Constructing and Analyzing Spectral Energy Distributions with the Virtual Observatory

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Spectral energy distributions (SEDs) are a common and useful means of assessing the relative contributions of different emission processes occurring within an object. Iris, the Virtual Astronomical Observatory (VAO) SED tool, seamlessly combines key features of several existing astronomical software applications to streamline and enhance the SED analysis process. With Iris, users may build and display SEDs, browse data and metadata and apply filters to them, fit models to SEDs, and calculate confidence limits on best-fit parameters. SED data may be built from a number of sources using the SED Builder. Iris supports the Simple Application Messaging Protocol for interoperability with other Virtual Observatory applications, like the VAO Data Discovery tool, and can directly fetch SEDs from the NASA Extragalactic Database SED service. Particular attention has been paid to the integration of user spectrophotometric data from files in several different formats. File readers for custom formats can be provided at runtime, as well as custom models to fit the data, as template libraries for template fitting or arbitrary python functions. New functionalities can be added by installing plugins, i.e. third party components that are developed using the Iris Software Development Kit.

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Iris provides a broad suite of capabilities for building, editing, viewing and analyzing SEDs.

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**Built-in Capabilities**

- Iris provides a broad suite of capabilities for building, editing, viewing and analyzing SEDs.

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**Example Thread**

1. Fetch NED SED

2. Get WISE photometry from VAO Data Discovery Tool

3. Beam data to TOPCAT using Virtual Observatory Interoperability (SAMP)

4. In TOPCAT, create new columns by converting magnitudes to differential fluxes

5. Beam data to Iris using Virtual Observatory Interoperability (SAMP)

6. In Iris, import the photometry coming from TOPCAT (Differential fluxes in the four WISE bands)

7. Using the Iris SED tool, add the SED components: logparabola for the synchrotron emission, the accretion disk (composition of black bodies) and a power law to account for the few high energy points available in this example

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**Iris extensibility and plugins**

- Plugins allow users to extend the set of existing models by building:
  - Custom Python functions
  - New models as custom data tables

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Demonstrations, tutorials, & more information at the VAO Exhibit (231-233)

[www.usvao.org](http://www.usvao.org)