

S3 Services

S3: Simple Self-described Service

A simple access protocol for microphysics simulations

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IVOA interoperability meeting
Victoria, May 17-21, 20010





Requirements

- **Simplicity.**
 - The simpler the development of the service is, the more people will be willing to implement it \Rightarrow more theoretical models in the VO.
- **Flexibility.**
 - Self-described data/service.
 - The protocol explains how the service must describe itself and how that description must be understood and used.



S3 protocol

- **Dialog** between the application and the model server.
- The server must be able to answer three questions:
 - Which parameters can be used for searching, and what values are allowed for each of them?
 - Which files are available for a given range of those parameters?
 - Give me a particular file.
- Each answer is just a VOTable document (XML)
 - (the final data file/s could be something else: image, fits...)



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S3 protocol

- Dialog

The query

<http://www.../.../s3p.php?format=metadata>

- The server must be able to answer three questions

The answer

```
<VOTABLE version="1.1">
  <RESOURCE type="meta">
    <DESCRIPTION>Theoretical Isochrones for the MyModel model. </DESCRIPTION>

    <PARAM name="INPUT:age" ucd="phys.age" unit="Gyr">
      <DESCRIPTION>Age of the star in Gyr. </DESCRIPTION>
      <VALUES TYPE="actual">
        <OPTION VALUE="1">
          <OPTION VALUE="5">
            <OPTION VALUE="15">
              </VALUES>
            </PARAM>

          <PARAM name="INPUT:metallicity" ucd="..." unit=">
            <DESCRIPTION>Metallicity of the star defined as Fe/H </DESCRIPTION>
            <VALUES TYPE="actual">
              <OPTION VALUE="0">
                <OPTION VALUE="0.5">
                  <OPTION VALUE="1">
                    </VALUES>
                  </PARAM>

                </RESOURCE>
              </VOTABLE>
```



S3 protocol

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S3 protocol

- Dialog

The query

```
http://www.../.../s3p.php?age=0/10&metallicity=0,1
```

- The server must be able to answer three questions:

The answer

```
<VOTABLE version="1.1">
  <INFO name="QUERY_STATUS" value="OK"/>
  <RESOURCE type="results">
    ...
    <TABLE>
      <FIELD NAME="age"/>
      <FIELD NAME="metallicity"/>
      <FIELD NAME="link"/>
      <TABLEDATA>
        <TR>
          <TD>1 </TD>
          <TD>0 </TD>
          <TD><![CDATA[http://myservice.com/s3.php?id=12]]> </TD>
        </TR>
        <TR>
          <TD>3 </TD>
          <TD>0.5 </TD>
          <TD><![CDATA[http://myservice.com/s3.php?id=23]]> </TD>
        </TR>
        ...
      </TABLEDATA>
    </TABLE>
  </RESOURCE>
</VOTABLE>
```



S3 protocol

- **Dialog** between the application and the model server.
- The server must be able to answer three questions:
 - Which parameters can be used for searching, and what values are allowed for each of them?
 - Which files are available for a given range of those parameters?
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S3 protocol

- Dialog

The query

<http://www.../.../s3p.php?id=12>

- The server must be able to answer three questions

The answer

```

<VOTABLE version="1.1">
  <INFO name="QUERY_STATUS" value="OK"/>
  <RESOURCE type="results">
    <DESCRIPTION>
      Theoretical Isochrone for the MyModel model.
    </DESCRIPTION>
    <PARAM name="age" ucd="phys.age" unit="Gyr" value="1"/ >
    <PARAM name="metallicity" ucd="..." unit="" value="0"/ >
    <TABLE>
      <FIELD name="t" ucd="time.age" unit="Gyr" datatype="float" / >
      <FIELD name="M" ucd="phys.mass" unit="" datatype="float" / >
      <FIELD name="teff" ucd="phys.temperature.effective" unit="K" datatype="int" / >
      <FIELD name="Logg" ucd="phys.gravity" unit="" datatype="float" / >
      <FIELD name="Lum" ucd="phys.luminosity" unit="" datatype="float" / >
      <TABLEDATA>
        <TR>
          <TD>0.001 </TD>
          <TD>0.0005 </TD>
          <TD>628 </TD>
          <TD>2.645 </TD>
          <TD>4.2658e-06 </TD>
        </TR>
        <TR>
          <TD>0.001 </TD>
          <TD>0.0010 </TD>
          <TD>942 </TD>
          <TD>2.996 </TD>
          <TD>1.92752e-05 </TD>
        </TR>
      </TABLEDATA>
    </TABLE>
  </RESOURCE>
</VOTABLE>

