

S3: Simple Self-described Service A simple access protocol for microphysics simulations

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- Requirements
- Protocol
- A working approach
- Misunderstandings
- 2 Astroseismology
- 3 Work in progress

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Requirements Protocol A working approach Misunderstandings



Requirements

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

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Requirements Protocol A working approach Misunderstandings



S3 protocol

- Dialog between the application and the model server.
- The server must be able to answer three questions:
 - Which parameters define this model, 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)

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Requirements Protocol A working approach Misunderstandings



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: <u>Theory Interest Group</u> Author(s): Carlos Rodrigo, Miguel Cerviño, Enrique Solano, Patrizia Manzato Editor(s): Carlos Rodrigo, Enrique Solano

Abstract

Requirements Protocol A working approach Misunderstandings



A working approach

- SSAP: a very similar approach for the case of theoretical spectra.
- Isochrones/evolutionary tracks servers.
 - Spanish VO: NextGen, COND, DUSTY, Siess.
 - Italian VO: BATSI.
 - An application using some services to compare with user data (*iDraw*)
- Synthetic photometry service.
 - An application using the service to infer physical parameters from observed data (*VOSA*).
 - Useful for science (*Bayo et al, A&A 2008, in press*).

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Requirements Protocol A working approach Misunderstandings



S3 wizard

- A wizard that helps to build a VO service for a theoretical model.
 - Two inputs are needed
 - A set of ascii files containing the data corresponding to each model.
 - An ascii file with the name of every data file and the values of the parameters that characterize each file.
 - (User inputs about the meaning of parameters, data columns, curation, credits... All by a web interface.)
 - The application builds:
 - The database
 - A web page with forms to download files in ascii and votable formats.

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• A VO service able to answer the three types of S3 queries.

Requirements Protocol A working approach Misunderstandings



S3 interface

- A web interface to test any S3 service.
 - Acting as an independent application.
 - You give it the S3 address of a service.
 - It shows how an application is expected to understand (or not) your service.

	S3 interface
	Although there are many fields in Autrophysics with a strong need of direct and rigorous comparisons between theoretical and observational data is most of the occasion, however, the different architectures, programming codes, formatis,, make it extremely difficult the comparison between them.
	In the context of the IVOA Theory Interest Group, in particular for Microsendulators, in the Spanish What Discaratory we are working in the definition of the scapical framework to provide applications and service of theretail autorphysics to the portend community. One of the Nete of work consists in the development of 53 (Simple Suf-discribed Service), a protocol to access theoretical spectral data is a simple any.
	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 th	e full base URL of a S3 service, starting with http:// (not including the format-metadata parameter
	Or try a know S3 service \$3 service: [spakes plateavip servic:] Co

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Requirements Protocol A working approach Misunderstandings



Misunderstandings

- Confusing Service/Protocol with the application using it.
- There is not a data model.
 - If the service offers a model corresponding to a physical case for which there exists a data model, the service should use it (utypes...)
- It depends on human interaction.
 - Typically, it does, because, after all, humans are who are using applications.
 - There are use cases where no human interaction is needed.

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Astroseismology

1.- Application: query

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

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Astroseismology

1.- Application: query

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Astroseismology

1.- Application: query

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

3.- Application: ...

S3 interface

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 code CESAM and two oscillation codes: GraCe and FLOU

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Mass:		More info
Vrot:		More info
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Trot:		More info
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F1:		More info
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S3: Simple Self-described Service

Astroseismology

1.- Application: query

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

3.- Application: ...

Granada Stellar Seismic Models

Granada Stellar Seismic Models (SSSM-VO) adapts the Granada Team numerical padrage outputs to be used in VO in order to perform on-line stellar seismology. This padrage contains the evolutionary code CSSM and two contained on the contained PLOU VOL can exact the database in themse of exempl parameter (now spain models contained parameter) seed to contained and the available range of

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Remember that only the marked parameters will be used in the search they don't need to be the same than the ones marked to be shown in the list of res





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S3: Simple Self-described Service

Astroseismology

1.- Application: query

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

3.- Application: ...

it could even go directly to next step.

