

VO Science Applications

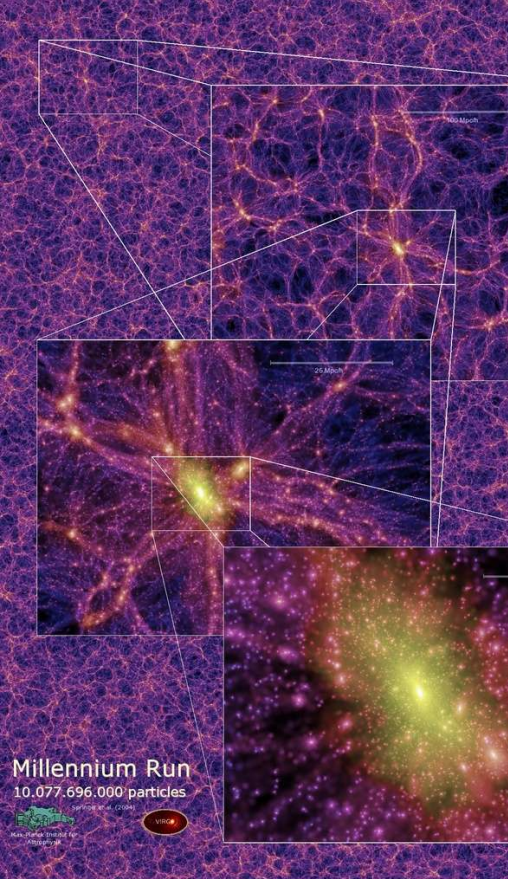
Mark Allen

Observatoire de Strasbourg

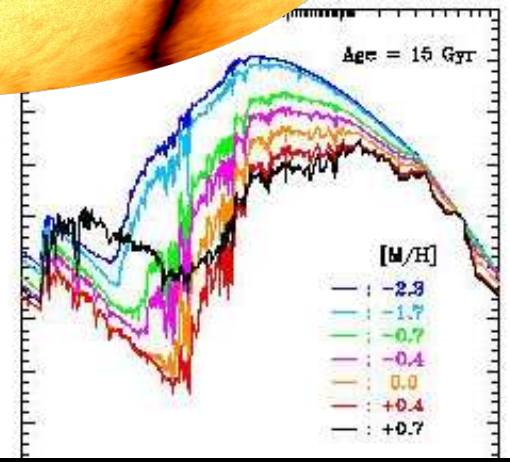
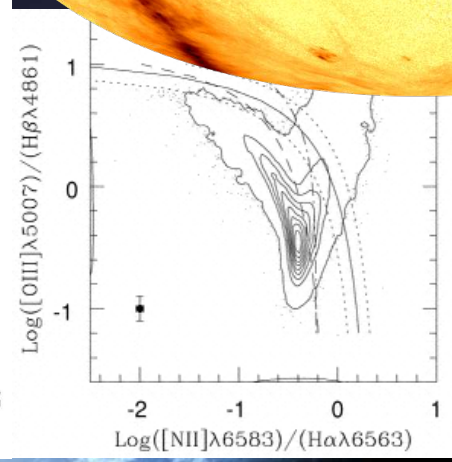
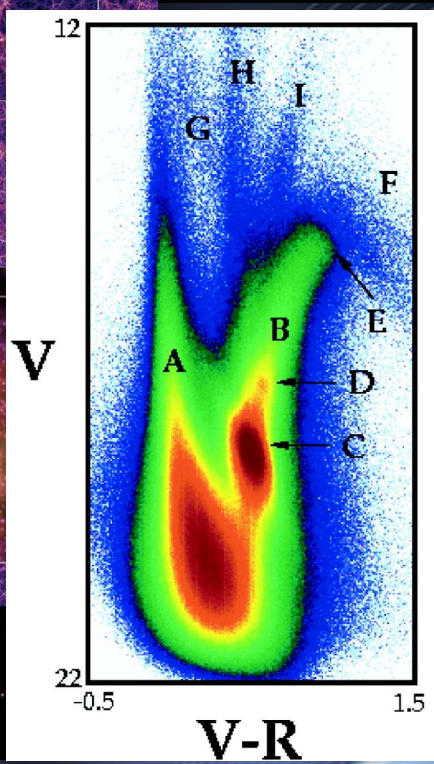
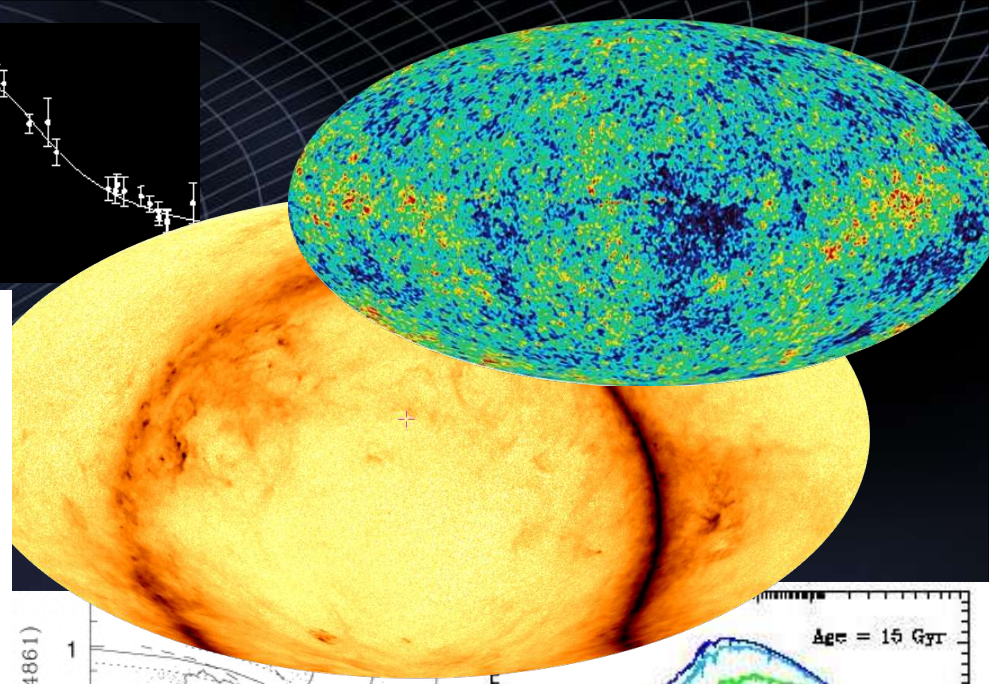
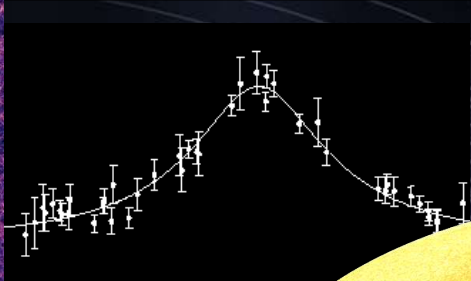
Centre de Donnees de Strasbourg

Turning point into the VO era

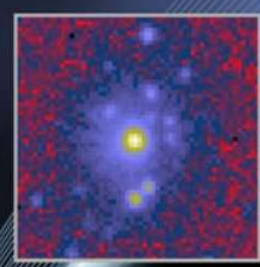
- Essential for imminent data volumes and rates
 - Multi- λ science requires
 - Data from different telescopes
 - Analysis tools
 - on-line services
 - archived information
- to be readily compatible*
- VO = framework for interoperable systems
 - VO Vision: *All Astronomy resources as if they were on your desktop*



Millennium Run
10,077,696,000 particles



Messier 81



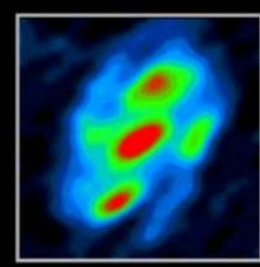
X-Ray (ROSAT)



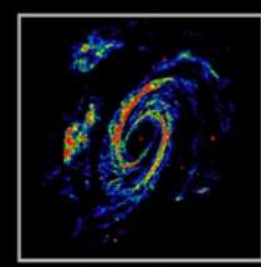
Ultraviolet (ASTRO-1)



Visible (Robert Gendler)



Infrared (IRAS)



Radio (VLA)

Astronomy Data interoperability

- Images (multi-band, mosaics, cutouts, FT)
- Catalogues
- Spectra
- Time series
- Spatial Information
 - Sky regions, slits, FoV, etc.
- Simulation data – many kinds
- Multi-d data sets
 - Data cubes, irregularly spaced data
 - Plots, multi-d cluster analysis and correlations

AVO Science Reference Mission

- Circumstellar disks: from pre-Main Sequence stars to stars harbouring planets
- Intermediate Velocity Clouds
- Which Star will go Supernova next?
- Initial Mass Function within 1kpc: Planetary to Stellar Masses
- Initial Mass Function for Massive Stars
- Contributions of Low and Intermediate Mass Stars to the ISM
- Galaxy Formation and Evolution from $z=10$ to 0.1
- Build-up of Supermassive Black Holes
- Formation and Evolution of Galaxy Clusters
- Correlation of CMB, radio/mm and optical/NIR Galaxy Surveys

Galaxy Formation and Evolution from $z=10$ to 0.1

- When did the 1st objects form?
- What are the progenitors of present day massive ellipticals?
- How many massive galaxies at $z>1,2,4$?
- How do SF and galaxy stellar mass densities evolve?

➔ Required data

- Deep Multi-wave surveys (GOODS, COSMOS)
- HST+ACS *bvz* imaging
- SLOAN
- Optical spectroscopy
- MERLIN, GMRT, VLA, ATCA radio
- Chandra and XMM-Newton X-ray
- Spitzer mid-IR
- Future sub-mm
- GALEX UV imaging

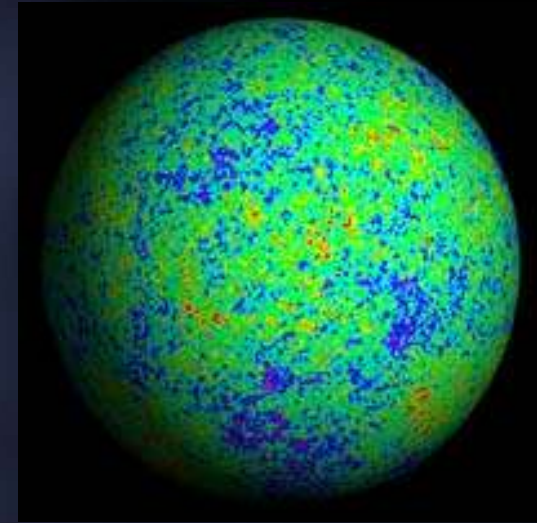
“Only now, and only with through the VO, are the datasets large enough, and the tools mature enough that Galaxy Formation and Evolution can be examined in a meaningful way.”

