

# Large-scale spectroscopic surveys management

**Paolo Franzetti**

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**INAF - IASF Milano**

**background**

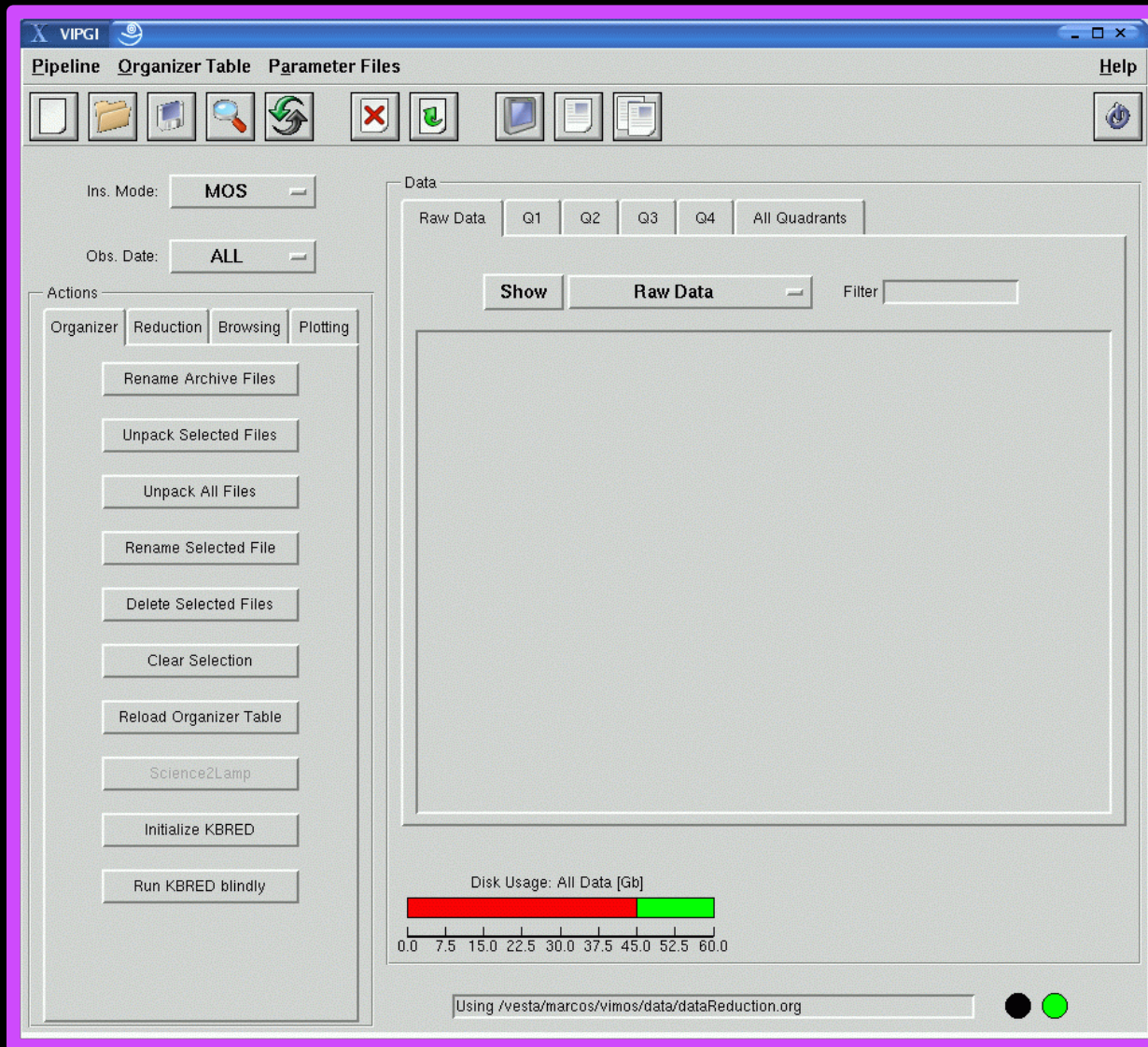
**In recent years, thanks to the evolution of the astronomical instrumentation, the size of spectroscopic surveys at all redshifts has greatly increased.**

**This trend will surely continue with the next generation of instruments posing new challenges for the management of such huge amounts of data. Information that can be potentially obtained from these surveys is enormous, but to extract it, the data organisation and reduction, the survey advancement monitoring at all stages and the data distribution within the collaboration and to the whole community must be performed at an unprecedented level of efficiency and with minimum human intervention.**