- the application is looking for models in a given T_{eff} range.
- it sees a T_{eff} parameter.
- directly queries for files in that range (no form, no human ineraction)

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2.- Server: answer
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        <DESCRIPTION-Hidrogen central fractions/DESCRIPTION>
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Astroseismology

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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 code CESAM and two oscillation codes: GraCo and FILOU

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, mark the parameters that you want to use in your search, select a range for each one and then click the "Search" button to retrieve a list
 of the available files
- Remember that only the marked parameters will be used in the search (they don't need to be the same than the ones marked to be shown in the list of results)

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Astroseismology

Granada Stellar Seismic Models

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 of the available files
- Remember that only the marked par (they don't need to be the same than

The	user	fills	the	form
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The application takes the inputs from the user and then what?

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Astroseismology

4.- Application: query

http://www.../.../s3p.php?teff=8000/8300

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Astroseismology

4.- Application: query

http://www.../.../s3p.php?teff=8000/8300

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Astroseismology

4.- Application: query

http://www.../.../s3p.php?teff=8000/8300

6.- Application: ...

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-	11.178	4.678	1.01	100		1.1.1	1.14	1.000	1.862	1000	A-10084-5	L.M.C.L	**	84	****	100.000	1.118	10.000	1.004		1.04	-	No. of Acres
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-		1.807	1.010	-		1.2.76	1.14	1.800	1.862	1.00011	5.4640-5	LINENTE	1.1	8.0		205,018	1.118	16.680	1.000	1.04	1.00		NAVY A
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-	14.08	4.88	1.348	100	1.0	4.57%	4.74	1.875	1.842	0.046+0	4.009+1	13043	43	3.3	87.04	14,405	3.758	10.004	1.001	-1.817	1.754	Atlan	failure for
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		1.100	1.071	-	**	1.2.76	1.14	1.88	1.862	1.0711	1.1000.1	LINEAU	11	8.0	P1.705	10.00	1.118	-	1.007	1.04	1.815	-	NAVY A
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10.04	14.040	1.00	1.314	-	**	1.2.76	1.74	1.800	1.80	4.53brd	6.104-1	LHOWE	0	82	11.04	20.045	1.704	0.101	110	-144	1.000	Anne	Antes Re
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	14.876	4.640	1.00	-	**	1.1.76	1.74	1.041	1.867	1.000	4.0008-5	1. Settle A	**	**	-		1.118	-	1.00		-	-	National Res
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88.01	118.00	1.1.01	1.348	-	**	1.2.76	1.74	1.8%)	1.862	6.634-6	6.1001	LINDWE	4.8	8.2	11.008	20.00	7.48	0.264	1.00	0.8.8	2.04	Acres	National Res
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Astroseismology

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			3992	RADIN	14443	4.177	4,344	426	1641	100	10.76	1.000	1840	4334344	0.0004-0	33853+5	145	14.2	H.H.N	TH-Her.	8.7736	84,00442,000	-3.4798-63.9041
			1967	10.75.00.00	14.008	4.032	0.004		9.61		1.798	1.000	1.000	-576850-6	-	3385545	4.5		10.4745	10.00	8.7798	10.100843.0079	-3.888443.7884
			Sec.		14,758		0.0644	841	8.84	1.04	1.768	1.16.75	1.0101	Allabora	APRIL 1	1.101.111	6.6	8.2	171.4.805	10.121	8.2188	ALCOURT ON	IN TRACELEORS
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Astroseismology

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 code CESAM and two oscillation codes: GraCo and FILOU