```

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S3 protocol

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IVOA Note

International Virtual Observatory Alliance

IVOA Documents



S3: Proposal for a simple protocol to handle theoretical data (microsimulations) Version 1.00

IVOA Note 15 October 2008

Interest/Working Group:

[*Theory Interest Group*](#)

Author(s):

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Editor(s):

Carlos Rodrigo, Enrique Solano

Abstract

The aim of this document is to suggest a new protocol designed to provide access to theoretical data/services in the



A working approach: Services

- Isochrones/evolutionary tracks servers.
 - Spanish VO: NextGen, COND, DUSTY, Siess.
 - Italian VO: BATSI.
- Synthetic photometry service + photometry fit service.
- Asteroseismology models.
 - Big models
 - Complex parametrization



A working approach: Applications

- An application (*VOSA*) using some of these services to infer physical parameters from observed data
 - Photometry fit services for Kurucz, NextGen, Dusty, COND models.
 - NextGen, COND, DUSTY, Siess isochrones/evol. tracks.
 - Used for science (*Bayo et al, A&A 2008, 429,277B*)
- An application (*VOTA*) using asteroseismology models services to:
 - explore the models,
 - find models with certain properties
 - make several kinds of plots
 - etc.



A working approach: Utilities

- S3 wizard
 - A wizard that helps to build a VO service for a theoretical model.
 - Simple inputs
 - The application builds the database, S3 services...
- S3 interface
 - A web interface to test any S3 service.
 - It shows how an application is expected to understand (or not) your service.



Asteroseismology: Service/models parameters

- 1: Which parameters can be used for searching, and what values are allowed for each of them?



Asteroseismology: Service/models parameters

```
<VOTABLE version="1.1" xsi:schemaLocation="http://www.ivoa.net/xml/VOTable/v1.1" <RESOURCE type="meta">
  <DESCRIPTION>Granada Stellar Seismic Models (GSSM-V0) adapts the Granada Team numerical package outputs to
  <PARAM name="concepts" value="http://localhost:80/carlos/svo/theory/astrosism/concepts.php"/>
  <PARAM name="bibcode" ucd="meta.bib" value="1997M%26AS..124..597H">
    <DESCRIPTION>CESAM evolutionary code</DESCRIPTION>
  </PARAM>
  <PARAM name="bibcode" ucd="meta.bib" value="2008Ap%26SS..316..129H">
    <DESCRIPTION>GraCo oscillation code</DESCRIPTION>
  </PARAM>
  <PARAM name="bibcode" ucd="meta.bib" value="2008Ap%26SS..316..155S">
    <DESCRIPTION>FILOU oscillation code</DESCRIPTION>
  </PARAM>
  <PARAM name="INPUT:teff:range" ucd="phys.temperature" unit="K" utype="Star.Teff" datatype="float">
    <DESCRIPTION>Effective temperature</DESCRIPTION>
    <values>
      <min value="6330.54259462"/>
      <max value="8624.90808613"/>
    </values>
  </PARAM>
  <PARAM name="INPUT:Lum:range" ucd="phys.luminosity" unit="Lsun" utype="Star.Luminosity" datatype="float">
    <DESCRIPTION>Luminosity (L/Lsun), Lsun=3.839 e33 erg/s</DESCRIPTION>
    <values>
      <min value="2.40289786048"/>
      <max value="17.3890505483"/>
    </values>
  </PARAM>
  <PARAM name="INPUT:logg:range" ucd="phys.gravity" unit="" utype="Star.logg" datatype="float">
    <DESCRIPTION>Log(g) (g in cm/s2)</DESCRIPTION>
    <values>
      <min value="3.8486433931"/>
      <max value="4.41867992287"/>
    </values>
  </PARAM>
  <PARAM name="INPUT:density:range" ucd="phys.density" unit="g/cm3" utype="Star.Density" datatype="float">
    <DESCRIPTION>Average density</DESCRIPTION>
    <values>
      <min value="0.137125362491"/>
      <max value="1.18750725442"/>
    </values>
  </PARAM>
  <PARAM name="INPUT:age:range" ucd="time.age" unit="Myr" utype="Star.Age" datatype="float">
    <DESCRIPTION>Age</DESCRIPTION>
    <values>
      <min value="49.95"/>
      <max value="3803.8"/>
    </values>
  </PARAM>
</RESOURCE>
</VOTABLE>
```