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Reduction
Browsing
Plotting

Vipgi

Projects:

VIMOS\_PROJECT

MOS-W1P111-LRred-Q1

FILETYPE	ORIGIN	OBSERVING NIGHT	MASK NUMBER
**ALL*	**ALL*	**ALL*	**ALL*

FILENAME	FILETYPE	SEEING MEASURED	DATE OBS
ff_W1P111_LRred_1_Q1_1.fits	FLAT	-99.99	11/16/2011 02:27:52
lp_W1P111_LRred_1_Q1_4.fits	LAMP	-99.99	11/16/2011 02:30:58
sc_W1P111_LRred_1_Q1_1.fits	SCIENCE	0.819	11/16/2011 01:36:05
sc_W1P111_LRred_1_Q1_1_BFCS.fits	SCIENCE	-99.99	11/16/2011 01:36:05
sc_W1P111_LRred_1_Q1_2.fits	SCIENCE	0.761	11/16/2011 01:46:00
sc_W1P111_LRred_1_Q1_2_BFCS.fits	SCIENCE	-99.99	11/16/2011 01:46:00
sc_W1P111_LRred_1_Q1_3.fits	SCIENCE	0.736	11/16/2011 01:55:55

FILENAME	FILETYPE
msF.fits	MASTER FLAT
msFlat_W1P111_LRred_1_Q1.fits	MASTER FLAT
msLamp_W1P111_LRred_1_Q1.fits	MASTER LAMP

FILETYPE	GRISM	QUADRANT
**ALL*	**ALL*	Q1

	FILENAME	FILETYPE	GRISM	QUADRANT	VALID FROM	VALID UPTO
<input type="checkbox"/>	Tab_st_EG-274_LR_blue_...	SPEC-PHOT TAB	LRblue	Q1	01/30/2011	01/30/2014
<input type="checkbox"/>	msBias_spec_mar2011_Q1....	MASTER BIAS		Q1	09/25/2012	09/25/2012

MOS-W1P111-LRred-Q1

Back
Import
Rescan
Unclassified
Calib. Files

Reduction Browsing Plotting

- Create Bad Pixels Image
- Append Bad Pixels Image
- Adjust First Guess
- Auto Adjust
- Measure Seeing
- Create Master Dark
- Create Master Bias
- Create Image Master Flat
- Locate Spectra
- Create Master Lamp
- Preliminary Reduction
- Create Sensitivity
- Create Sensitivity One Click
- Reduce Single Observations
- Reduce Sequence of Obs.
- Apply Atrn. Correction
- Create Summary File
- Split 1D Spectra
- Measure Redshift

Projects: VIMOS\_PROJECT

MOS-W1P111-LRred-Q1

FILETYPE ORIGIN OBSERVING NIGHT MASK NUMBER

FILENAME	FILETYPE	SEEING MEASURED	DATE OBS
ff_W1P111_LRred_1_Q1_1.fits	FLAT	-99.99	11/16/2011 02:27:52
lp_W1P111_LRred_1_Q1_4.fits	LAMP	-99.99	11/16/2011 02:30:58
sc_W1P111_LRred_1_Q1_1.fits	SCIENCE	0.819	11/16/2011 01:36:05
sc_W1P111_LRred_1_Q1_1_BFCS.fits	SCIENCE	-99.99	11/16/2011 01:36:05
sc_W1P111_LRred_1_Q1_2.fits	SCIENCE	0.761	11/16/2011 01:46:00
sc_W1P111_LRred_1_Q1_2_BFCS.fits	SCIENCE	-99.99	11/16/2011 01:46:00
sc_W1P111_LRred_1_Q1_3.fits	SCIENCE	0.736	11/16/2011 01:55:55