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Mark	Files		Track	Teff	Lum	Log(g)	Density	Age	[Fe/H]	z	Hcent	R+	Mass	Vrot	Wrot	Trot	a _{MLT}	Over.	F0	F1	F0/F1	∆(v)	ð(v)
	osc	freq	Track2	8295.2387	13.9730	4.1886	0.4382	490	0.01	0.0178	0.708	1.8130	1.8502	-4.9808e+6	-3.9500e-5	1.5907e+5	0.5	0.2	198.7240	256.7710	0.7739	64.6402±2.3950	0.3917±1.3494
	osc	freq	Track2	8284.8200	14.0225	4.1848	0.4326	500	0.01	0.0178	0.708	1.8208	1.8502	-5.0021e+6	-3.9500e-5	1.5907e+5	0.5	0.2	197.4472	255.1196	0.7739	64.2420±2.3805	0.2306±1.3836
	osc	freq	Track2	8274.2655	14.0723	4.1811	0.4270	510	0.01	0.0178	0.708	1.8287	1.8502	-5.0238e+6	-3.9500e-5	1.5907e+5	0.5	0.2	196.1745	253.4917	0.7739	63.8421±2.3653	0.1104±1.4451
	osc	freq	Track2	8263.5735	14.1225	4.1773	0.4214	520	0.01	0.0178	0.708	1.8367	1.8502	-5.0458e+6	-3.9500e-5	1.5907e+5	0.5	0.2	194.8903	251.8325	0.7739	63.4416±2.3506	-0.0197±1.4877
	osc	freq	Track2	8252.7423	14.1729	4.1735	0.4159	530	0.01	0.0178	0.708	1.8448	1.8502	-5.0681e+6	-3.9500e-5	1.5907e+5	0.5	0.2	193.6095	250.1949	0.7738	63.0391±2.3352	-0.1405±1.5529
	osc	freq	Track2	8241.7651	14.2238	4.1696	0.4104	540	0.01	0.0178	0.708	1.8530	1.8502	-5.0907e+6	-3.9500e-5	1.5907e+5	0.5	0.2	192.3146	248.5179	0.7738	62.6357±2.3205	-0.2941±1.5882
	osc	freq	Track2	8230.6270	14.2749	4.1657	0.4049	550	0.01	0.0178	0.708	1.8614	1.8502	-5.1136e+6	-3.9500e-5	1.5907e+5	0.5	0.2	191.0235	246.8639	0.7738	62.2305±2.3052	-0.4199±1.6492
	osc	freq	Track2	8219.3439	14.3265	4.1617	0.3994	560	0.01	0.0178	0.708	1.8699	1.8502	-5.1369e+6	-3.9500e-5	1.5907e+5	0.5	0.2	189.7190	245.1735	0.7738	61.8243±2.2904	-0.5765±1.6824
	osc	freq	Track2	8207.9093	14.3783	4.1578	0.3939	570	0.01	0.0178	0.708	1.8785	1.8502	-5.1606e+6	-3.9500e-5	1.5907e+5	0.5	0.2	188.4166	243.4993	0.7738	61.4160±2.2751	-0.7271±1.7316
	osc	freq	Track2	8196.3174	14.4306	4.1537	0.3885	580	0.01	0.0178	0.708	1.8872	1.8502	-5.1846e+6	-3.9500e-5	1.5907e+5	0.5	0.2	187.1041	241.8005	0.7738	61.0074±2.2601	-0.8657±1.7704
	osc	freq	Track2	8184.5639	14.4831	4.1496	0.3831	590	0.01	0.0178	0.708	1.8961	1.8502	-5.2089e+6	-3.9500e-5	1.5907e+5	0.5	0.2	185.7926	240.1158	0.7738	60.5965±2.2446	-0.9983±1.8238
	osc	freq	Track2	8172.6440	14.5361	4.1455	0.3777	600	0.01	0.0178	0.708	1.9051	1.8502	-5.2337e+6	-3.9500e-5	1.5907e+5	0.5	0.2	184.4684	238.3967	0.7738	60.1843±2.2297	-1.1780±1.8472