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Asteroseismology: Service/models parameters

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

Continue

References:

- [CESAM evolutionary code](#)
- [CESAM2k evolutionary code](#)

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Asteroseismology: Service/models parameters

Granada Stellar Seismic Models

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CESAM2k evolutionary code

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

Oscillation code

- None
- GraCo oscillation code

Continue

References:

- [CESAM2k evolutionary code](#)
- [GraCo oscillation code](#)

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Asteroseismology: Service/models parameters

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](#).

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 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			Sismology search parameters		
(?) T_{eff}	4000	- 5000 (K)	(?) F0	<input type="text"/>	- <input type="text"/> (muHz)
(?) Lum	<input type="text"/>	- <input type="text"/> (Lsun)	(?) F1	<input type="text"/>	- <input type="text"/> (muHz)
(?) Log(g)	<input type="text"/>	- <input type="text"/>	(?) F0/F1	<input type="text"/>	- <input type="text"/>
(?) Density	<input type="text"/>	- <input type="text"/> (g/cm3)	(?) Δ(v)	20	- 25 (muHz)
(?) Age	<input type="text"/>	- <input type="text"/> (Myr)	(?) δ(v)	<input type="text"/>	- <input type="text"/> (muHz)
(?) [Fe/H]	<input type="text"/>	- <input type="text"/>	(?) ν	<input type="text"/>	- <input type="text"/> (muHz)
(?) Z	<input type="text"/>	- <input type="text"/>	(?) l	<input type="text"/>	- <input type="text"/>
(?) Hcent	<input type="text"/>	- <input type="text"/>	(?) n	<input type="text"/>	- <input type="text"/>
(?) R-	<input type="text"/>	- <input type="text"/> (Rsun)	(?) Sta.	all modes	<input type="text"/>
(?) Mass	<input type="text"/>	- <input type="text"/> (Msun)	(?) νSta	<input type="text"/>	- <input type="text"/> (muHz)
(?) Vrot	<input type="text"/>	- <input type="text"/> cm/s			
(?) Wrot	<input type="text"/>	- <input type="text"/> rad/s			
(?) Trot	<input type="text"/>	- <input type="text"/> sec			
(?) αMLT	<input type="text"/>	- <input type="text"/>			
(?) Over.	<input type="text"/>	- <input type="text"/>			

Search **Reset**



Asteroseismology: Search, available results

- 1: Which parameters can be used for searching, and what values are allowed for each of them?
- 2: Which files are available for a given range of those parameters?



Asteroseismology: Search, available results

```
<VOTABLE version="1.1" xmlns:schenalocation="http://www.ivoa.net/xml/VOTable/v1.1"> <INFO name="QUERY_STATUS" val
<RESOURCE type="results">
  <DESCRIPTION>Granada Stellar Seismic Models (GSSM-V0) adapts the Granada Team numerical package outputs to b
  <PARAM name="concepts" value="http://localhost:80/carlos/svo/theory/astrosism/concepts.php"/>
  <PARAM name="bibcode" ucd="meta.bib" value="1997A%26AS...124...597H">
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  </PARAM>
  <PARAM name="bibcode" ucd="meta.bib" value="2008Ap%26SS...316...129M">
    <DESCRIPTION>GraCo oscillation code</DESCRIPTION>
  </PARAM>
  <PARAM name="bibcode" ucd="meta.bib" value="2008Ap%26SS...316...155S">
    <DESCRIPTION>FILOU oscillation code</DESCRIPTION>
  </PARAM>
  <PARAM name="teff" ucd="phys.temperature" unit="K" value="8000/8300" utype="Star.Teff" datatype="float"/>
  <TABLE>
    <FIELD name="teff" ucd="phys.temperature" unit="K" utype="Star.Teff" datatype="float">
      <DESCRIPTION>Effective temperature</DESCRIPTION>
    </FIELD>
    <FIELD name="Lum" ucd="phys.luminosity" unit="Lsun" utype="Star.Luminosity" datatype="float">
      <DESCRIPTION>Luminosity (L/Lsun), Lsun=3.839 e33 erg/s</DESCRIPTION>
    </FIELD>
    <FIELD name="logg" ucd="phys.gravity" unit="" utype="Star.logg" datatype="float">
      <DESCRIPTION>Log(g) (g in cm/s2)</DESCRIPTION>
    </FIELD>
    <FIELD name="density" ucd="phys.density" unit="g/cm3" utype="Star.Density" datatype="float">
      <DESCRIPTION>Average density</DESCRIPTION>
```