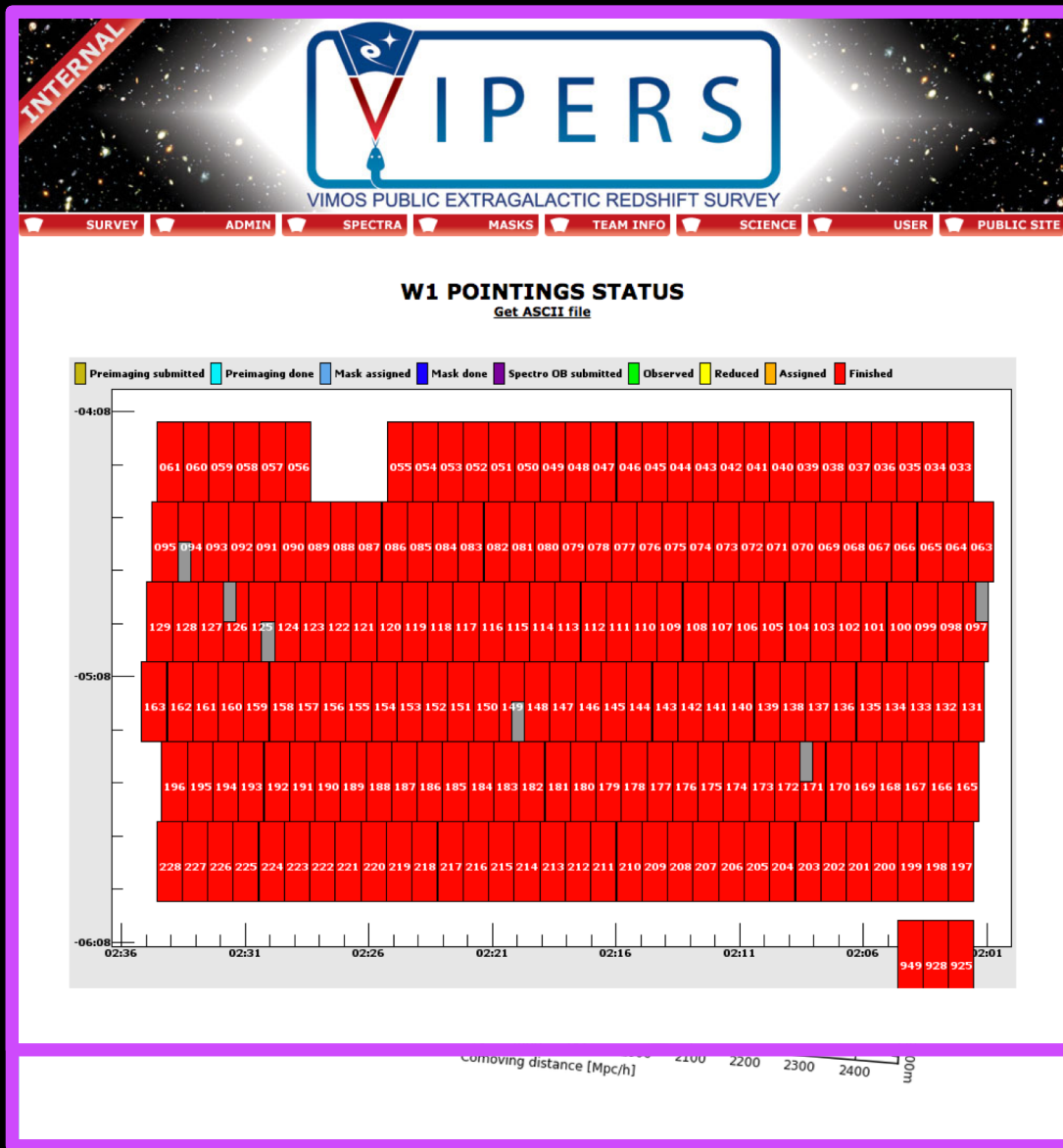
FILENAME	FILETYPE
msF.fits	MASTER FLAT
msFlat_W1P111_LRred_1_Q1.fits	MASTER FLAT
msLamp_W1P111_LRred_1_Q1.fits	MASTER LAMP

FILETYPE GRISM QUADRANT

	FILENAME	FILETYPE	GRISM	QUADRANT	VALID FROM	VALID UPTO
<input type="checkbox"/>	Tab_st_EG-274_LR_blue_...	SPEC-PHOT TAB	LRblue	Q1	01/30/2011	01/30/2014
<input type="checkbox"/>	msBias_spec_mar2011_Q1....	MASTER BIAS		Q1	09/25/2012	09/25/2012