	osc	freq	Track2	8160.5395	14.5892	4.1414	0.3723	610	0.01	0.0178	0.708	1.9142	1.8502	-5.2588e+6	-3.9500e-5	1.5907e+5	0.5	0.2	183.1458	236.6947	0.7738	59.7705±2.2142	-1.3157±1.8952
	osc	freq	Track2	8148.2699	14.6428	4.1372	0.3669	620	0.01	0.0178	0.708	1.9235	1.8502	-5.2843e+6	-3.9500e-5	1.5907e+5	0.5	0.2	181.8128	234.9667	0.7738	59.3556±2.1991	-1.4758±1.9247
	osc	freq	Track2	8135.8149	14.6966	4.1329	0.3616	630	0.01	0.0178	0.708	1.9330	1.8502	-5.3103e+6	-3.9500e-5	1.5907e+5	0.5	0.2	180.4799	233.2491	0.7738	58.9390±2.1835	-1.6164±1.9684
	osc	freq	Track2	8123.1818	14.7509	4.1286	0.3562	640	0.01	0.0178	0.708	1.9425	1.8502	-5.3366e+6	-3.9500e-5	1.5907e+5	0.5	0.2	179.1365	231.5072	0.7738	58.5215±2.1682	-1.7626±1.9998
	osc	freq	Track2	8110.3775	14.8056	4.1243	0.3509	650	0.01	0.0178	0.708	1.9523	1.8502	-5.3634e+6	-3.9500e-5	1.5907e+5	0.5	0.2	177.7918	229.7729	0.7738	58.1010±2.1526	-1.9207±2.0351
	osc	freq	Track2	8097.3448	14.8603	4.1199	0.3456	660	0.01	0.0178	0.708	1.9622	1.8502	-5.3906e+6	-3.9500e-5	1.5907e+5	0.5	0.2	176.4430	228.0330	0.7738	57.6799±2.1369	-2.0629±2.0730
	osc	freq	Track2	8084.1301	14.9154	4.1154	0.3404	670	0.01	0.0178	0.708	1.9723	1.8502	-5.4183e+6	-3.9500e-5	1.5907e+5	0.5	0.2	175.0839	226.2698	0.7738	57.2579±2.1215	-2.2111±2.1000
	osc	freq	Track2	8070.7140	14.9709	4.1109	0.3351	680	0.01	0.0178	0.708	1.9825	1.8502	-5.4464e+6	-3.9500e-5	1.5907e+5	0.5	0.2	173.7240	224.5152	0.7738	56.8336±2.1057	-2.3528±2.1351
	osc	freq	Track2	8057.0825	15.0267	4.1064	0.3299	690	0.01	0.0178	0.708	1.9929	1.8502	-5.4750e+6	-3.9500e-5	1.5907e+5	0.5	0.2	172.3526	222.7337	0.7738	56.4075±2.0903	-2.5233±2.1534
	osc	freq	Track2	8043.2393	15.0828	4.1018	0.3247	700	0.01	0.0178	0.708	2.0035	1.8502	-5.5041e+6	-3.9500e-5	1.5907e+5	0.5	0.2	170.9806	220.9613	0.7738	55.9791±2.0745	-2.6843±2.1808
	osc	freq	Track2	8029.1759	15.1391	4.0971	0.3195	710	0.01	0.0178	0.708	2.0143	1.8502	-5.5337e+6	-3.9500e-5	1.5907e+5	0.5	0.2	169.6029	219.1812	0.7738	55.5499±2.0586	-2.8306±2.2122
	osc	freq	Track2	8014.8863	15.1958	4.0924	0.3143	720	0.01	0.0178	0.708	2.0253	1.8502	-5.5639e+6	-3.9500e-5	1.5907e+5	0.5	0.2	168.2156	217.3803	0.7738	55.1197±2.0430	-2.9831±2.2375
	osc	freq	Track2	8000.3621	15.2527	4.0876	0.3092	730	0.01	0.0178	0.708	2.0364	1.8502	-5.5945e+6	-3.9500e-5	1.5907e+5	0.5	0.2	166.8257	215.5831	0.7738	54.6862±2.0270	-3.1468±2.2645