VO steps

- Extract sample from data
 - Perform SExtractor type photometry
 - Cross correlate with images, catalogues, spectra.
Crucial that output results are scientifically useable and reliable Matching of PSF, consistent photometric apertures, treatment of noise, and upper limits
 - Consistency checks like stellar colours
 - Output multi-band catalogue, and colour-colour diagrams
 - Visualize output colour-colour space
 - Photometric z from SEDs (Template SED libraries, extinction curves etc.)
 - Physical Parameters – L, E(B-V), SFR, M/L \in stellar mass
 - Comparison with star formation scenarios and synthetic spectra
 - Morphological analysis
 - Stack images at same wavelength, or spectra at different redshifts
 - Build average spectra for specific object classes
 - Angular clustering analysis
 - Comparison with mock catalogues from theoretical simulations

Correlation of CMB, radio/mm and optical//NIR Galaxy Surveys

- **Integrated Sachs-Wolfe Effect**
- *CMB fluctuations from passage through time varying gravitaitaional potential*
- **Sunyaev-Zel'dovich Effect**
- *Inverse compton scattering of photons by plasma in the hot intra-cluster medium*
- ➔ **Required data**
 - **WMAP**
 - **Planck**
 - **radio/IR surveys**
 - **X-ray/optical cluster data**



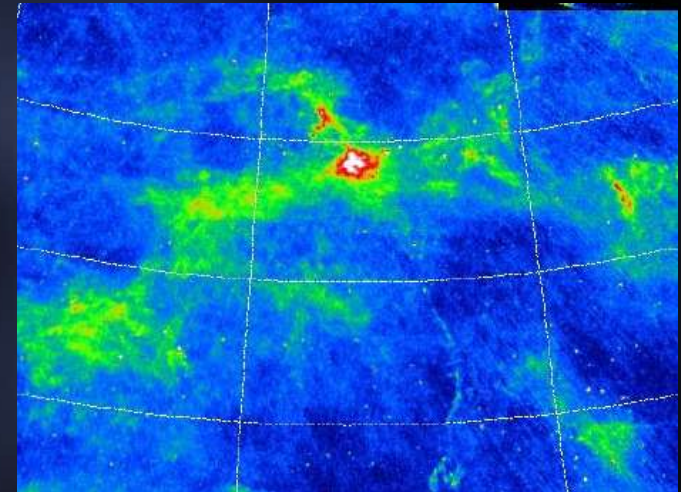
Study of full-sky maps from federated archives to disentangle various cosmological and astrophysical effects

Intermediate Velocity Clouds

➤ What is the origin of neutral gas clouds moving with unexpected velocities in the galaxy ?

→ Required data

- All sky far-IR surveys DIRBE
- IAR, HIPASS 21cm
- SHASSA H



→ VO Steps

Identify regions of excess HI or H

To detect IR IVC, remove foreground using HI

Check contamination by warm ISM

Classify dust rich/poor IVCs

Analyse spatial distribution

We need (1)

- Visual browsing of data and distributed information
- Visualizing heterogeneous data
 - Combining Multi-wavelength data taking into account different:
 - Units
 - coverage
 - Resolutions/PSF, observing technique

We need (2)

- Multi-wave cutouts of individual sources
- Generate and visualize SEDs from image, and spectral and catalogue data
 - Taking into account different
 - Beams/apertures (extended sources)
 - Backgrounds
 - Photometric systems
- Time axis:
 - Light-curves
 - Multi-epoch imaging

We need (3)

- Compare observations with models
 - Virtual observations of models
 - Projection of models to observed parameter space
 - Spectral fitting/classification
 - Colour-colour visualization Tool
- Astronomy functionality alongside visualization
 - Reproject data, correct for extinction, calculate luminosities etc.
 - Visualization requirements \in Analysis requirements

VO Tools

- **Prototypes**
 - VO-enabled existing tools & new tools
- **Services**
 - VO-enabled with *'translation layer'*
 - New services
- **Applications Infrastructure**
 - Make tools accessible
 - Build your own customized system from VO components

Tree view

Data Tree

- GOODS-WFI
 - DEEP2C-FV-PREVIEW 38.1 'x37.3 ' 2000-10-2
 - DEEP2C-FV 8.2 'x8.2 ' 2000-10-26
- GOODS-ACIS
 - ACISMCDFSM000 1.2 'x1.2 ' 1999-10-14
- GOODS-ISAAC
 - GOODS-10 2.5 'x2.5 ' 08/04/2002
 - GOODS-11 2.5 'x2.5 ' 08/04/2002
 - GOODS-14 2.5 'x2.5 ' 08/04/2002
 - GOODS-15 2.5 'x2.5 ' 08/04/2002
 - GOODS-20 2.5 'x2.5 ' 08/04/2002
 - GOODS-16 2.5 'x2.5 ' 08/04/2002
 - GOODS-21 2.5 'x2.5 ' 08/04/2002
 - GOODS-9 2.5 'x2.5 ' 08/04/2002
- GOODS-HST-ACS
 - epoch1
 - epoch2
 - epoch3
 - epoch4
 - epoch5
 - version1.0
 - CDF-SOUTH-SECT32-VERSIO
 - CDF-SOUTH-SECT25-VERSIO
 - CDF-SOUTH-SECT23-VERSIO
 - CDF-SOUTH-SECT21-VERSIO
 - CDF-SOUTH-SECT44-VERSIO
 - CDF-SOUTH-SECT14-VERSIO
 - CDF-SOUTH-SECT42-VERSIO
 - CDF-SOUTH-SECT12-VERSIO
 - CDF-SOUTH-SECT35-VERSIO
 - CDF-SOUTH-SECT33-VERSIO
 - CDF-SOUTH-SECT31-VERSIO
 - CDF-SOUTH-SECT24-VERSIO
 - CDF-SOUTH-SECT22-VERSIO
 - CDF-SOUTH-SECT45-VERSIO
 - CDF-SOUTH-SECT43-VERSIO
 - CDF-SOUTH-SECT13-VERSIO
 - CDF-SOUTH-SECT11-VERSIO
 - CDF-SOUTH-SECT34-VERSIO

Submit Reset Clear Close

Data available at selected point are highlighted in tree

Info Frame

CDF-SOUTH-SECT23-VERSION1.0

Observation_Name	CDF-SOUTH-SECT23-VERSION1.0
ObservingProgram_Name	GOODS-HST-ACS
FilterName	F775W
Size_alpha	4.1 "
Size_delta	4.1 "
Angular Pixel Size	0.029 "
Origin	STSC1
OriginalCoding	FITS
CentralPoint_RA	03:32:38.72
CentralPoint_DEC	-27:48:18.3
DateAndTime	2002-08-01
Position Angle	0.0°

Cutout Target: 03 32 33.50 -27 47 36. Grab

Stick FoV in stack LOAD Close

Image metadata

A.V.O demonstration prototype v1.0

Load... Save... Plugins... Print... Help... Quit

J2000 03:32:33.50 -27:47:36.9 Field: 03:32:25.77 -27:48:07.4 38.08"x37.2"

cdfs

Field of view outlines are plotted automatically

CDS - ESO - AstroGrid - ST-ECF - UMAN/Jodrell Bank - CNRS/DR01 - VO-India - STScI