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```
<FIELD name="link_osc" ucd="DATA_LINK">
  <DESCRIPTION>Link to structure data file</DESCRIPTION>
</FIELD>
<FIELD name="link_freq" ucd="DATA_LINK">
  <DESCRIPTION>Link to seismology data file</DESCRIPTION>
</FIELD>
<TABLEDATA>
  <TR>
    <TD>8295.2387</TD>
    <TD>13.9730</TD>
    <TD>4.1886</TD>
    <TD>0.4382</TD>
  </TR>
  <TR>
    <TD>8284.8200</TD>
    <TD>14.0225</TD>
    <TD>4.1848</TD>
    <TD>0.4326</TD>
  </TR>
  <TR>
    <TD>8274.2655</TD>
    <TD>14.0723</TD>
    <TD>4.1811</TD>
    <TD>0.4270</TD>
  </TR>
  <TR>
    <TD>8263.5735</TD>
    <TD>14.1225</TD>
    <TD>4.1773</TD>
    <TD>0.4214</TD>
  </TR>
  <TR>
    <TD>8252.7423</TD>
    <TD>14.1729</TD>
    <TD>4.1735</TD>
    <TD>0.4159</TD>
```



Asteroseismology: Search, available results

Results table
[Summary](#) [New Search](#) [Restart](#)

Values common to all shown results

[Fe/H]	Z	Vrot	Wrot	Trot	Mx,T	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)	σ(v)	
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	0289	4924.1000	3.7276	3.6862	0.0940	5254.6000	0.0055	2.6575	1.2502	85.0550	113.5400	0.7531	22.6830	-35.8050
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	0287	4906.7000	3.6849	3.6850	0.0936	5251.8000	0.0064	2.6610	1.2502	84.9640	113.1300	0.7512	22.8640	-35.5080
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	0284	4892.7000	3.6509	3.6841	0.0933	5249.0000	0.0072	2.6639	1.2502	84.5410	112.7900	0.7496	23.4410	-35.0020
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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	-35.0690
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	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
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	0276	4880.6000	3.6179	3.6837	0.0932	5246.2000	0.0081	2.6650	1.2502	84.2140	112.5900	0.7481	22.9950	-32.8680
<input type="checkbox"/>	<input type="checkbox"/>	cesam2k	graco	cesam2k	graco	m125fe0.08a0.S0b.3rco0	0275	4880.3000	3.6171	3.6837	0.0932	5246.1000	0.0081	2.6651	1.2502	84.2040	112.5700	0.7480	23.4950	-32.6260

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those



Asteroseismology: Search, available results

Results table

Summary New Search Restart

Values common to all shown results

[Fe/H]	Z	Vrot	Wrot	Trot	Mx.Y	Over.
0.0800	0.0206	0	0	0	0.5000	0.3000

HR diagram

Age (Myr)

[Fe/H]

Options:
Graph: x,y
Title:
Subtitle:

Count	R _*	Mass	F0	F1	F0/F1	Δ(v)	σ(v)
0033	2.6433	1.2502	87.3310	115.2400	0.7578	22.4010	-37.1810
0042	2.6503	1.2502	86.4820	114.4000	0.7559	22.4240	-36.1970
0049	2.6546	1.2502	85.9140	113.9000	0.7543	22.0370	-36.9380
