



VIRTUAL ASTRONOMICAL OBSERVATORY

# Iris v2.0

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VAO



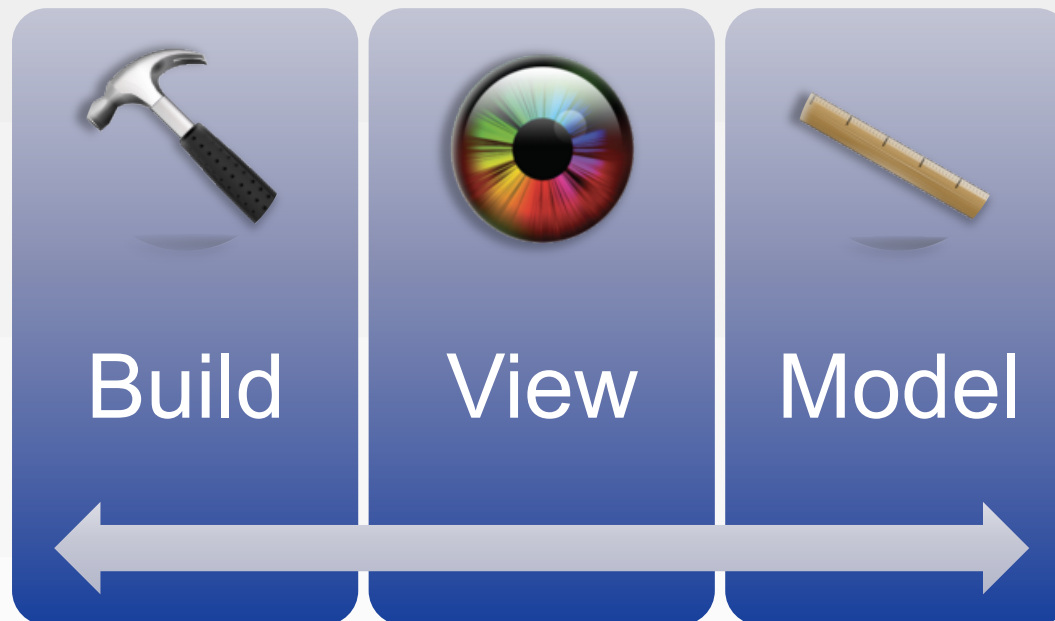
The VAO is operated by the VAO, LLC.



# High level view

## Built-in Capabilities

- Iris provides several generic capabilities for building, editing, viewing and analyzing SEDs.



## Extensions

- Iris provides a high number of possible customizations and extensions, so that specific science cases can be built on top of the basic infrastructure.



# New Features

## Visualization improvements

- Coplotting SEDs

## Science features

- Interpolation, possibly with normalization and/or smoothing
- Red/Blue-shifting
- Integrating quantities (**using >2100 filters from SVO their fps**)

## Plugins

- ASDC now shipping pre-installed in Iris

## Interoperability

- Single Table output



# Iris features summary

## SED Builder

- Load SED Segments from File, URL
- Add/Edit/Save/Delete:
  - Photometry Points
  - Photometry Catalogs
  - Entire SEDs, Spectra
- Import non-compliant user files from many different formats
- Integrated client for NED SED service
- SAMP I/O with SED message extension

## SED Viewer

- Metadata Filtering through user defined boolean expressions or interactive selection
- Display single point metadata in tree format
- Interactive Aperture Correction

## Fitting Tool

- Arbitrarily combine model components in different spectral ranges
- Compute confidence intervals for best fit parameters
- Template Fitting



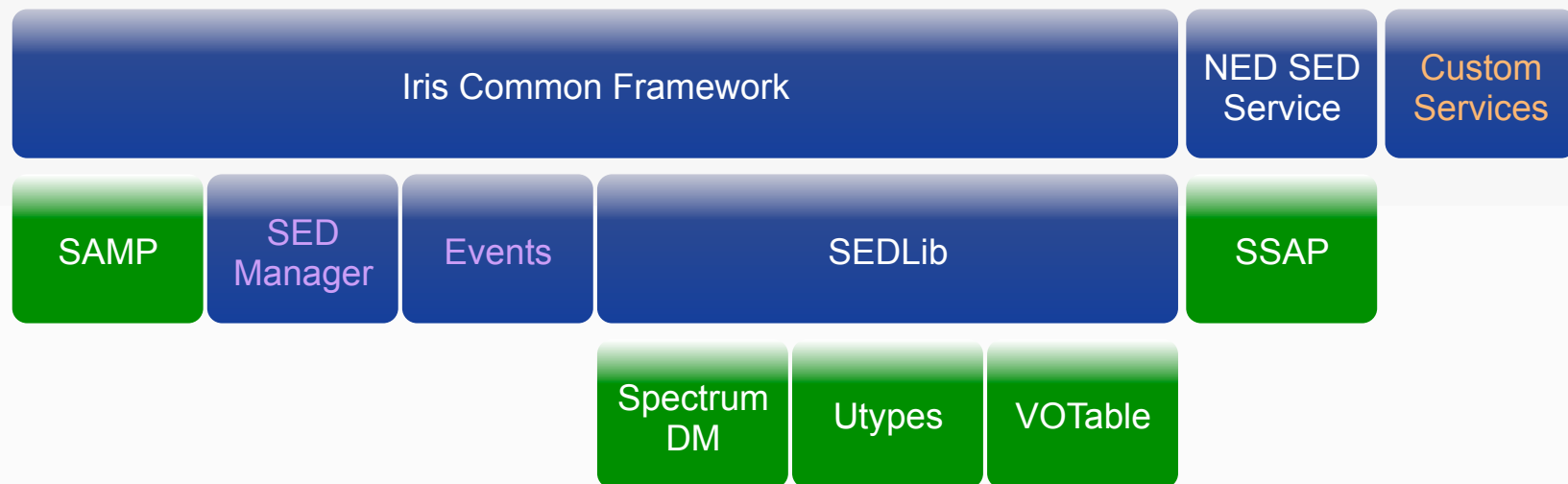
# Meeting fluid requirements

## Iris components stack

- Builds up a high-cross-section stack of tools, hiding the standards implementation layer from the science layer, in a loosely coupled extensible architecture

## Science capabilities

Iris Components: Builder, Viewer, Fitting Tool, Plugins





# ASDC+NED embedded clients

Iris

Load File Load NED SED SED Builder ASDC Data SED Viewer Fitting Tool

ASDC Catalog Query

Target Name: 3c273 NED Resolve

Ra: 187.27792 Dec: 2.05239

Version: 1.1.7

Date Format: yyyy-MM-dd...

TStart Date: Time HH SS MM

TStop Date: Time HH SS MM

Catalogs Available:

- Catalogs
- Radio
- Infrared
- Optical UV
- Soft X Ray
- Hard X Ray
- Gamma Ray

SED Creation Mode: Append

Catalog Name: Search Radius: arcmin

Submit Change Apply

Sed

File Display

X axis: SpectralAxis Y axis: FluxAxis

3.4512807E14 1.80868239E10

Print Redraw

Grid off Auto Plot type Expand Metadata Flux Units

SED Plot:  $\nu F(\nu)$  (Jy-Hz) vs Frequency (Hz)

Legend:  Error  No error

Segments:

Target	Coordinates	Publisher	#Points
3C 273	187.28, 2.0524	NASA/IPAC Extragalactic Database (NED)	501
3EG J1229+0210	187.25, 2.17	ASDC	1
3EG J1229+0210	187.25, 2.17	ASDC	1
3EG J1229+0210	187.25, 2.17	ASDC	1
3EG J1229+0210	187.25, 2.17	ASDC	1
3EG J1229+0210	187.25, 2.17	ASDC	1
3EG J1229+0210	187.25, 2.17	ASDC	1
3EG J1229+0210	187.25, 2.17	ASDC	1
3EG J1229+0210	187.25, 2.17	ASDC	1
3EG J1229+0210	187.25, 2.17	ASDC	1
3EG J1229+0210	187.25, 2.17	ASDC	1

SAMP status: connected



# Redshift (+coplot)

Iris

Load File Load NED SED Builder ASDC Data SED Viewer Fitting Tool Custom Models Manager Shift, Interpolate, Integrate Help

Co-plot: Sed Sed\_3.5

File Display

X axis: SpectralAxis Y axis: FluxAxis

1.9386568E14 1.259488E-16 Print Redraw

Grid off Auto Plot type Expand Metadata Flux density Units

CO-PLOT

Flux density (Jy)

Frequency (Hz)

Legend: Error No error Sed\_3.5 Sed

Co-plot SEDs

Sed (Segments: 408)  
Sed\_3.5 (Segments: 1)

Science

Open SEDs

Sed (Segments: 408)  
Sed\_3.5 (Segments: 1)

Redshift

Initial redshift: 0.158 Move to redshift: 3.5 Create new SED

Interpolation

Method: Linear Spline

X Min: -Infinity X Max: Infinity Units: Angstrom

Number of Bins: 1,000 Normalize after interpolation

Smooth Box Size: 20 Logarithmic binning

Create New SED

SAMP status: connected

Target	ASDC	ASDC	ASDC
3C 273			
3EG J1229+0210	187.25, 2.17	ASDC	
3EG J1229+0210	187.25, 2.17	ASDC	
3EG J1229+0210	187.25, 2.17	ASDC	



# Interpolation (+coplot)

The screenshot displays the Iris software interface with several windows open. At the top, a toolbar contains icons for 'Load File', 'Load NED SED', 'SED Builder', 'ASDC Data', 'SED Viewer', 'Fitting Tool', 'Custom Models Manager', 'Shift, Interpolate, Integrate', and 'Help'. The main window shows a 'Co-plot: Sed\_Sed\_LinearSpline.2' with a log-log plot of 'VF(v) (Jy-Hz)' vs 'Frequency (Hz)'. The plot features data points (black squares and diamonds) and a red spline fit. A 'Science' dialog box is open, showing 'Redshift and Interpolation' settings. The 'Interpolation' section is highlighted with a red box and includes: 'Method: Linear Spline', 'X Min: -Infinity', 'X Max: Infinity', 'Units: Angstrom', 'Number of Bins: 1,000', 'Normalize after interpolation' (unchecked), 'Smooth' (unchecked), 'Box Size: 20', and 'Logarithmic binning' (checked). Other windows include 'Co-plot: SEDs' listing 'Sed (Segments: 408)', 'Sed\_3.5 (Segments: 1)', and 'Sed\_LinearSpline.2 (Segments: 1)'. A 'SAMP status: connected' indicator is visible in the bottom left.





# Integrated fluxes

The screenshot displays the Iris software interface. At the top, there is a toolbar with icons for 'Load File', 'Load NED SED', 'SED Builder', 'ASDC Data', 'SED Viewer', 'Fitting Tool', 'Custom Models Manager', 'Shift, Interpolate, Integrate', and 'Help'. Below the toolbar, the main workspace contains several windows:

- Sed\_LinearSpline.2**: A plot window showing 'Flux density (Jy)' on the y-axis (log scale from 1.0e-9 to 0.1) and 'Frequency (Hz)' on the x-axis (log scale from 1.0e11 to 10.0e20). The plot shows a magenta line representing the SED. The plot area includes a legend with 'Error' (checkbox) and 'No error' (checkbox).
- Co-plot**: A window titled 'SEDs' listing:
  - Integrated (Segments: 1)
  - Sed (Segments: 408)
  - Sed\_3.5 (Segments: 1)
  - Sed\_LinearSpline.2 (Segments: 1)
- Science**: A dialog box with tabs for 'Redshift and Interpolation' and 'Calculate Flux'. It features:
  - 'Add Passband' section with 'Passband' and 'Photometry Filter' options.
  - 'Results' table:

The 'Science' dialog box results table is as follows:

Passband	Eff WL (Angstrom)	Flux (Jy)
SLOAN/SDSS.u	3.59493E3	2.655418E-2
SLOAN/SDSS.g	4.64042E3	2.681426E-2
SLOAN/SDSS.r	6.12233E3	2.751224E-2
SLOAN/SDSS.i	7.43949E3	2.856677E-2
SLOAN/SDSS.z	8.897062E3	3.127471E-2

At the bottom left, a status bar indicates 'SAMP status: connected'.



# Integrated fluxes

Photometry Filter Selector

Photometry Filters by Facility

- ▼ 2MASS
  - 2MASS.H
  - 2MASS.J
  - 2MASS.Ks
- ▶ AAO
- ▶ AKARI
- ▶ CAHA
- ▶ CFHT
- ▶ CTIO
- ▶ DENIS
- ▶ GALEX
- ▶ GTC
- ▶ Gemini
- ▶ Generic
- ▶ Geneva
- ▶ HST
- ▶ Herschel
- ▶ Hipparcos
- ▶ IAC80
- ▶ INT
- ▶ IRAS
- ▶ ISO

Search

By String:

Clear Search

Description: 2MASS Ks

Band: Ks

Instrument:

Facility: 2MASS

Wavelength

Min: 19543.691

Max: 23552.4

Mean: 21590.0

Eff: 21590.0

Angstrom

Done

You can select multiple filters.  
Transmission curves for the filters will be downloaded in a local cache,  
so you need an Internet connection only for downloading new filters.



# Integrated fluxes

The screenshot displays the Iris software interface with several windows open:

- Top Panel:** A row of icons for various functions: Load File, Load NED SED, SED Builder, ASDC Data, SED Viewer, Fitting Tool, Custom Models Manager, Shift, Interpolate, Integrate, and Help.
- Integrated Window:** A plot showing Flux density (Jy) on the y-axis (ranging from 2.0e-2 to 4.0e-2) versus Wavelength (Angstrom) on the x-axis (ranging from 5000.0 to 10000.0). The plot contains five data points represented by pink diamonds. The plot title is "Integrated".
- Co-plot Window:** A window titled "Co-plot" with a sub-tab "SEDs" containing a list of SEDs:
  - Integrated (Segments: 1)
  - Sed (Segments: 408)
  - Sed\_3.5 (Segments: 1)
  - Sed\_LinearSpline.2 (Segments: 1)
- SED Builder Window:** A window for managing SEDs. It shows a list of "Open SEDs" with "Integrated (Segments: 1)" selected. The "Selected SED" section shows:
  - ID: Integrated
  - Target Name: [empty]
  - Target: 3C 273
  - Coordinates: 187.28, 2.0524
  - Publisher: [empty]
  - #Points: 5



# How to write Iris plugins (Java)

Generate  
Maven Project  
From Iris Plugin  
Archetype

Edit Example  
Stub

Implement  
'onClick'  
callback

Test Plugin

## Easily implementable

- Example Plugin is 100 lines worth of code.

## Smart dependencies

- Dependencies not already included in Iris are automatically packaged with the Plugin.

## Branding

- Plugins are completely customizable and can be branded with the Provider's logo.



# Future plans

## Release v2.0

- Update documentation
- Release candidate: <http://cxc.cfa.harvard.edu/contrib/sed/>

## Maintenance

- VAO is dropping science applications development, this is the final **VAO** Iris release
- Under VAO we will fix significant bugs

## Post 2.0

- SAO is willing to take over, if possible
- SAO is willing to provide SED, Spectral reference implementations, but we need more mature technologies, also to save time and resources (e.g. UTYPEs/VO-DML)

## Plugins are still supported!

- Assessing possible stellar SED modeling toolkit plugin
- Ongoing collaboration with ASDC for Blazar Analysis plugin