fe0.08a0.5o0.2rot0
m129fe0.08a0.5o0.2rot0
Age (Myr)
Lum (Lsun)
(?) X: Lum
Flip
Plot
(?) Y: Age
Flip
Options:
Graph: x-y
Title:
Subtitle:



Interesting!!

- Sismological information restricts the results

Including seismology

Results table

Summary | New Search | Restart

Values common to all shown results

[Fe/H]	Z	Vrot	Wrot	Trot	α_{MLT}	Over.
0.0800	0.0206	0	0	0	0.5000	0.3000

Page: 1 2 3 4 Next Results

Mark All | Unmark All | Retrieve | Plot

Plot	VOT	Txt	VOT		Txt		Track	FileId	T_{eff}	Lum	Log(g)	Density	Age	Hcent	R_*	Mass	F0	F1	F0/F1	Δ(v)	δ(v)
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0292	4986.7000	3.8788	3.6908	0.0955	5261.3000	0.0033	2.6433	1.2502	87.3310	115.2400	0.7578	22.4010	-37.1810
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0291	4957.1000	3.8078	3.6885	0.0948	5258.6000	0.0042	2.6503	1.2502	86.4820	114.4000	0.7559	22.4240	-36.1970
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0290	4937.7000	3.7608	3.6871	0.0943	5256.4000	0.0049	2.6546	1.2502	85.9140	113.9000	0.7543	22.0370	-36.9380
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0289	4924.1000	3.7276	3.6862	0.0940	5254.6000	0.0055	2.6575	1.2502	85.5050	113.5400	0.7531	22.6830	-35.8050
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0288	4914.2000	3.7033	3.6855	0.0938	5253.0000	0.0060	2.6595	1.2502	85.2120	113.3100	0.7520	23.4070	-34.5530
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0287	4906.7000	3.6849	3.6850	0.0936	5251.8000	0.0064	2.6610	1.2502	84.9840	113.1300	0.7512	22.8640	-35.5080
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0286	4901.0000	3.6708	3.6847	0.0935	5250.7000	0.0067	2.6622	1.2502	84.7990	112.9800	0.7506	23.0220	-35.3060
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0285	4896.4000	3.6597	3.6843	0.0934	5249.8000	0.0070	2.6631	1.2502	84.6550	112.8700	0.7500	23.2040	-35.1530
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0284	4892.7000	3.6509	3.6841	0.0933	5249.0000	0.0072	2.6639	1.2502	84.5410	112.7800	0.7496	23.4410	-35.0020
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0283	4889.7000	3.6435	3.6839	0.0933	5248.4000	0.0074	2.6644	1.2502	84.4550	112.7300	0.7492	23.2930	-34.9090
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0282	4887.3000	3.6372	3.6838	0.0932	5247.9000	0.0076	2.6648	1.2502	84.3850	112.6800	0.7489	23.2950	-34.8380
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0281	4885.4000	3.6319	3.6838	0.0932	5247.5000	0.0077	2.6649	1.2502	84.3290	112.6300	0.7487	22.8750	-34.7850
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0280	4883.9000	3.6275	3.6837	0.0932	5247.1000	0.0078	2.6650	1.2502	84.2900	112.6100	0.7485	23.1260	-33.0690
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0279	4882.7000	3.6240	3.6837	0.0932	5246.8000	0.0079	2.6650	1.2502	84.2700	112.6200	0.7483	23.3500	-32.7900
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0278	4881.8000	3.6213	3.6837	0.0932	5246.6000	0.0080	2.6650	1.2502	84.2440	112.5900	0.7482	23.4390	-33.0420
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0277	4881.1000	3.6193	3.6837	0.0932	5246.4000	0.0080	2.6650	1.2502	84.2330	112.6000	0.7481	23.1310	-33.0610
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0276	4880.6000	3.6179	3.6837	0.0932	5246.2000	0.0081	2.6650	1.2502	84.2140	112.5800	0.7481	22.9590	-32.8680
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0275	4880.3000	3.6171	3.6837	0.0932	5246.1000	0.0081	2.6651	1.2502	84.2040	112.5700	0.7480	23.6950	-32.6260