0055	2.6575	1.2502	85.0550	113.5400	0.7531	22.6830	-35.8050
0060	2.6595	1.2502	85.2120	113.3100	0.7520	23.4070	-34.5530
0064	2.6610	1.2502	84.9640	113.1300	0.7512	22.8640	-35.5080
0067	2.6622	1.2502	84.7990	112.9800	0.7506	23.0220	-35.3060
0070	2.6631	1.2502	84.6550	112.8700	0.7500	23.2040	-35.1530
0072	2.6639	1.2502	84.5410	112.7800	0.7496	23.4410	-35.0020
0074	2.6644	1.2502	84.4550	112.7300	0.7492	23.2930	-34.9090
0076	2.6648	1.2502	84.3850	112.6800	0.7489	23.2950	-34.8380
0077	2.6649	1.2502	84.3290	112.6300	0.7487	22.8750	-34.7850
0078	2.6650	1.2502	84.2900	112.6100	0.7485	23.1260	-33.0690
0079	2.6650	1.2502	84.2700	112.6200	0.7483	23.3500	-32.7900
0080	2.6650	1.2502	84.2440	112.5900	0.7482	23.4390	-33.0420
0080	2.6650	1.2502	84.2330	112.6000	0.7481	23.1310	-33.0610
0081	2.6650	1.2502	84.2140	112.5800	0.7481	22.9990	-32.8680
0081	2.6651	1.2502	84.2040	112.5700	0.7480	23.4950	-32.6260

, and what

those

Asteroseismology: Search, available results

Results table
Summary | New Search | Restart

Values common to all shown results

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

Count	R _*	Mass	F0	F1	F0/F1	$\Delta(v)$	$\sigma(v)$
1033	2.6433	1.2502	87.3310	115.2400	0.7578	22.4010	-37.1810
1042	2.6503	1.2502	86.4820	114.4000	0.7559	22.4240	-36.1970
1049	2.6546	1.2502	85.9140	113.9000	0.7543	22.6370	-36.9380
1055	2.6575	1.2502	85.5050	113.5400	0.7531	22.6830	-35.8050
1120	113.3100	0.7520	23.4070				-34.5530
1040	113.1300	0.7512	22.8640				-35.5080
7990	112.9800	0.7506	23.0220				-35.3060
6550	112.8700	0.7500	23.2040				-35.1530
5410	112.7900	0.7496	23.4410				-35.0020
4550	112.7300	0.7492	23.2930				-34.9090
3850	112.6800	0.7489	23.2950				-34.8380
3290	112.6300	0.7487	22.8750				-34.7850
2900	112.6100	0.7485	23.1260				-33.0690
2700	112.6200	0.7483	23.3500				-32.7900
2440	112.5900	0.7482	23.4390				-33.0420
2330	112.6000	0.7481	23.1310				-33.0610
2140	112.5900	0.7481	22.9990				-32.8680
2040	112.5700	0.7480	23.4950				-32.6260

HR diagram

Age (Myr)

Log(L/L_{sun})

Log(Teff (K))

Legend:

- Data
- Model: $\alpha=20\%$, $Z=0.0206$, $Vrot=0$, $Wrot=0$, $Trot=0$, $MLT=0.5000$
- Model: $\alpha=20\%$, $Z=0.0206$, $Vrot=0$, $Wrot=0$, $Trot=0$, $MLT=0.3000$

Graph: x,y
Title:
Subtitle:

Options:
Graph: x,y
Title:
Subtitle:

Options:
Graph: x,y
Title:
Subtitle:

Options:
Graph: x,y
Title:
Subtitle:

Options:
Graph: x,y
Title:
Subtitle:

, and what

those



Asteroseismology: Data files

- 1: Which parameters can be used for searching, and what values are allowed for each of them?
- 2: Which files are available for a given range of those parameters?
- 3: Give me a particular file.



Asteroseismology: Data files