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Astroseismology

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 code CESAM and two oscillation codes: GraCo and FILOU

25 results have been found for your search criteria.. You can did: on column titles to sort results by that field

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Mark	Files	3	Track	Teff	Lum	Log(g)	Density	Age	[Fe/H]	z	Hcent	R+	Mass	Vrot	Wrot	Trot	amet	Over.	F0	F1	F0/F1	∆(v)	δ(v)
	osc	freq	Track2	8295.2387	13.9730	4.1886	0.4382	490	0.01	0.0178	0.708	1.8130	1.8502	-4.9808e+6	-3.9500e-5	1.5907e+5	0.5	0.2	198.7240	256.7710	0.7739	64.6402±2.3950	0.3917±1.3494
	osc	freq	Track2	8284.8200	14.0225	4.1848	0.4326	500	0.01	0.0178	0.708	1.8208	1.8502	-5.0021e+6	-3.9500e-5	1.5907e+5	0.5	0.2	197.4472	255.1196	0.7739	64.2420±2.3805	0.2306±1.3836
	osc	freq	Track2	8274.2655	14.0723	4.1811	0.427												D 1			3421±2.3653	0.1104±1.4451
	osc	freq	Track2	8263.5735	14.1225	4.1773	0.421	۱ľ	ne i	ISE	er r	na	rk	som	ie til	es.	CII	CK.	PIC)†		.6±2.3506	-0.0197±1.4877
	osc	freq	Track2	8252.7423	14.1729	4.1735	0.415	· · ·							· · · ·	 ,						1±2.3352	-0.1405±1.5529
	osc	freq	Track2	8241.7651	14.2238	4.1696	0.410	W/b	at doc	e the		licati	ion d	02								7±2.3205	-0.2941±1.5882
	osc	freq	Track2	8230.6270	14.2749	4.1657	0.404		ai uue	5 110	s app	iicai	unu	0:								5±2.3052	-0.4199±1.6492
	osc	freq	Track2	8219.3439	14.3265	4.1617	0.3994	1	-			-				_			_	_	_	_243±2.2904	-0.5765±1.6824
	osc	freq	Track2	8207.9093	14.3783	4.1578	0.3939	570	0.01	0.0178	0.708	1.8785	1.8502	-5.1606e+6	-3.9500e-5	1.5907e+5	0.5	0.2	188.4166	243.4993	0.7738	61.4160±2.2751	-0.7271±1.7316
	osc	freq	Track2	8196.3174	14.4306	4.1537	0.3885	580	0.01	0.0178	0.708	1.8872	1.8502	-5.1846e+6	-3.9500e-5	1.5907e+5	0.5	0.2	187.1041	241.8005	0.7738	61.0074±2.2601	-0.8657±1.7704
	osc	freq	Track2	8184.5639	14.4831	4.1496	0.3831	590	0.01	0.0178	0.708	1.8961	1.8502	-5.2089e+6	-3.9500e-5	1.5907e+5	0.5	0.2	185.7926	240.1158	0.7738	60.5965±2.2446	-0.9983±1.8238
	osc	freq	Track2	8172.6440	14.5361	4.1455	0.3777	600	0.01	0.0178	0.708	1.9051	1.8502	-5.2337e+6	-3.9500e-5	1.5907e+5	0.5	0.2	184.4684	238.3967	0.7738	60.1843±2.2297	-1.1780±1.8472
	osc	freq	Track2	8160.5395	14.5892	4.1414	0.3723	610	0.01	0.0178	0.708	1.9142	1.8502	-5.2588e+6	-3.9500e-5	1.5907e+5	0.5	0.2	183.1458	236.6947	0.7738	59.7705±2.2142	-1.3157±1.8952
	osc	freq	Track2	8148.2699	14.6428	4.1372	0.3669	620	0.01	0.0178	0.708	1.9235	1.8502	-5.2843e+6	-3.9500e-5	1.5907e+5	0.5	0.2	181.8128	234.9667	0.7738	59.3556±2.1991	-1.4758±1.9247
	osc	freq	Track2	8135.8149	14.6966	4.1329	0.3616	630	0.01	0.0178	0.708	1.9330	1.8502	-5.3103e+6	-3.9500e-5	1.5907e+5	0.5	0.2	180.4799	233.2491	0.7738	58.9390±2.1835	-1.6164±1.9684
	osc	freq	Track2	8123.1818	14.7509	4.1286	0.3562	640	0.01	0.0178	0.708	1.9425	1.8502	-5.3366e+6	-3.9500e-5	1.5907e+5	0.5	0.2	179.1365	231.5072	0.7738	58.5215±2.1682	-1.7626±1.9998
	osc	freq	Track2	8110.3775	14.8056	4.1243	0.3509	650	0.01	0.0178	0.708	1.9523	1.8502	-5.3634e+6	-3.9500e-5	1.5907e+5	0.5	0.2	177.7918	229.7729	0.7738	58.1010±2.1526	-1.9207±2.0351
	osc	freq	Track2	8097.3448	14.8603	4.1199	0.3456	660	0.01	0.0178	0.708	1.9622	1.8502	-5.3906e+6	-3.9500e-5	1.5907e+5	0.5	0.2	176.4430	228.0330	0.7738	57.6799±2.1369	-2.0629±2.0730
	osc	freq	Track2	8084.1301	14.9154	4.1154	0.3404	670	0.01	0.0178	0.708	1.9723	1.8502	-5.4183e+6	-3.9500e-5	1.5907e+5	0.5	0.2	175.0839	226.2698	0.7738	57.2579±2.1215	-2.2111±2.1000
	osc	freq	Track2	8070.7140	14.9709	4.1109	0.3351	680	0.01	0.0178	0.708	1.9825	1.8502	-5.4464e+6	-3.9500e-5	1.5907e+5	0.5	0.2	173.7240	224.5152	0.7738	56.8336±2.1057	-2.3528±2.1351
	osc	freq	Track2	8057.0825	15.0267	4.1064	0.3299	690	0.01	0.0178	0.708	1.9929	1.8502	-5.4750e+6	-3.9500e-5	1.5907e+5	0.5	0.2	172.3526	222.7337	0.7738	56.4075±2.0903	-2.5233±2.1534
	osc	freq	Track2	8043.2393	15.0828	4.1018	0.3247	700	0.01	0.0178	0.708	2.0035	1.8502	-5.5041e+6	-3.9500e-5	1.5907e+5	0.5	0.2	170.9806	220.9613	0.7738	55.9791±2.0745	-2.6843±2.1808
0	osc	freq	Track2	8029.1759	15.1391	4.0971	0.3195	710	0.01	0.0178	0.708	2.0143	1.8502	-5.5337e+6	-3.9500e-5	1.5907e+5	0.5	0.2	169.6029	219.1812	0.7738	55.5499±2.0586	-2.8306±2.2122
	osc	freq	Track2	8014.8863	15.1958	4.0924	0.3143	720	0.01	0.0178	0.708	2.0253	1.8502	-5.5639e+6	-3.9500e-5	1.5907e+5	0.5	0.2	168.2156	217.3803	0.7738	55.1197±2.0430	-2.9831±2.2375
	osc	freq	Track2	8000.3621	15.2527	4.0876	0.3092	730	0.01	0.0178	0.708	2.0364	1.8502	-5.5945e+6	-3.9500e-5	1.5907e+5	0.5	0.2	166.8257	215.5831	0.7738	54.6862±2.0270	-3.1468±2.2645