Field of view outlines are plotted automatically

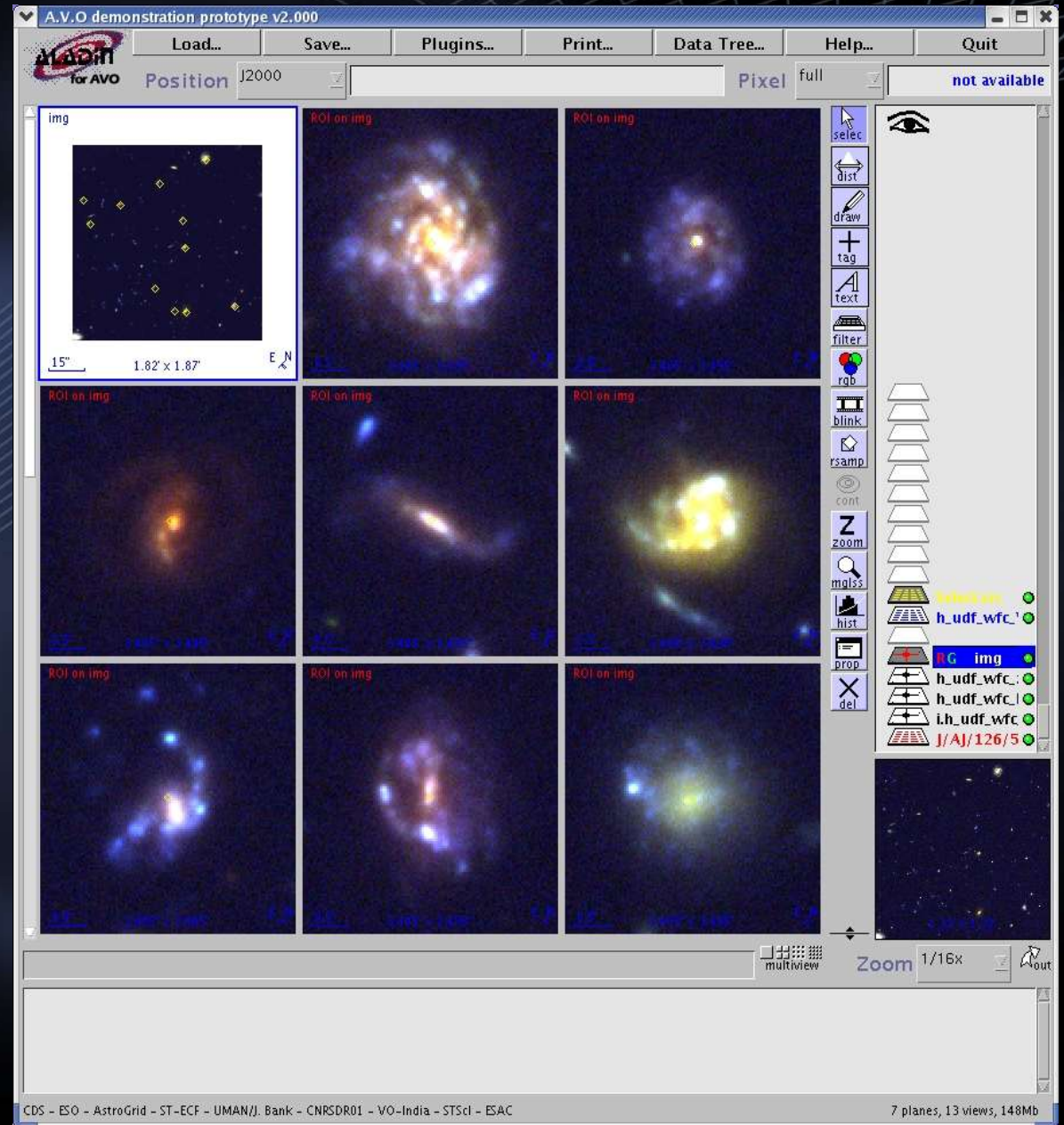
Catalogues

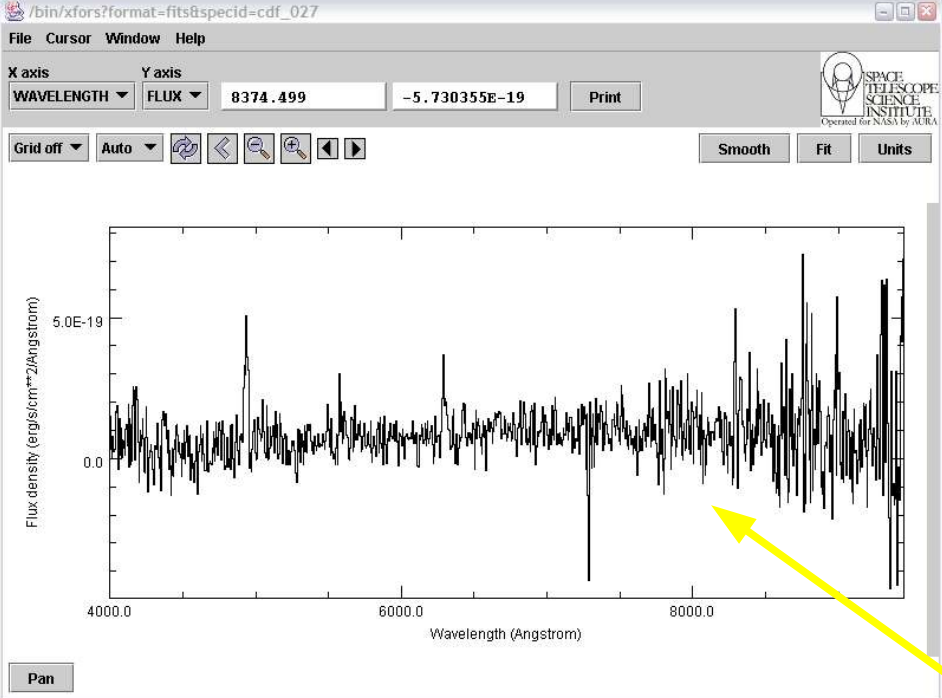
- Manipulation
- X-match
- Visualization
- Direct links to:



A screenshot of the CDS Aladin software interface. The main window displays a large field of stars in various colors (red, green, cyan, yellow) against a dark background. A central star is marked with a white crosshair. The interface includes a menu bar at the top with options: Load..., Save..., VOPlot..., Print..., Help..., and Quit. Below the menu bar, there are input fields for J2000 coordinates (14:02:43.71 +54:26:46.5) and a field size (12.9'x12.9'). On the right side, there is a toolbar with icons for selection, properties, drawing, text, tagging, distance measurement, filtering, color selection, comparison, history, zooming, magnification, deletion, and padding. Below the toolbar, there are checkboxes for 'Mag.Circle', 'USNO-B1', and 'POSSII.F.DSS'. A zoom level of 'Zoom 2/3x' is indicated. In the bottom right corner, there is a small inset window showing a zoomed-in view of the central star with a red crosshair and a north arrow.

Image Cutout Tool





Pan

<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033214-274825
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033214-274825
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033214-275124
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033214-275257
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033214-275258
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033215-274633
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-275113
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-275228
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-275234
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-275247
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-274721
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-274807
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-274810
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-274811
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-274823
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-274838
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-274844
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-275024
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033218-274743
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033216-275238
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033216-275241
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-274122
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033217-274602
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033218-274619
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033218-274619
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033218-274705
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033218-274705
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033218-274705
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033218-274718
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033218-274743
<input type="checkbox"/>	FORS2	1d spectrum	GOODS	J033218-274850

Submit Reset Clear Close

A.V.O demonstration prototype v1.0

Load... Save... Plugins... Print... Help... Quit

J2000 03:32:39.67 -27:48:50.5 Field: 03:32:40.38 -27:48:49.2 1.03"x1.03'

Spectrum	FORS2	1d spectrum	GOODS	J033239-274850	53.1652972222222	-27.8140630555556
Spectrum	FORS2	1d spectrum	GOODS	J033239-274851	53.1648288888889	-27.8143688888889
Spectrum	Spitzer	1d spectrum	GOODS	J033239-274851	53.1648288888889	-27.8143688888889
Spectrum	FORS2	1d spectrum	CFD 027	53.1652916666667	-27.8140277777778	

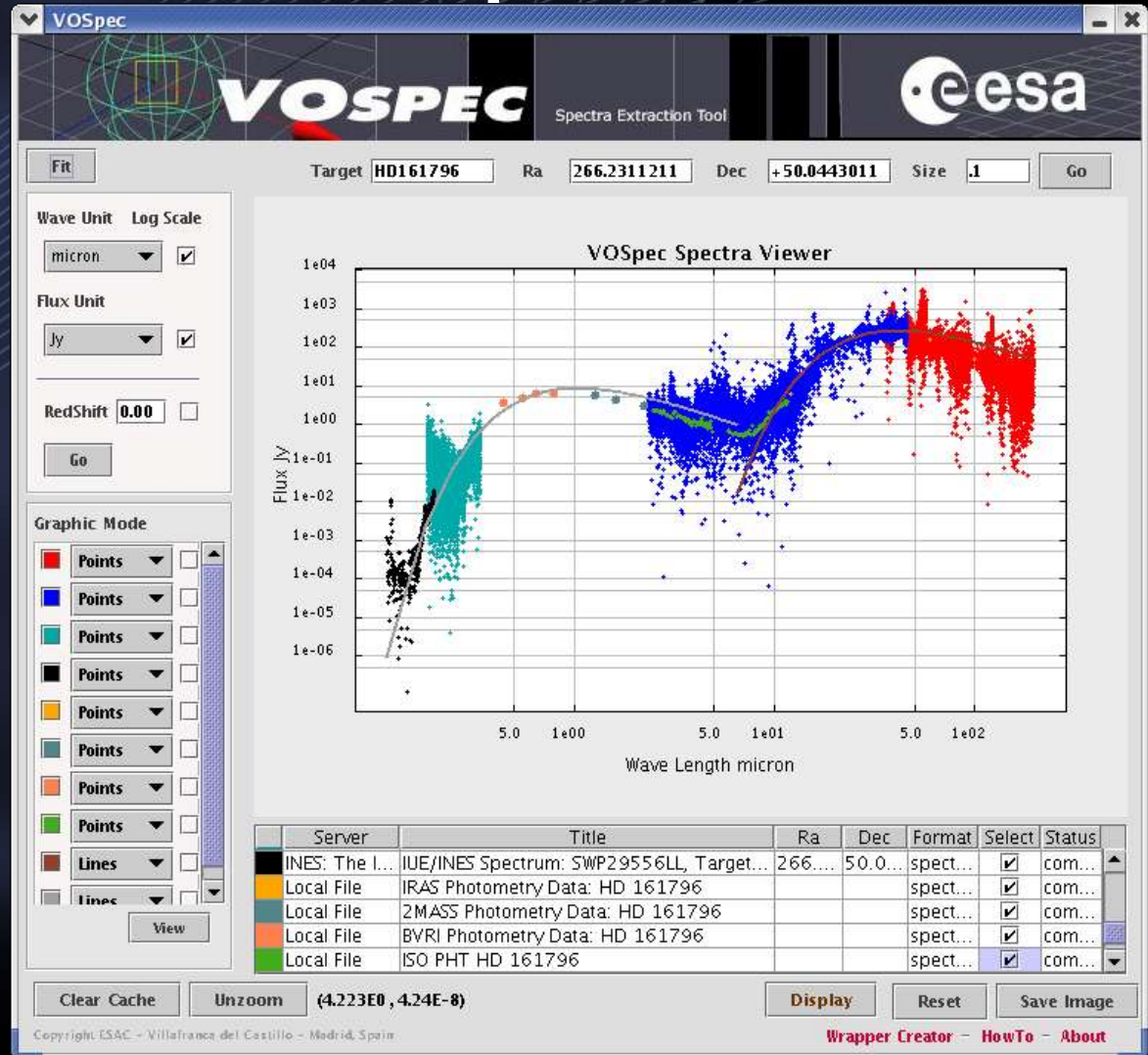
CDS - ESO - AstroGrid - ST-ECF - UMAN/Jodrell Bank - CNRS/DR01 - VO-India - STScI