```
<VOTABLE version="1.1" xmlns="http://www.ivoa.net/xml/VOTable/v1.1" xsi:schemaLocation="http://www.ivoa.net/xml/VOTable/v1.1" <INFO name="
<RESOURCE type="data">
  <PARAM name="concepts" value="http://localhost:80/carlos/svo/theory/astrosism/concepts.php"/>
  <TABLE>
    <FIELD name="r" ucd="phys.size.radius" unit="cm" utype="Shell.Radius" datatype="float">
      <DESCRIPTION>Distance to the center of the star</DESCRIPTION>
    </FIELD>
    <FIELD name="Logg" ucd="phys.mass" unit="" utype="Shell.Mass.Log" datatype="float">
      <DESCRIPTION>Logarithm of the mass of the shell at r distance from the center. It is given as a logarithm</DESCRIPTION>
    </FIELD>
    <FIELD name="temp" ucd="phys.temperature" unit="K" utype="Shell.Temp" datatype="float">
      <DESCRIPTION>Temperature at a distance r from the center: T(r)</DESCRIPTION>
    </FIELD>
    <FIELD name="pressure" ucd="phys.pressure" unit="dyn/cm^2" utype="Shell.Pressure" datatype="float">
      <DESCRIPTION>Pressure at distance r from the center: P(r)</DESCRIPTION>
    </FIELD>
    <FIELD name="density" ucd="phys.density" unit="g/cm^3" utype="Shell.Density" datatype="float">
      <DESCRIPTION>density at distance r from the center: rho(r)</DESCRIPTION>
    </FIELD>
    <FIELD name="dLTdP" ucd="arith.grad;phys.temperature;phys.pressure" unit="" utype="Shell.RealGradient" datatype="float">
      <DESCRIPTION>Called "real gradient". Variation of the temperature as a function of the pressure) (adimensional)</DESCRIPTION>
    </FIELD>
    <FIELD name="lum" ucd="phys.luminosity" unit="erg/s" utype="Shell.Luminosity" datatype="float">
      <DESCRIPTION>Luminosity at distance r from the center: L(r)</DESCRIPTION>
    </FIELD>
    <FIELD name="kappa" ucd="" unit="" utype="Shell.Kappa" datatype="float">
      <DESCRIPTION>Rosseland opacity</DESCRIPTION>
    </FIELD>
    <FIELD name="thermgy" ucd="phys.energy" unit="" utype="Shell.ThermoEnergy" datatype="float">
```

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those

3. Give me a particular file