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7.- Application: queries (...)

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C. Rodrigo Blanco S3: Simple Self-described Service

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(?)	R	Distance to the center of the star	
Divi	log(m)	Logarithm of the mass of the shell at r distance from the center. It is given as a logarithm	
(?)) (?)) Gra	т	Temperature at a distance r from the center: T(r))	
	Р	Pressure at distance r from the center: P(r))	
	ρ	density at distance r from the center: p(r))	\vee
plea	dinT/dinP	Called "real gradient". Variation of the temperature as a function of the pressure) (adimensional)	
<	Lum	Luminosity at distance r from the center : L(r)	
	к	Rosseland opacity	
₹ ₹	Th.Energy	Thermonuclear energy	
	Г1	din(P)/din(p)	
	adiab. ⊽	adiabatic gradient, defined as: [d In(T) / dIn(P)]s, that is, the real gradient at constant entropy	
	õ	- din(p) / din(T)	
(2)	CP	specific heat per unit mass at constant pressure (defined as C _P = T (dS /dT) _P)	
(2)	1/(μ _e)	1/(µelec), where µ is the main molecular weight	
Gra	Α	A : Quantity proportional to Brunt-Vaisala frequency defined as: $A = (1/\Gamma_1)^* [dln(P)/dln(r) - dln(p)/dln(r)]$	
Gra	Ω	angular velocity	
	d in κ/d in T	d in ĸ/d in T	
	d in κ/d in ρ	d in ĸ/d in p	
	dε/d In T	d ɛ(nuc) / d in T	
	dε/din ρ	dɛ/din p	1e+2 1e+3
	P _{tot} /P _{gas}	Ptot/Pgas, Ptot=Pturb+Pgas+Prad	
	∇rad	temperature radiative gradient (defined as: ∇ _{rad} = (3 / [16*π*a*c ₁ *G])*(κ*P/T ⁴)*L(r) /M(r)	

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Astroseismology



Seismic variable plots

(?) X:	Log(g)	-	Plot
(?) Y:	F0/F1	-	
Graph:	х-у	-	



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Work in progress

- Minor changes to the IVOA note defining the protocol.
- Having the protocol considered by DAL people?
- Astroseismology case.

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THANK YOU!

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