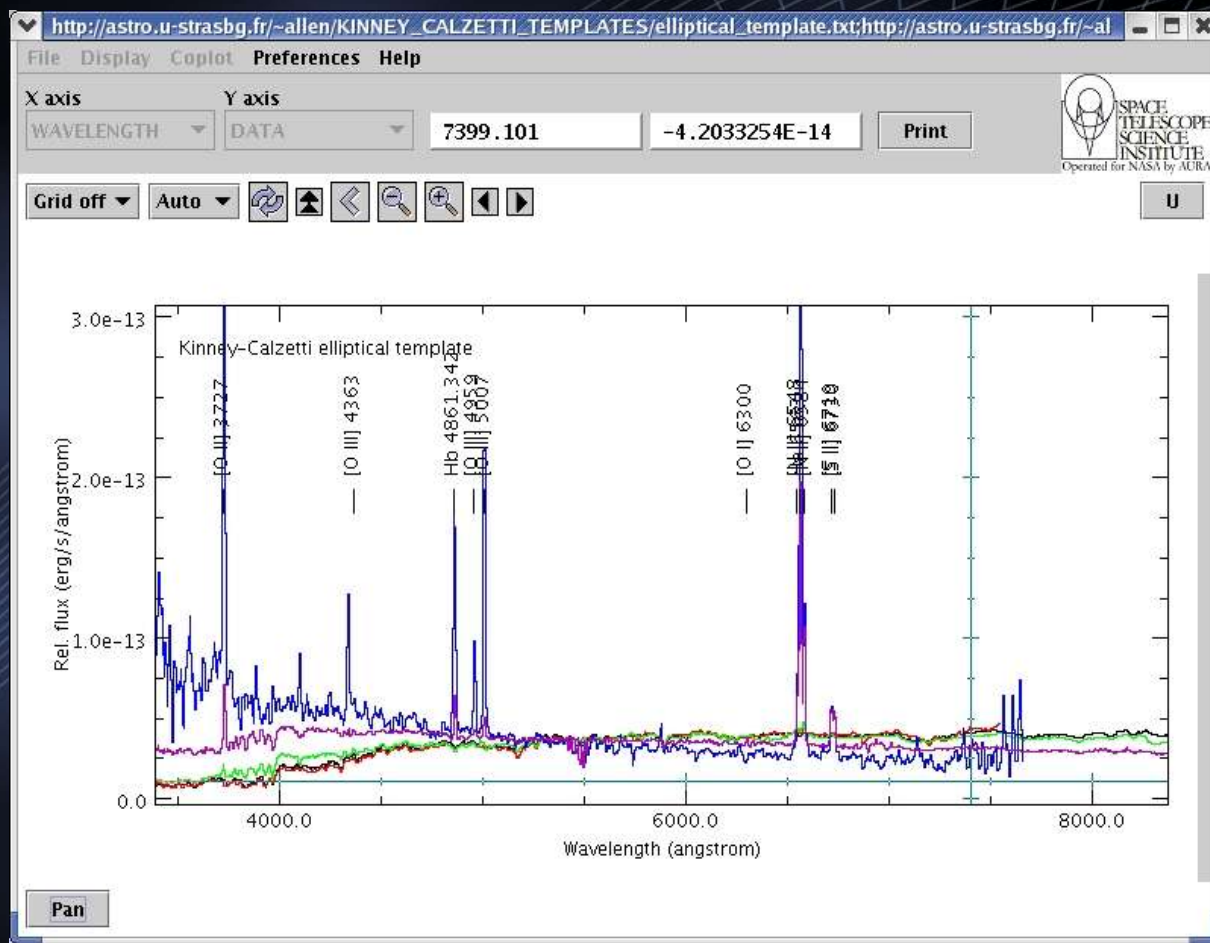
Simple Spectrum Access

Image / Spectrum / Catalog interoperability

Multi-archive spectra

- SSA servers
- Registry
- Unit interop.





Line lists integrated into the tool

Line lists from a Service

SLAP Viewer Copyright ESAC, Spain

Server Selector

SLAP Services

IASD - Simple Line Access Data Server

<http://esavo02.esac.esa.int/slap/jsp/slapBeta.jsp?>

Select

Range of Search (μm):

Wavelength Start Wavelength End

Reset

Slap Services Output

Wavelength	Id	Transition	SourceType	ObsFlux	Intensity	Noise
18.72200	[SIII]	3P1-3P2	L	3.149999...	null	100.000
21.84100	[ArIII]	3P1-3P0	L	6.999999...	null	null
28.23200	H2	0-0 S(0)	L	7.799999...	null	null
33.49800	[SIII]	3P0-3P1	L	8.029999...	null	85.000
36.03100	[NeIII]	3P1-3P0	L	2.679999...	null	15.000

Close

VOSpec

Spectra Extraction Tool

Target: Ra: Dec: Size: Go

Simple Line Access

Wave Unit Log Scale

Flux Unit

RedShift

Go

Graphic Mode

Points

Points

View

Clear Cache Unzoom (1,8778E1, 3,459E1) Display Res... Save Image

Copyright ESAC - Villafraanca del Castillo - Madrid, Spain

Wrapper Creator - HowTo - About

VOSpec Spectra Viewer

[SII]

Flux Jy

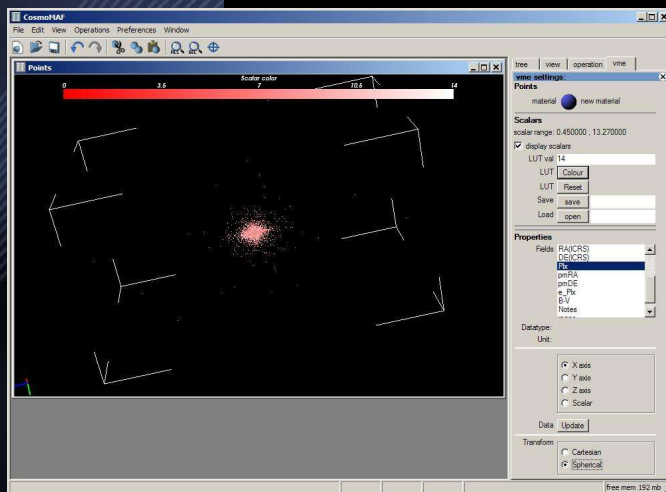
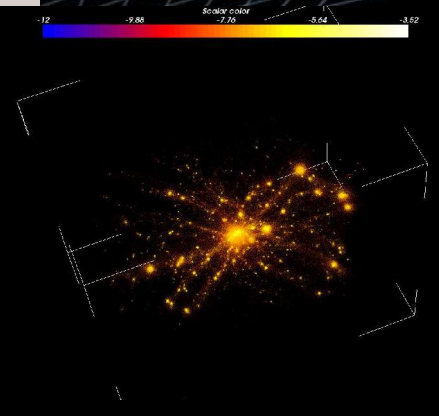
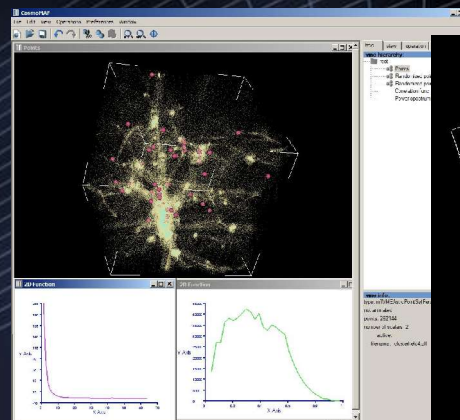
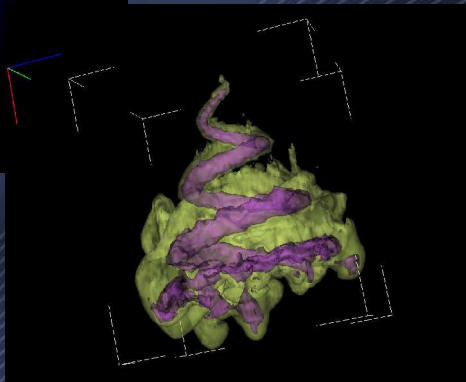
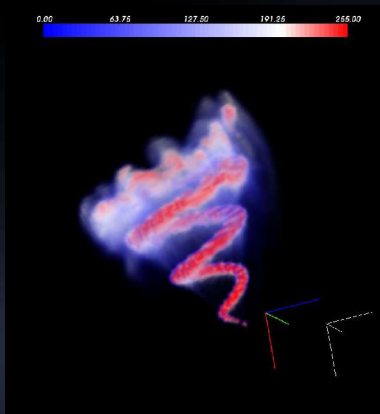
Wave Length micron

Server	Title	Ra	Dec	Format	Select	Status
Infrared Spa...	ISO LWS01 ...	235.571265	-53.97539	spectrum/fits	<input checked="" type="checkbox"/>	complete
Infrared Spa...	ISO SWS01 ...	235.571265	-53.97539	spectrum/fits	<input checked="" type="checkbox"/>	complete

VisIVO : Visualization tools

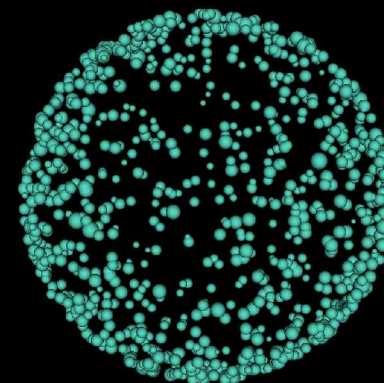
Grid based data:

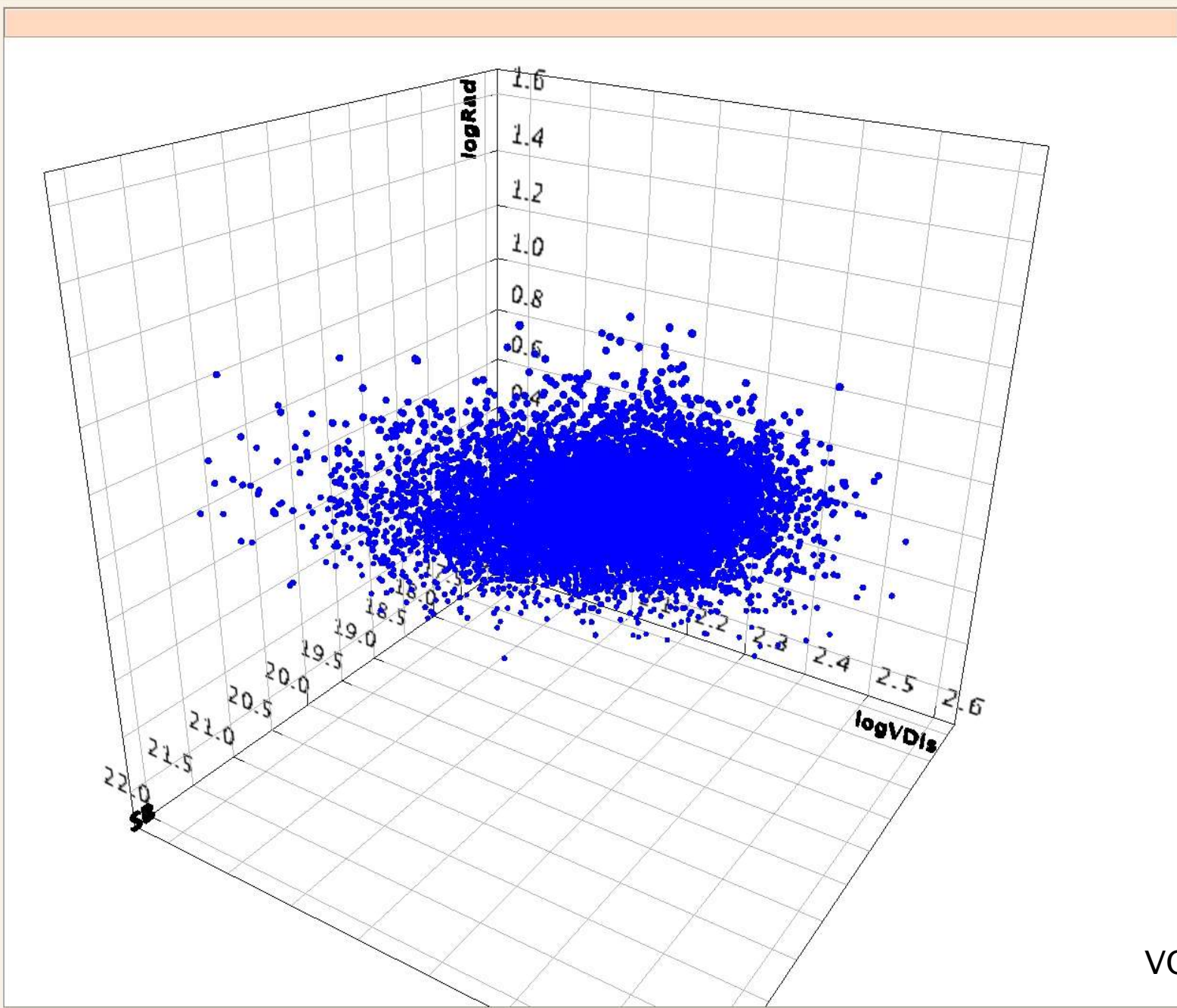
- Isosurfaces
- Volume rendering



Point like data:

- Pixels
- Scalar quantities with colours
- Scalar quantities with variable size and shape glyphs





Theta : 0.52
Phi : -0.48
Psi : -0.29

X Axis Log
logVDis

Y Axis Log
logRad

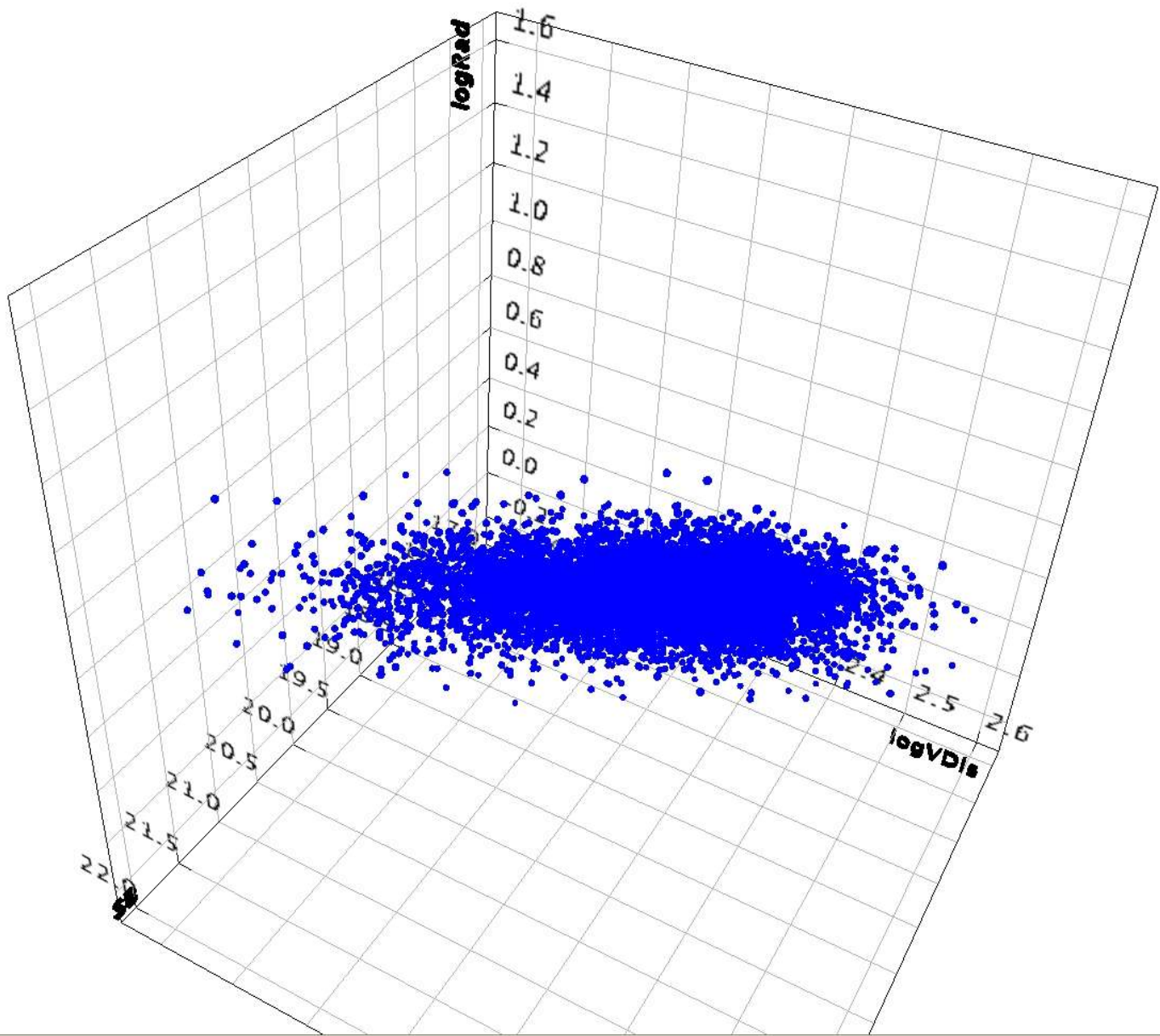
Z Axis Log
SB

Filter
None

Overlay

Plot





Theta : 0.69
Phi : -0.36
Psi : -0.35

X Axis Log
logVDis

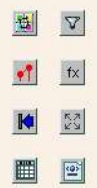
Y Axis Log
logRad

Z Axis Log
SB

Filter
None

Overlay

Plot



VOIndia VOPLot



US National Virtual Observatory

News

- [VOEvent Workshop Report](#)
- [NVO at the AAS, January 2005](#)
- [VO Science Session at San Diego AAS Meeting](#)
- [LSST Meeting](#)
- [NVO News Archive](#)

About

- [What is the NVO?](#)
- [Who is Involved?](#)
- [Science Objectives](#)
- [NVO in Use](#)

Community

- [NVO Meetings](#)
- [International VO Alliance](#)
- [NVO Summer School](#)

Documents

- Recent NVO Documents:
- [Quarterly Report, Jan-Mar 2005](#)
 - [NVO Advisory Committee Report](#)
 - [White Paper: NASA Universe Roadmap Project Plan Update](#)
 - [All NVO Documents](#)
 - [IVOA Documents](#)

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NVO Core Applications

NVO's objective is to enable new science by greatly enhancing access to data and computing resources. In conjunction with the January 2005 meeting of the American Astronomical Society, NVO is releasing a first set of software tools and applications that make it easy to locate, retrieve, and analyze data from archives and catalogs worldwide.

Title	Contact	Description
NVO Registry Portal at STScI	Gretchen Greene	Find source catalogs, observation logs, image archives, and other astronomical resources registered with the NVO.
DataScope	Thomas McGlynn	Discover and Explore Data in the Virtual Observatory
Open Sky Query	William O'Mullane	Cross match your data with numerous catalogues
Spectrum Services	Tamas Budavari	Search, plot, and retrieve SDSS, 2dF, and other spectra.
Web Enabled Source Identification with Cross Matching (WESIX)	Simon Krughoff	Upload images to SExtractor and cross-correlate the objects found with selected survey catalogs.
How to Publish to the NVO	Ray Plante	Find out how to make your data collection available to NVO users.

The NVO web site is a community-maintained collection with content control by the NVO Executive Committee. Content is judged by the extent to which it: (a) reflects an aspect of the Virtual Observatory, such as astronomy with federated data, (b) uses VO standards or software, or (c) exemplifies grid-based astronomical computing. If you would like a description of your project, data, or software included here, please write to web at us-vo.org with a short description of your work.

Open SkyQuery - Mozilla

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop <http://openskyquery.net/Sky/skysite/browse/Browse.aspx#> Search Print

Home Bookmarks Red Hat Network Support Shop Products Training

Open SkyQuery

Home Query Import Tutorial Help

National Virtual Observatory

Nodes

- Rosat
- XMM
- GALEX
- DLS
- RC3
- SDSS
- SDSSDR2
- SDSSDR3
- TwoDF
- Twoqz
- USNOB
- GOODS
- HDFN
- HDFE
- UDF
- ISO
- TWOMASS
- IRAS
- PSCz
- ADIL
- FIRST
- NVSS
- DEEP2
- NDWFS
- NVORegistry
- phoenix
- POSSUM_mini
- exds_sky_node

Build Edit Submit

```

SELECT o.objId, o.ra,
       o.dec, o.r, o.type,
       a.r
FROM
  SDSS.PhotoPrimary o, SDSSDR2.PhotoPrimary a
WHERE XMATCH(o, a) < 3.5

```

Welcome to the Open SkyQuery interactive query builder. You should see a parsed, clickable version of your entered query in the pane directly above this one.

If instead you see 'Query is empty', this means that builder needs a node or two to get started. You can add nodes to the builder by clicking the desired node's '+' icon in the left panel.