MOS-W1P111-LRred-Q1

Back Import Rescan Unclassified Calib. Files





A deep VIMOS survey of the CANDELS UDS and CDFS fields

You are logged as Paolo Franzetti

- SURVEY
- SPECTRA
- MASKS
- TEAM INFO
- SCIENCE
- USER
- PUBLIC

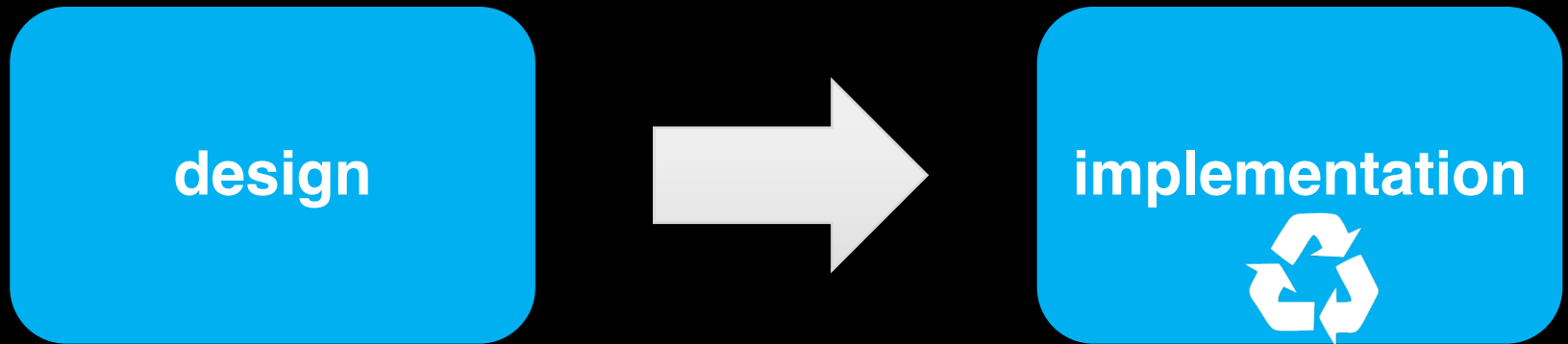
## survey status

(as of 10-12-2018)

category (TARG/OBS)		placed on mask	observed	reduced	measured
<b>UDS</b>					
<b>ALL</b>		1055	1055	948	614
<b>20</b>	20	283	283	283	159
	>20	33	33	22	9
<b>40</b>	20	10	10	10	9
	40	485	485	480	330
	>40	32	32	8	3
<b>80</b>	20	2	2	2	0
	40	5	5	5	3
	60	3	3	0	0
	80	185	185	121	99
	>80	17	17	17	2
<b>CDFS</b>					
<b>ALL</b>		1006	1006	977	450
<b>20</b>	20	209	209	209	61
	>20	36	36	34	6
<b>40</b>	20	9	9	9	3
	40	463	463	456	278
	>40	33	33	28	1
<b>80</b>	40	9	9	7	1
	60	12	12	7	0
	80	222	222	215	100
	>80	13	13	12	0

**design**

# in a nutshell design



**database**

# database

- users**
- **contacts**
- **team roles**
- **public**



# database

users

parent catalog(s)

## database

users

parent catalog(s)

ancillary data

# database

users

parent catalog(s)

ancillary data

masks • targets  
• OBs

## database

users

parent catalog(s)

ancillary data

masks

observations

## database

users

parent catalog(s)

ancillary data

masks

observations

spectra

- status
- measures

## database

users

parent catalog(s)

ancillary data

masks

observations

spectra

derived data

## database

users

parent catalog(s)

ancillary data

masks

observations

spectra

derived data

## website

public

- database
- info

internal

- database
- wiki /  
workgroups
- team info
- mailing lists
- measurements  
assignments
- data releases
- abstracts /  
papers

test

# data processing design

## pipeline(s)

- data organization
- data reduction

## database

users

parent catalog(s)

ancillary data

masks

observations

spectra

derived data



## pipeline(s)

- data organization
- data reduction

## management

- masks /OBs preparation
- observations monitoring and raw retrieval
- data distribution for measurements
- data distribution for analysis

## database

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test

# workflow design

Software interface showing a table of files and their properties. The table includes columns for FILENAME, FILETYPE, ORIGIN, QUADRANT, VALID FROM, and VALID UPTO. The data is as follows:

FILENAME	FILETYPE	ORIGIN	QUADRANT	VALID FROM	VALID UPTO
ECDFS_P3M1_Q1_VH_MR_WD02_N_Adp	ADP FILE	MR	01	00/00/00	01/01/0000
ECDFS_P3M1_Q1_VH_MR_WD02_N_Adp	ADP FILE	MR	01	00/00/00	01/01/0000
ECDFS_P3M1_Q1_VH_MR_WD02_N_Adp	ADP FILE	MR	01	12/05/2006	01/01/0000
ECDFS_P3M1_Q1_VH_MR_WD02_N_Adp	ADP FILE	MR	01	00/00/00	01/01/0000
ECDFS_P3M1_Q1_VH_MR_WD02_N_Adp	ADP FILE	MR	01	00/00/00	01/01/0000
ECDFS_P3M1_Q1_VH_MR_WD02_N_Adp	ADP FILE	MR	01	10/02/2007	01/01/0000