```
<TABLEDATA>
  <TR>
    <TD>7. 870188097492E+10</TD>
    <TD>7. 4424e-11</TD>
    <TD>5709. 3156</TD>
    <TD>1350. 8334</TD>
    <TD>7. 870146391040E+10</TD>
    <TD>7. 4375e-11</TD>
    <TD>5709. 4051</TD>
    <TD>1389. 4471</TD>
    <TD>7. 870089908460E+10</TD>
    <TD>7. 4306e-11</TD>
    <TD>5709. 5323</TD>
    <TD>1443. 5106</TD>
    <TD>7. 870014686396E+10</TD>
    <TD>7. 4211e-11</TD>
    <TD>5709. 7133</TD>
    <TD>1518. 7980</TD>
    <TD>7. 869916577107E+10</TD>
    <TD>7. 4079e-11</TD>
    <TD>5709. 9707</TD>
    <TD>1622. 9355</TD>
    <TD>7. 869791770304E+10</TD>
    <TD>7. 3898e-11</TD>
    <TD>5710. 3367</TD>
    <TD>1765. 8117</TD>
    <TD>7. 869637449792E+10</TD>
    <TD>7. 3652e-11</TD>
    <TD>5710. 8571</TD>
    <TD>1960. 0116</TD>
    <TD>7. 869452396574E+10</TD>
    <TD>7. 3320e-11</TD>
    <TD>5711. 5969</TD>
    <TD>2221. 2828</TD>
    <TD>7. 869237256112E+10</TD>
    <TD>7. 2880e-11</TD>
    <TD>5712. 6486</TD>
    <TD>2569. 1690</TD>
    <TD>7. 868994421527E+10</TD>
    <TD>7. 2299e-11</TD>
    <TD>5714. 1432</TD>
    <TD>3027. 7106</TD>
    <TD>7. 86872724768E+10</TD>
    <TD>7. 1542e-11</TD>
    <TD>5716. 2669</TD>
    <TD>3626. 1169</TD>
```

Asteroseismology: Data files

Plot files

Legend:

- rd_20fa-6.46a1_ba1_2a0baa12913
- rd_20fa-6.46a1_ba1_2a0baa12792
- rd_20fa-6.46a1_ba1_2a0baa12796
- rd_20fa-6.46a1_ba1_2a0baa12798

Legend:

- rd_20wa-6.46a1_ba1_2a0baa12410
- rd_20wa-6.46a1_ba1_2a0baa12792
- rd_20fa-6.46a1_ba1_2a0baa12796
- rd_20fa-6.46a1_ba1_2a0baa12798
- rd_20wa-6.46a1_ba1_2a0baa12410
- rd_20fa-6.46a1_ba1_2a0baa12796

Structure variables plots

(1) X: Flip Plot

(2) Y: Flip Plot

Divide by constant value:

(1) X: Flip Plot

(2) Y: Flip Plot

Options:

Graph: Flip Plot

Title:

Subtitle:

X range:

Y range:

Seismic variable plots

(1) X: Flip Plot

(2) Y: Flip Plot

Options:

Graph: Flip Plot

Title:

Subtitle:

X range:

Y range:

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those



S3 interface

S3 interface

Although there are many fields in Astrophysics with a strong need of direct and rigorous comparisons between theoretical and observational data in most of the occasions, however, the different architectures, programming codes, formats,..., make it extremely difficult the comparison between them.

In the context of the IVOA Theory Interest Group, in particular for Microsimulations, in the Spanish Virtual Observatory we are working in the definition of the required framework to provide applications and services of theoretical astrophysics to the general community. One of the lines of work consists in the development of S3 (*Simple Self-described Service*), a protocol to access theoretical spectral data in a simple way.

This interface allows you to access to the data offered by any S3 server if you know its main URL, and can be used by service providers to check that they are offering their data as VO-S3 compliant.

Enter the full base URL of a S3 service, starting with http:// (not including the format=metadata parameter)

S3 URL:

Go

Or try a know S3 service

S3 Service:

Go

S3 interface

S3 interface

Although there are many fields in Astrophysics with a strong need of direct and rigorous comparisons

Spanish Virtual Observatory - Theoretical models

URL: <http://vo.laaff.inia.es/theory/S3F...d32v4/typh.php?66model=Keruc&>

S3 interface

ODFNEW /NOVER models. Newly computed ODFs with better opacities and better abundances have been used.

teff: - (value for the effective temperature for the model. Temperatures are given in K)

logg: - (value for Log(G) for the model.)

meta: - (value for the Metallicity for the model.)

UFI: (Available filters)

[See VOTable](#)

Enter the t

Or try a know S3 service

S3 Service:

S3 interface

S3 interface

Although there are many fields in Astrophysics with a strong need of direct and rigorous comparisons

Spanish Virtual Observatory - Theoretical models Funded by

URL: http://vo.laefi.inta.es/theory3if_/d2v44syh.php?666model=Kurucz&

S3 interface

Spanish Virtual Observatory - Theoretical models Funded by

URL: http://vo.laefi.inta.es/theory3if_/d2v44syh.php?666model=Kurucz&teff=5000&logg=1.00&meta=0.00&UFU=SDSS_R6

S3 interface

Synthetic photometry for Kurucz ODFNEW /NOVER models. Newly computed ODFs with better opacities and better abundances have been used.

teff	logg	meta	UFU	phot
5000	1.00	0.00	SDSS_R	1.39734087217e-13
5000	1.50	0.00	SDSS_R	1.38714034883e-13
5000	2.00	0.00	SDSS_R	1.37719326443e-13
5250	1.00	0.00	SDSS_R	1.7696765093e-13
5250	1.50	0.00	SDSS_R	1.75586497773e-13
5250	2.00	0.00	SDSS_R	1.74292047386e-13
5500	1.00	0.00	SDSS_R	2.19029620013e-13
5500	1.50	0.00	SDSS_R	2.17163839636e-13
5500	2.00	0.00	SDSS_R	2.15413488457e-13
5750	1.00	0.00	SDSS_R	2.66023807988e-13
5750	1.50	0.00	SDSS_R	2.63624783206e-13
5750	2.00	0.00	SDSS_R	2.61345124187e-13
6000	1.00	0.00	SDSS_R	3.17930670692e-13
6000	1.50	0.00	SDSS_R	3.15149711273e-13
6000	2.00	0.00	SDSS_R	3.1237641431e-13

See VOTable

Theoretical spectra

- Daliesio
- CoRoT
- NextGen
- cmd00
- dust00
- Kurucz

Services

- Files
- TSAP
- VOSA
- Ischrones

Enter the



THANK YOU!