Once you have some sql in the above panel, you can then click on a token in that query to pull up a menu with options appropriate for that specific token. For example, one way to select an additional column from a mythical 'mytable' is to click on 'mytable' and then chose 'Add Selection', then pick the desired column from the given choices.

You can switch between 'edit' and 'build' modes at any time by using the tabs at the top of the query panel. Your changes from one will carry over to the other. Most menu options have additional mouse-over info.

Sigmas Region Clear

Sample Queries

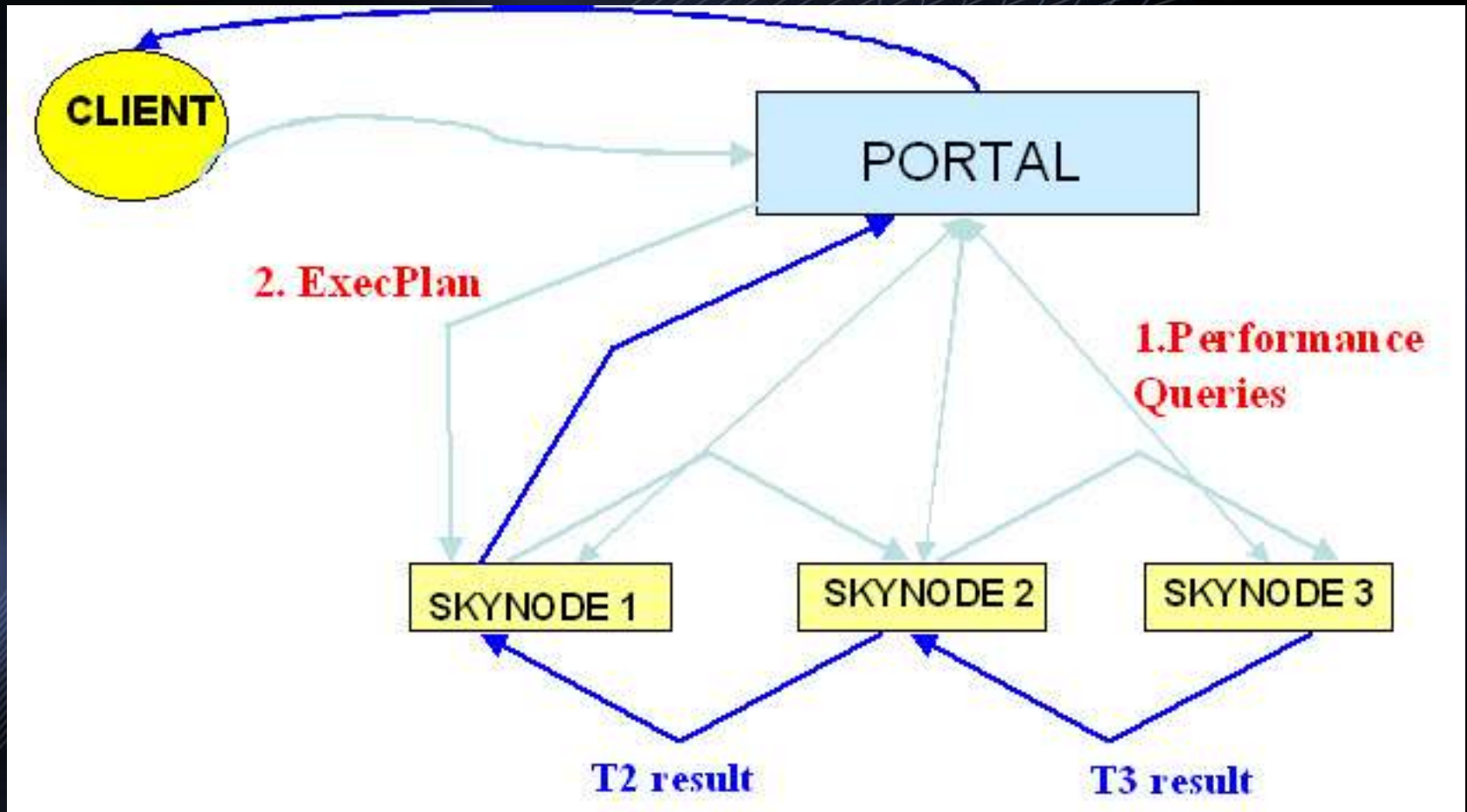
- XMATCH/Region
- XMATCH/Region 2
- Three Node Match
- Brown Dwarf Search
- MyData XMATCH (upload)
- Xmatch t+ (upload)
- ABELL Xmatch (upload)
- Single Node Query
- Single Node Join

Version: v1_0_9
US-VO.org

PhotoPrimary . Columns

- objID
- skyVersion
- run
- rerun
- camcol
- field
- obj
- mode
- nChild
- type
- probPSF
- insideMask
- flags
- rowc
- rowcErr
- colc
- colcErr
- rowv
- rowvErr
- colv
- colvErr
- rowc_u
- rowc_g

SkyQuery



Mozilla

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop http://openskyquery.net/Sky/skysite/browse/Browse.aspx#

Home Bookmarks Red Hat Network Support Shop Products Training

HTML Save

Only the first 128 of 5000 rows are displayed for this query. Please click 'Save'.

sdss_objid	sdss_ra	sdss_dec	sdss_r	sdss_g
582100152821940758	259.717782786004	25.6622296171871	17.447	
582100152821941587	259.721099546249	25.6648094400192	21.97009	
582100152821941845	259.7266508356	25.6674890743119	22.04127	
582100152821941259	259.722602975049	25.6670984433228	21.15369	
582100152821940993	259.741105598172	25.6757329621483	21.06688	
582100152821941260	259.737180295526	25.675305780907	20.96707	
582100152821941582	259.738716367207	25.6768855982933	22.0847	
582100152821940992	259.748946684833	25.6819240558371	25.59123	
582100152821941761	259.728661478031	25.6743529419369	23.87707	
582100152821940752	259.754257953719	25.6842210782903	19.86288	
582100152821940949	259.733115993724	25.6772429133124	20.63649	

Done

Open SkyQuery - Mozilla

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Back Forward Reload Stop http://openskyquery.net/Sky/skysite/browse/Browse.aspx#

Home Bookmarks Red Hat Network Support Shop Products Training

Open SkyQuery

Home Query Import Tutorial Help

National Virtual Observatory

Nodes

- Rosa1
- XMM
- GALEX
- DL5
- RC3
- SDSS
- SDSSDR2
- SDSSDR3
- TwoDF
- Twoqz
- USNOB
- GOODS
- HDFN
- HDFS
- UDF
- ISO
- TWOMASS
- IRAS
- PSC2
- ADIL
- FIRST
- NVSS
- DEEP2
- NDWFS
- NVORegistry
- phoenix
- POSSUM_mini
- sxds_sky node

Build **Edit** **Submit**

```

SELECT o.objId, o.ra,
       o.dec, o.r, o.type,
       a.r
FROM
  SDSS:PhotoPrimary o, SDSSDR2:Photoprimary a
WHERE XMATCH(o, a) < 3.5
          
```