Including seismology

Results table

Summary | New Search | Restart

Values common to all shown results

[Fe/H]	Z	Vrot	Wrot	Trot	α_{MLT}	Over.
0.0800	0.0					

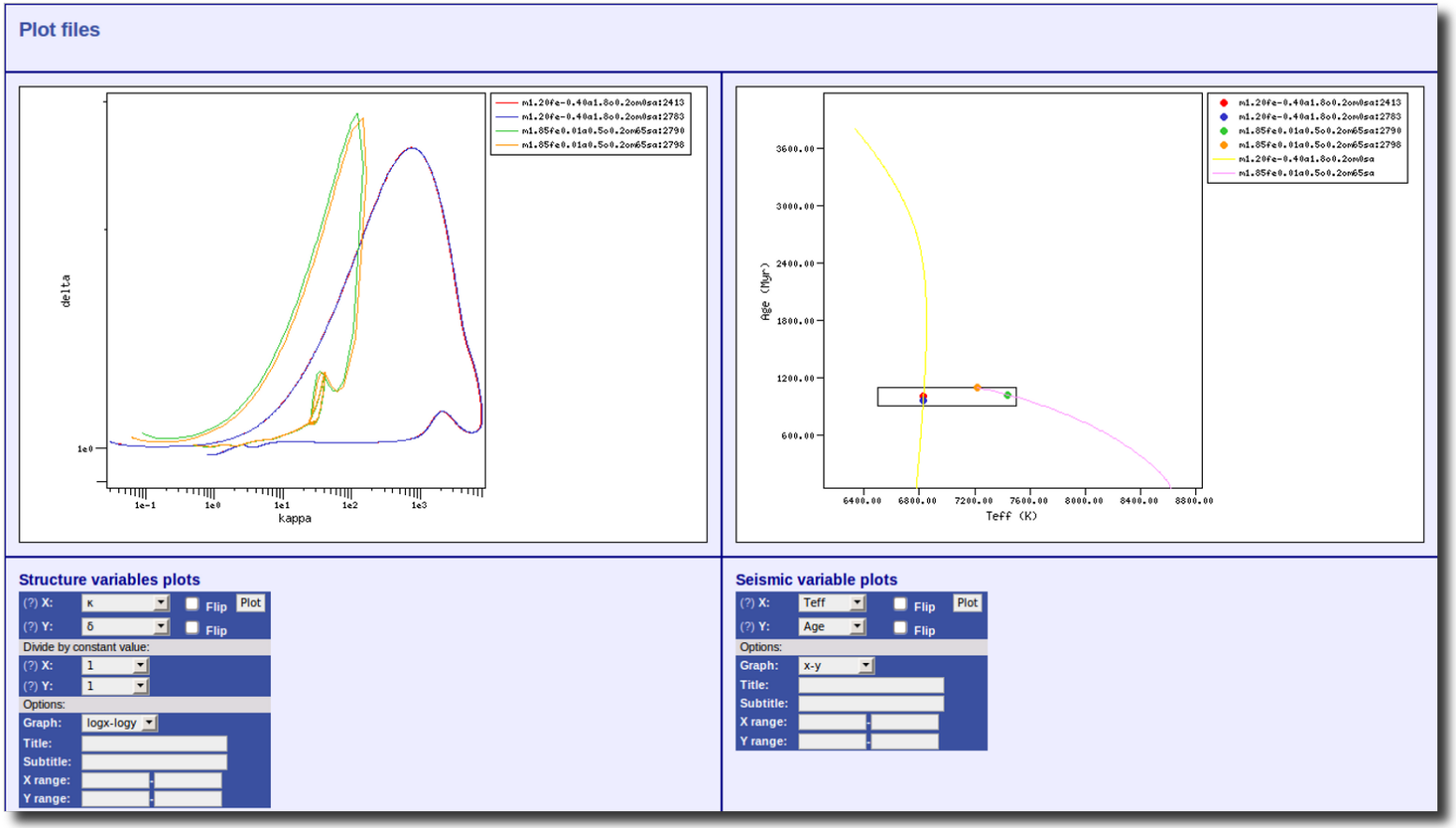
Z

Relative fraction (in mass) of metals, i.e. elements heavier than He.
Z = (1-ypr) / ((1.d0/(solarzx*10^feh)) + (dydz+1.d0)), where

- ypr = 0.235,
- dydz = 2.2,
- solarzx = 0.0245

Plot	VOT	Txt	VOT		Txt		Track	Fileid	T_{ef}							Mass	F0	F1	F0/F1	Δ(ν)	δ(ν)
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0292	4986.7							1.2502	87.3310	115.2400	0.7578	22.4010	-37.1810
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0291	4957.1							1.2502	86.4820	114.4000	0.7559	22.4240	-36.1970
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0290	4937.7000	3.7608	3.6871	0.0943	5256.4000	0.0049	2.6546	1.2502	85.9140	113.9000	0.7543	22.0370	-36.9380
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0289	4924.1000	3.7276	3.6862	0.0940	5254.6000	0.0055	2.6575	1.2502	85.5050	113.5400	0.7531	22.6830	-35.8050
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0288	4914.2000	3.7033	3.6855	0.0938	5253.0000	0.0060	2.6595	1.2502	85.2120	113.3100	0.7520	23.4070	-34.5530
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0287	4906.7000	3.6849	3.6850	0.0936	5251.8000	0.0064	2.6610	1.2502	84.9840	113.1300	0.7512	22.8640	-35.5080
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0286	4901.0000	3.6708	3.6847	0.0935	5250.7000	0.0067	2.6622	1.2502	84.7990	112.9800	0.7506	23.0220	-35.3060