Web interface for 'redshift measurement assignment'. It features a navigation bar with 'SURVEY', 'SPECTRA', 'MASKS', 'TEAM INFO', 'SCIENCE', 'USER', and 'PUBLIC'. The main content includes an 'assign to' section with 'primary' and 'secondary' dropdowns, and a 'commit' button. Below this are two tables:

category full/obj	objects	assign
20/20	0	<input type="checkbox"/>
20/40	27	<input type="checkbox"/>
20/60	7	<input type="checkbox"/>
20/80	7	<input type="checkbox"/>
40/20	0	<input type="checkbox"/>
40/40	144	<input type="checkbox"/>

user	current	previous
Adam Carnali	0	274
Angela Bongiorno	0	175
Angela Iovino	0	100
Anton Koekemoer	0	30
Bianca Garilli	0	39
Dario Maccagni	0	430
Emanuela Pompei	0	140

database

Web interface for 'redshift measurement checking'. It features a navigation bar with 'SURVEY', 'SPECTRA', 'MASKS', 'TEAM INFO', 'SCIENCE', 'USER', and 'PUBLIC'. The main content includes an 'assign' section with 'assign', 'reset', and 'commit' buttons. Below this are two tables:

category full/obj	objects	assign
20/20	0	<input type="checkbox"/>
20/40	0	<input type="checkbox"/>
20/80	0	<input type="checkbox"/>
40/20	7	<input type="checkbox"/>
40/40	0	<input type="checkbox"/>
40/80	0	<input type="checkbox"/>
80/20	24	<input type="checkbox"/>
80/40	1	<input type="checkbox"/>
80/80	0	<input type="checkbox"/>

id	objects

Web interface for 'my spectra'. It features a navigation bar with 'SURVEY', 'SPECTRA', 'MASKS', 'TEAM INFO', 'SCIENCE', 'USER', and 'PUBLIC'. The main content includes a table of spectra packages:

package	mode	other measurer	n. spectra	status	actions
spectra-0002.tar.gz	primary	Francesca Marchi	50	Finished	-
spectra-0006.tar.gz	secondary	Lucia Gualita	40	Finished	-
spectra-0019.tar.gz	secondary	Marco Castellano	40	Finished	-
spectra-0034.tar.gz	primary	Ricardo Amorin	60	Finished	-
spectra-0046.tar.gz	primary	Francesca Marchi	53	Finished	-
spectra-0047.tar.gz	secondary	Dario Maccagni	50	Finished	-
spectra-0050.tar.gz	secondary	Fergus Cullen	50	Finished	-
spectra-0054.tar.gz	primary	Lucia Pozzetti	50	Finished	-
spectra-0060.tar.gz	primary	Marcella Lenghetti	45	Downloaded	download upload

The screenshot shows the CANDELS Database website. At the top, the logo features the word "CANDELS" in a blue, outlined font, with a red diagonal banner across it containing the word "DATABASE" in white. Below the logo is the text "A deep VIMOS survey of the CANDELS UDS and CDFS fields". A navigation bar contains buttons for "new query", "modify query", "query results", "user data", "help", "internal", and "public". Below this is a sub-navigation bar with "Tables", "Simple", "Advanced", and "Get all columns". The main content area is divided into two columns. The left column, titled "TABLES", lists categories and tables: "Photometry" (CDFS\_PARENT, UDS\_PARENT), "Spectroscopy" (CDFS\_BEST\_SPECTRA, CDFS\_SPECTRA, CDFS\_SPECTRA\_DR2, UDS\_BEST\_SPECTRA, UDS\_SPECTRA, UDS\_SPECTRA\_DR2), and "Releases" (DR2). Each table name has a small square checkbox to its right. The right column, titled "CORRELATION", contains a dropdown menu currently set to "Do not apply correlation".