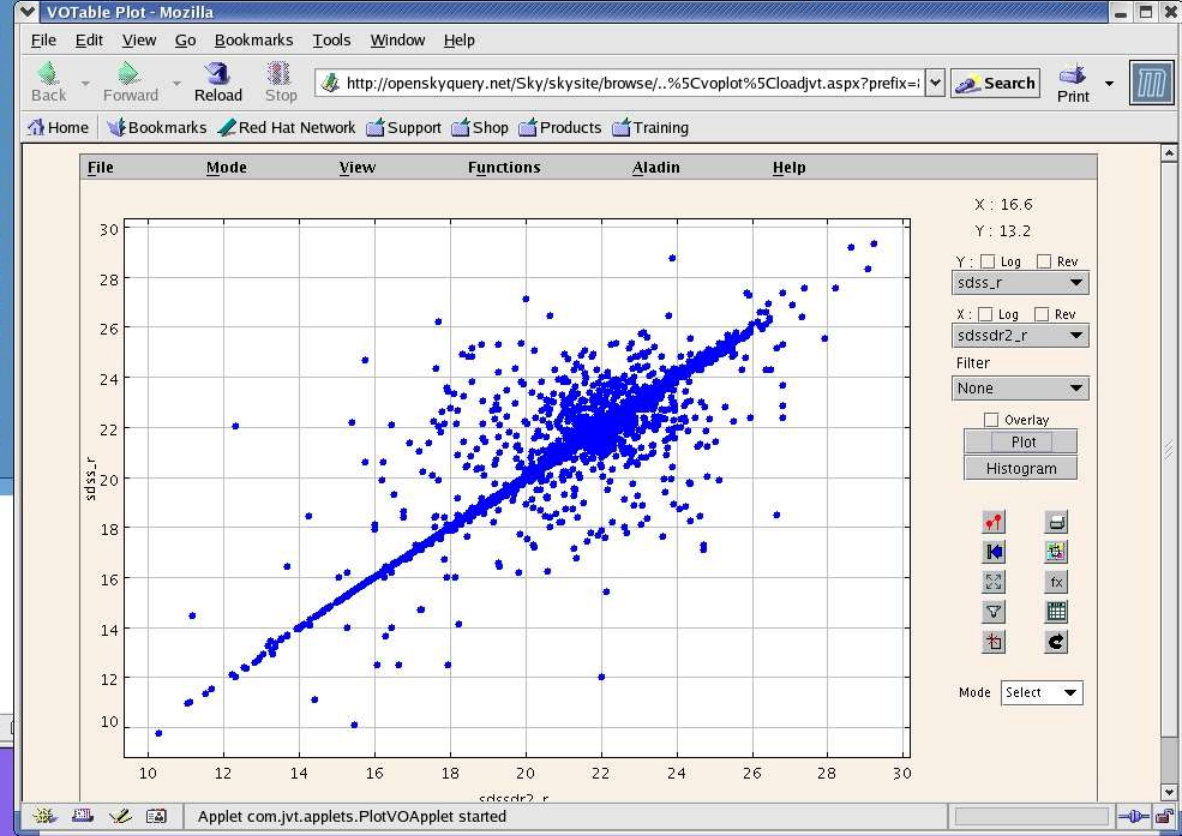
Query Status

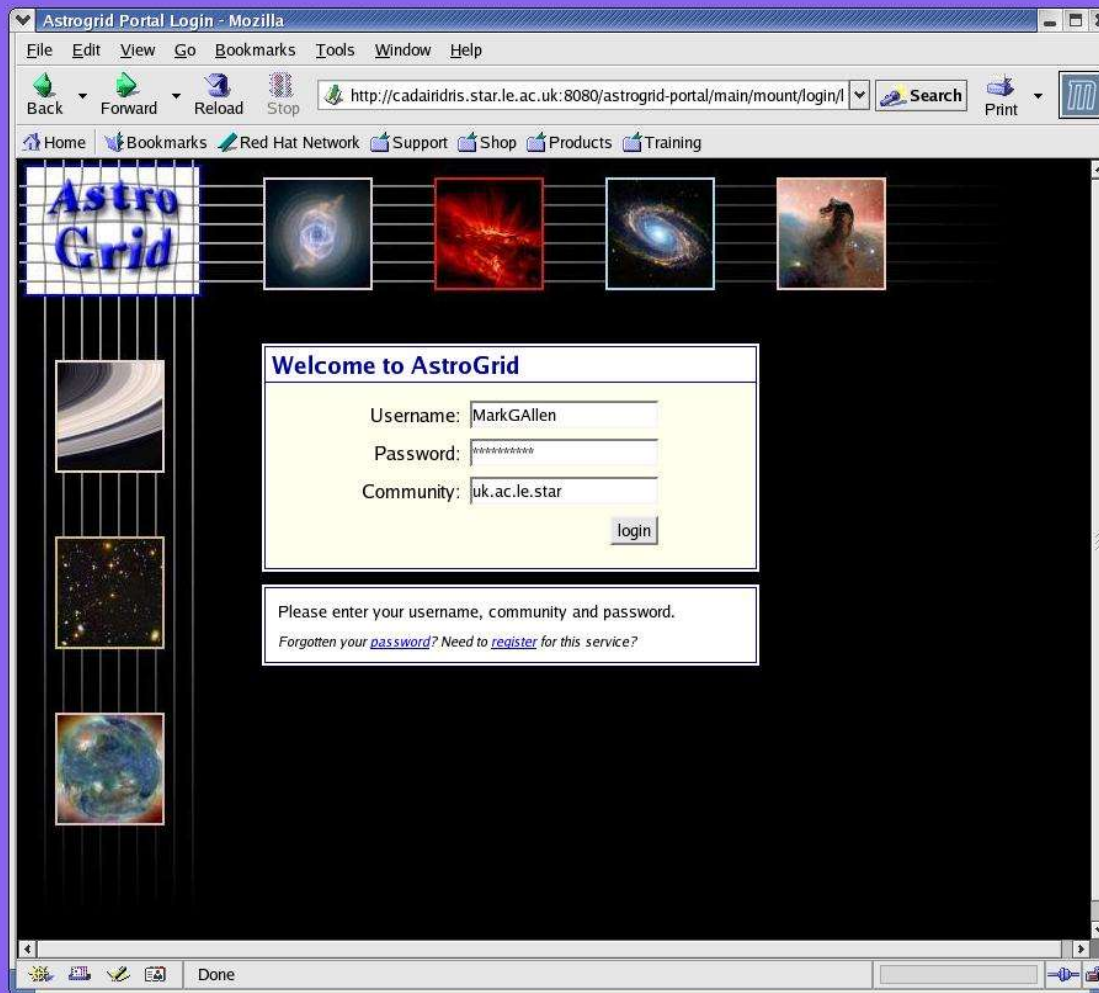
Query is **complete**

RESULTS **View** **Plot**

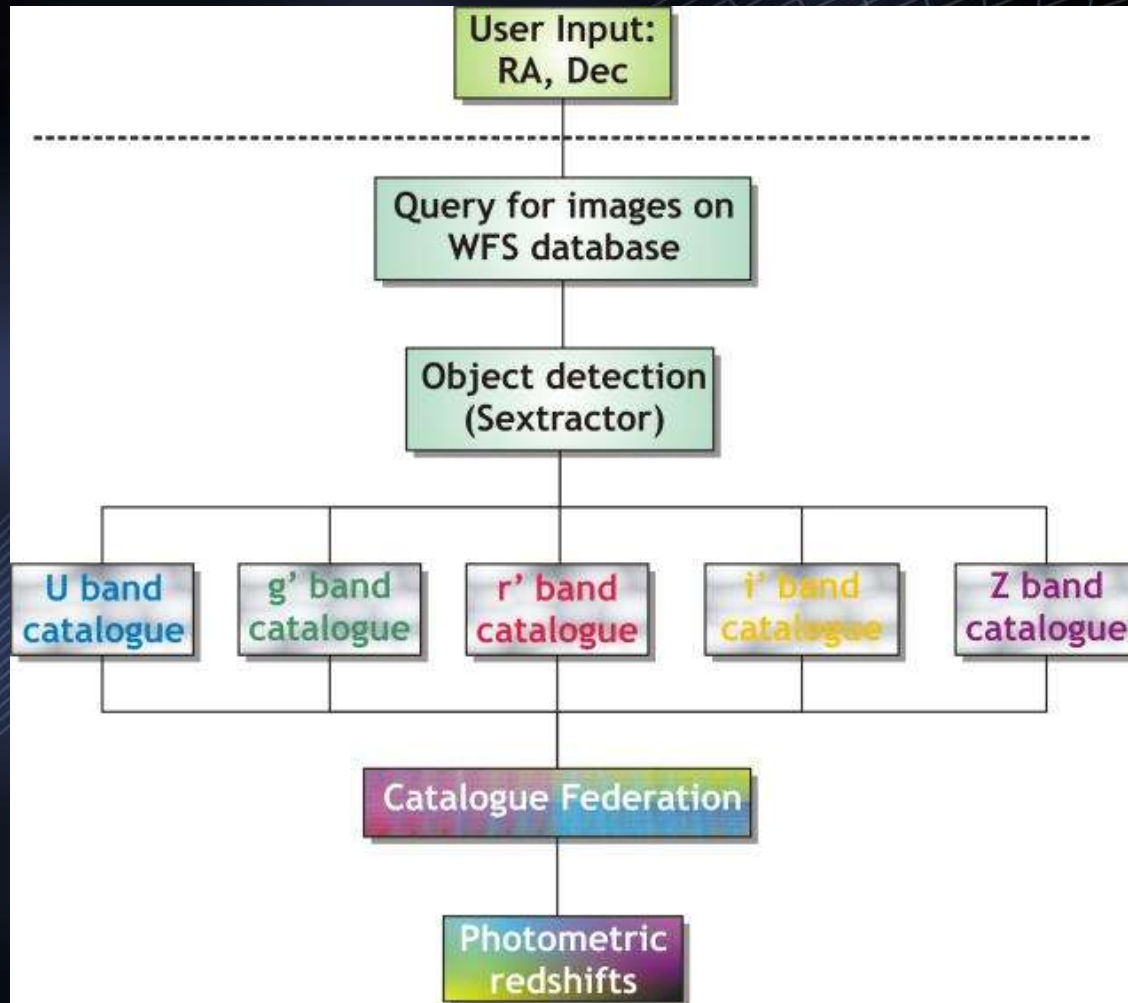
View Info: **View**

Nodes:	Colors?
Node:	SDSSDR2
Node:	SDSS





AstroGrid : scaling up VO processing into WorkFlows





Workflow Editor - Mozilla

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop <http://cadairidris.star.le.ac.uk:8080/astrogrid-portal/main/mount/workflow/agjobmanager.html> Search Print

Home Bookmarks Red Hat Network Support Shop Products Training

Home MySpace Resources Queries Workflows Jobs Help Logout

Workflow Editor

File Edit

Name: AstroGrid Redshift Maker NG

Description: Calculate redshifts from imaging data

update workflow details

```

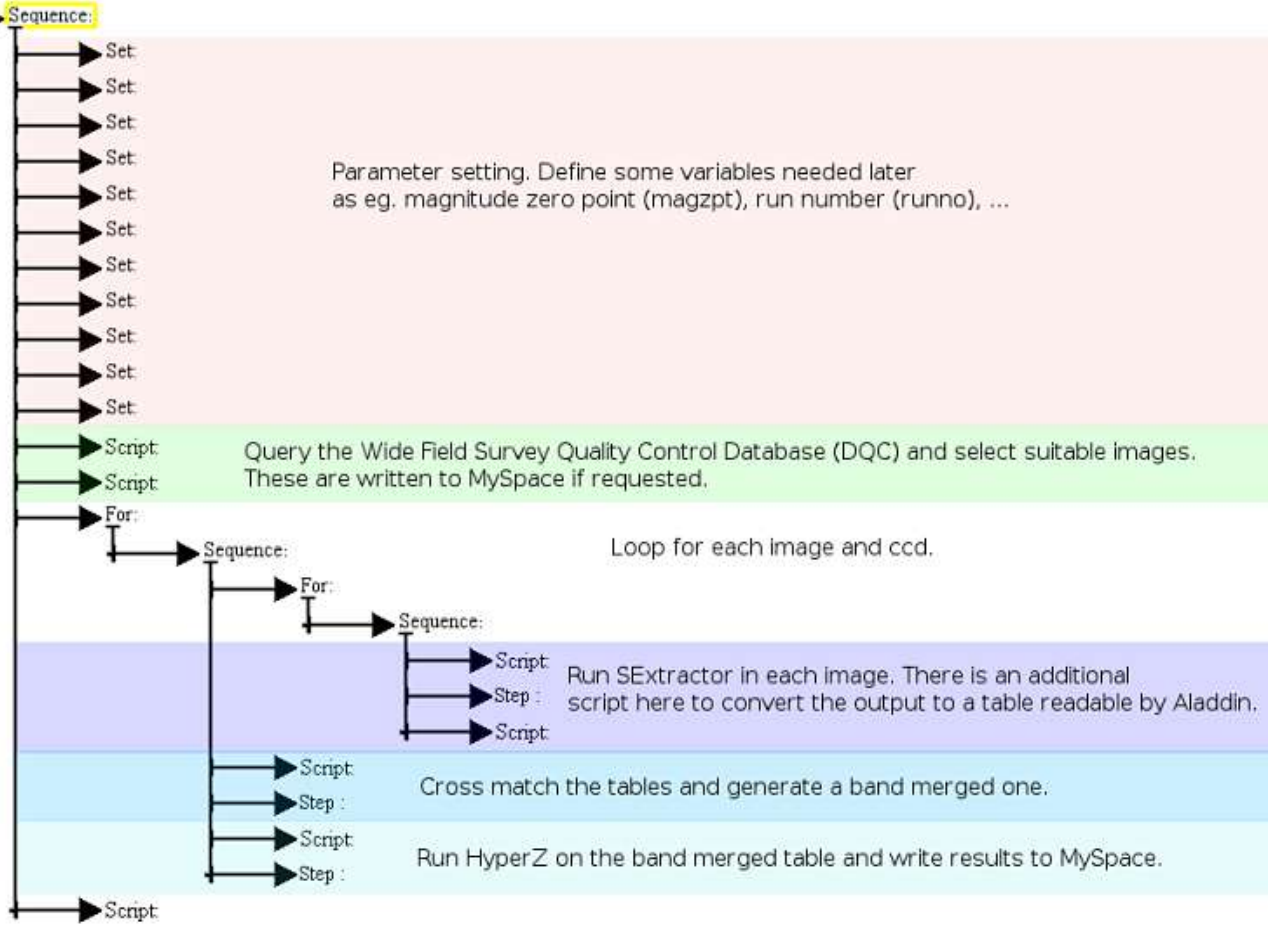
graph TD
    Root(( )) --> S1[Script]
    Root --> S2[Script]
    Root --> F1[For]
    F1 --> S3[Script]
    F1 --> S4[Script]
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```

Step:	Task:
Step name: sex_COPY	org.astrogrid/SExtractor
Var. name:	Task name: SExtractor : Galactic
Description: SExtractor	Description: -- Select task --
	SExtractor is a program that builds a catalogue of objects from an astronomical image. Although it is particularly oriented towards reduction of large scale galaxy-survey data, it performs rather well on moderately crowded star fields....

update step details

File...

The Workflow explained



Astrogrid Webstart applications - Mozilla

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop htl Search Print

Home Bookmarks Red Hat Network Support Shop Products

Home MySpace Resources Queries Wor

Astrogrid Webstart applications

- What are webstart applications?
- What will happen when I select one?
- System requirements.
- Frequently asked questions.

Integrates astrogrid into the desktop. Allows astrogrid services to be easily called from user applications and scripts;

Aladin is an interactive software sky atlas allowing the user to visualize digitized images of any part of the sky, to superimpose entries from astronomical catalogs or personal user data files, and to interactively access related data and information from the SIMBAD, NED, VizieR, or other archives for all known objects in the field. Aladin is particularly useful for multi-spectral cross-identifications of astronomical sources, observation preparation and quality control of new data sets. The Aladin sky atlas is available in three modes: a simple previewer, a Java applet interface and a Java Standalone application.

http://softwa...din-avo.jnlp

A.V.O demonstration prototype v2.002 multiview

Load... Save... Plugins... Print... Data Tree... Help... Quit

Position J2000 [16:02:59.22 +54:31: Pixel full

sex_R_1.vot

32.16° x 32.16°

- sex_R_1.vot

▷	5826.0	240.8436	54.56303	1844.288	3699.34
▷	5827.0	240.7997	54.61246	1309.996	3979.79
▷	5828.0	240.847	54.54867	2000.614	3675.876
▷	5832.0	240.7895	54.60539	1387.68	4043.319
▷	5835.0	240.802	54.57811	1683.542	3962.486

CDS - ESO - AstroGrid - ST-ECF - UMAN/J. Bank - CNRSDR01 -

Server selector

Choose an image server or a data server and fill in the associated form drawn below

Image servers: Aladin server, VOdemo, SSS..., SkyView, SDSS, VLA..., Others..., Others: All VO, SSA, MyData, MySpace

Data servers: VizieR Catalogs, Surveys in VizieR, Missions in VizieR, Simbad, NED, Others.., SDSS., FoV

MvSpace Browser

Login Logout Logged in as ivo://uk.ac.le.star/Mar

- home
 - M51_images
 - votable
 - intwfs
 - allsky.fits
 - sex_G_1.vot
 - sex_R_1.vot**
 - sex_U_1.vot
 - mga_1

Refresh Detach

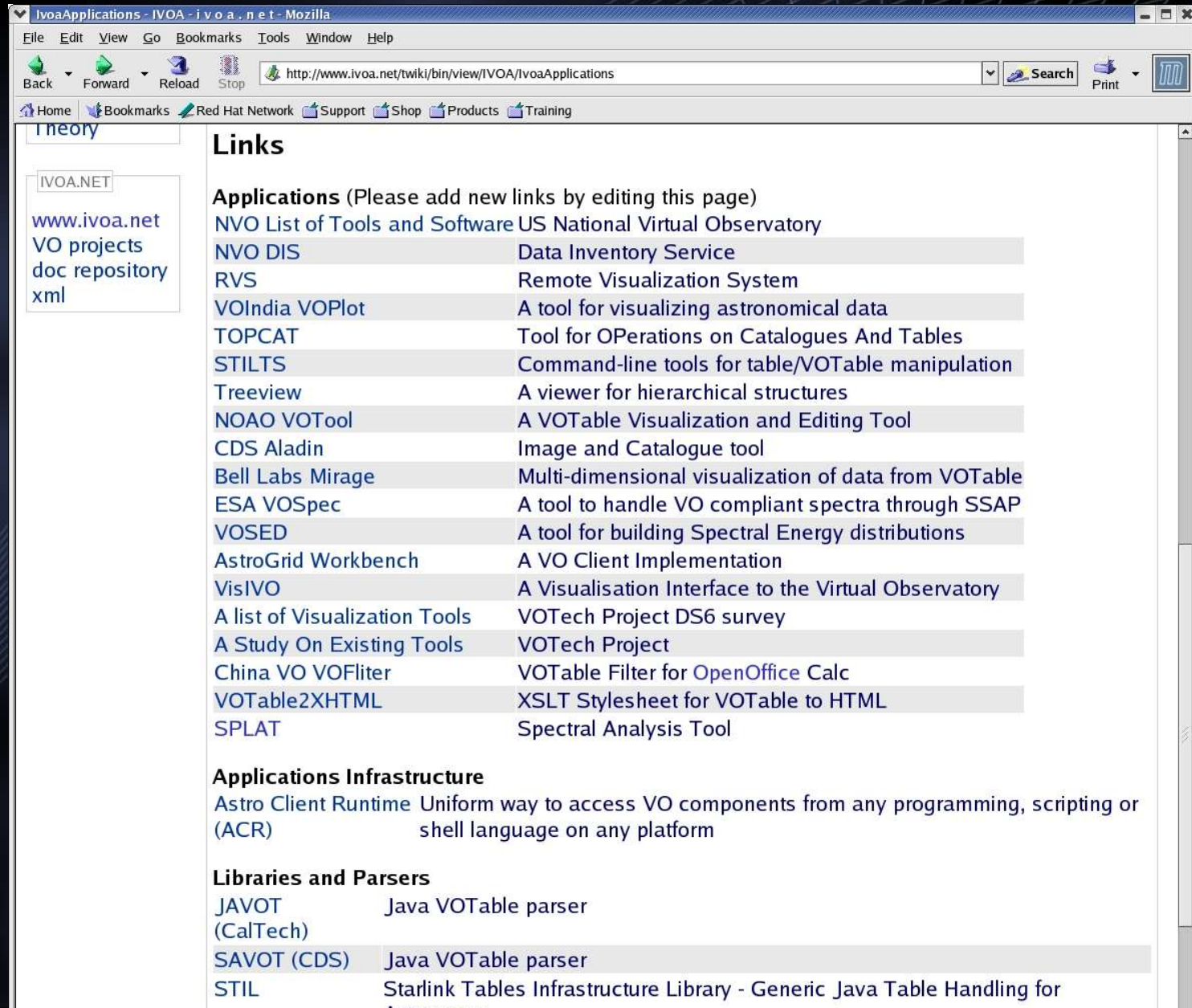
* SUBMIT * Reset Clear Close



IVOA Applications Interest Group

- Announcements of new tools
- Discussion on VO tools
- Suggestions for enhancements
- Feedback to IVOA working groups on standards etc.

Working list of applications – add your own!



File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop <http://www.ivoa.net/twiki/bin/view/IVOA/IvoaApplications> Search Print

Home Bookmarks Red Hat Network Support Shop Products Training

Theory

IVOA.NET

www.ivoa.net
VO projects
doc repository
xml

Links

Applications (Please add new links by editing this page)

NVO List of Tools and Software	US National Virtual Observatory
NVO DIS	Data Inventory Service
RVS	Remote Visualization System
VOIndia VOPlot	A tool for visualizing astronomical data
TOPCAT	Tool for OPERations on Catalogues And Tables
STILTS	Command-line tools for table/VOTable manipulation
Treeview	A viewer for hierarchical structures
NOAO VOTool	A VOTable Visualization and Editing Tool
CDS Aladin	Image and Catalogue tool
Bell Labs Mirage	Multi-dimensional visualization of data from VOTable
ESA VOSpec	A tool to handle VO compliant spectra through SSAP
VOSED	A tool for building Spectral Energy distributions
AstroGrid Workbench	A VO Client Implementation
VisIVO	A Visualisation Interface to the Virtual Observatory
A list of Visualization Tools	VOTech Project DS6 survey
A Study On Existing Tools	VOTech Project
China VO VOfliter	VOTable Filter for OpenOffice Calc
VOTable2XHTML	XSLT Stylesheet for VOTable to HTML
SPLAT	Spectral Analysis Tool

Applications Infrastructure

[Astro Client Runtime](#) Uniform way to access VO components from any programming, scripting or shell language on any platform (ACR)

Libraries and Parsers

JAVOT (CalTech)	Java VOTable parser
SAVOT (CDS)	Java VOTable parser
STIL	Starlink Tables Infrastructure Library - Generic Java Table Handling for

Summary

- **VO tools are ready for doing science**
 - Varying levels of stability and maturity
- **VO services are rapidly coming online**
 - Data centres implementing translation layers
 - Specialized services uptake of VO standards
- **Workflows and Grid capabilities**
 - First steps are promising