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0285	4896.4000	3.6597	3.6843	0.0934	5249.8000	0.0070	2.6631	1.2502	84.6550	112.8700	0.7500	23.2040	-35.1530
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0284	4892.7000	3.6509	3.6841	0.0933	5249.0000	0.0072	2.6639	1.2502	84.5410	112.7800	0.7496	23.4410	-35.0020
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0283	4889.7000	3.6435	3.6839	0.0933	5248.4000	0.0074	2.6644	1.2502	84.4550	112.7300	0.7492	23.2930	-34.9090
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0282	4887.3000	3.6372	3.6838	0.0932	5247.9000	0.0076	2.6648	1.2502	84.3850	112.6800	0.7489	23.2950	-34.8380
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0281	4885.4000	3.6319	3.6838	0.0932	5247.5000	0.0077	2.6649	1.2502	84.3290	112.6300	0.7487	22.8750	-34.7850
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0280	4883.9000	3.6275	3.6837	0.0932	5247.1000	0.0078	2.6650	1.2502	84.2900	112.6100	0.7485	23.1260	-33.0690
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0279	4882.7000	3.6240	3.6837	0.0932	5246.8000	0.0079	2.6650	1.2502	84.2700	112.6200	0.7483	23.3500	-32.7900
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0278	4881.8000	3.6213	3.6837	0.0932	5246.6000	0.0080	2.6650	1.2502	84.2440	112.5900	0.7482	23.4390	-33.0420
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0277	4881.1000	3.6193	3.6837	0.0932	5246.4000	0.0080	2.6650	1.2502	84.2330	112.6000	0.7481	23.1310	-33.0610
☐	☐	☐	cesam2k	graco	cesam2k	graco	m125fe0.08a0.5o0.3rot0	0276	4880.6000	3.6179	3.6837	0.0932	5246.2000	0.0081	2.6650	1.2502	84.2140	112.5800	0.7481	22.9590	-32.8680

Shell structure plots



THANK YOU!