**DATABASE** CANDELS  
A deep VIMOS survey of the CANDELS UDS and CDFS fields

new query modify query query results user data help internal public

Tables Simple Advanced Get all columns

TABLES		CORRELATION	
Photometry		Do not apply correlation ▾	
CDFS_PARENT	<input type="checkbox"/>		
UDS_PARENT	<input type="checkbox"/>		
Spectroscopy			
CDFS_BEST_SPECTRA	<input type="checkbox"/>		
CDFS_SPECTRA	<input type="checkbox"/>		
CDFS_SPECTRA_DR2	<input type="checkbox"/>		
UDS_BEST_SPECTRA	<input type="checkbox"/>		
UDS_SPECTRA	<input type="checkbox"/>		
UDS_SPECTRA_DR2	<input type="checkbox"/>		
Releases			
DR2	<input type="checkbox"/>		

**database:**



**database interface:**



**website:**



**pipelines: C /**



**management:**



**spectra format**

## database

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### public

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test

## user

- FITS files
- programs
- scripts

<http://archive.eso.org/cms/eso-data/help/1dspectra.html>

The screenshot shows the ESO Science Archive Facility (SAF) website. The header includes the ESO logo and the tagline "ESO — Reaching New Heights In Astronomy". The navigation bar contains links for Public, Science, User Portal, Intranet, Contact, Site Map, Search, and Go! The main content area is titled "The spectroscopic data products from the ESO Science Archive Facility (SAF)" and contains a "Table of contents" with the following items:

- The 1d spectral data format
- How to display the ESO SAF spectra
  - IRAF/SPTABLE [23-FEB-2015]
    - fv
    - VOspec
    - SPLAT VO
  - A quick guide to read and display ESO SAF spectra in IDL, IRAF, and Python
    - IDL
    - IRAF, including SPTABLE package (September 2014)
    - Python

The page also includes sections for "The 1d spectral data format", "How to display the ESO SAF spectra stored in binary table format", and "How to display the ESO SAF spectra stored in FITS table format".

**The 1d spectral data format**

The ESO science data products standard (SDP) format for a one-dimensional (1D) spectrum is a binary table that contains information for an individual object. It is made of a primary header and one single extension. The primary header contains the main SDP keywords whose values are used for the identification/selection of the product in the ESO SAF query forms (see for example: [http://archive.eso.org/web/web/ads/phase3\\_spectralform](http://archive.eso.org/web/web/ads/phase3_spectralform)). The extension contains a FITS binary table, with its own header unit and with the data arrays (wavelength, flux, error, etc.) stored as 1D vectors in single cells. Each FITS file contains only one science spectrum, plus associated information; for instance: sky background subtracted spectrum, error spectrum, best fitted model for the continuum, etc. The spectrum binary table format complies with the basic requirements of the Virtual Observatory (VO) Spectrum Data Model (v1.1) standard.

**How to display the ESO SAF spectra stored in binary table format**

According to our experience the following tools support the science 1d spectra downloaded from the ESO science archive: IRAF onedspec (plot) and rv packages, fv, vospec, splatvo. A list of instructions for displaying the spectra with the mentioned tools is provided here below.

[\[2015-02-23\] IRAF/SPTABLE external package, including xonedspec and xrv](#)

The new SPTABLE IRAF external package is able to read, display, and analyse (via the onedspec and rv packages) the ESO one-dimensional science spectra. Please find [the IRAF announcement with instructions](#). Please, note that the SPTABLE package is already configured to recognise all the ESO 1d science spectral data products, so no other action is needed to start working with the data. The IRAF/SPTABLE Spectrum Table Database is already fully setup for all current ESO spectral types, and therefore e.g. the xonedspec plot task can be used right away.

The other mentioned tools (excluding the IRAF ones) are available directly within the Linux distribution of Scisoft; if you have Scisoft install there is no further installation required. Otherwise, instructions on how to install them, or to launch them directly from the web, are provided below. None of the mentioned tools is available in the Scisoft Mac distribution. To download Scisoft, please visit: <http://www.eso.org/sci/software/scisoft/>

**fv**

On a Linux system with Scisoft installed, **fv** can be launched using the unix command: `fv`.

To download a stand alone version of fv, please visit: <http://heasarc.gsfc.nasa.gov/heasoft/tools/fv/>.

Once **fv** is opened, make sure that POW (and not ds9) is selected as Display Device. To do this click **Display Device** on the **fv** main panel and select POW. **Please do NOT use DS9 to display a 1D spectrum, unless you have an fv version higher than 5.3, which should be available around December 2013. For this type of data, fv, when communicating to ds9, creates a file whose size is proportional to  $N^2$ , where N is the number of points in the spectrum, potentially eating all your disk space.**

To load a 1D spectrum in the **fv** panel:

- choose "Open File" and navigate to the folder where the 1D spectra are stored,
- select the spectrum of interest by clicking on it,
- click "Open".





**future**

- **spectra format**
- **capabilities requests**

database:



database interface:



website:



pipelines: C /



management:

