

Astronomical images

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SCHOOL OF
PHYSICAL SCIENCES
AND NANOTECHNOLOGY

Our Galaxy

What can we see with our eyes?

What can we not see with our eyes?

Milky Way over Chimborazo

© Stéphane Guisard



Our Galaxy

What can we see with our eyes?

- Stars
- Dust

What can we not see with our eyes?

- Gas
- Dark matter

Milky Way over Chimborazo

© Stéphane Guisard

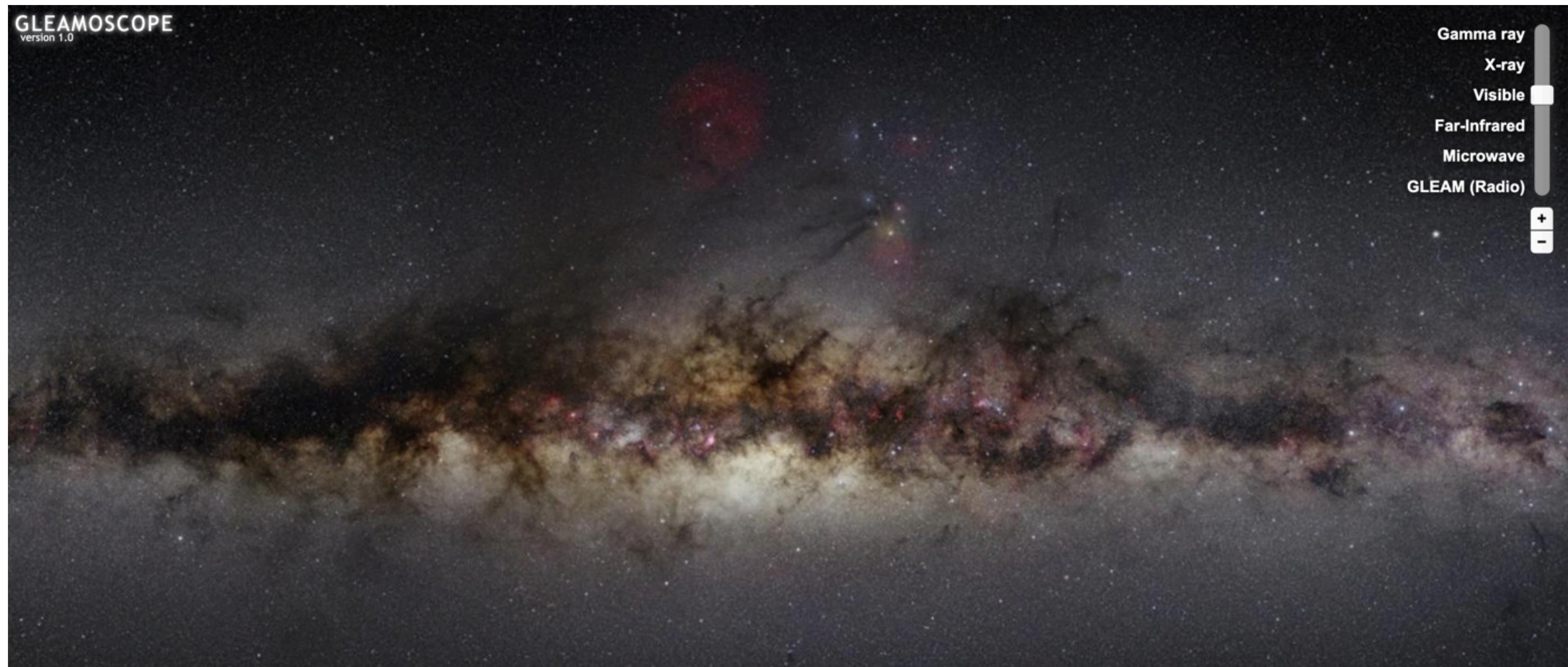


The Milky Way in different wavelengths

Gleamoscope

- There is a lot of Astrophysical data available for **education and outreach**.

<https://gleamoscope.icrar.org/gleamoscope/trunk/src/>



Our Galaxy

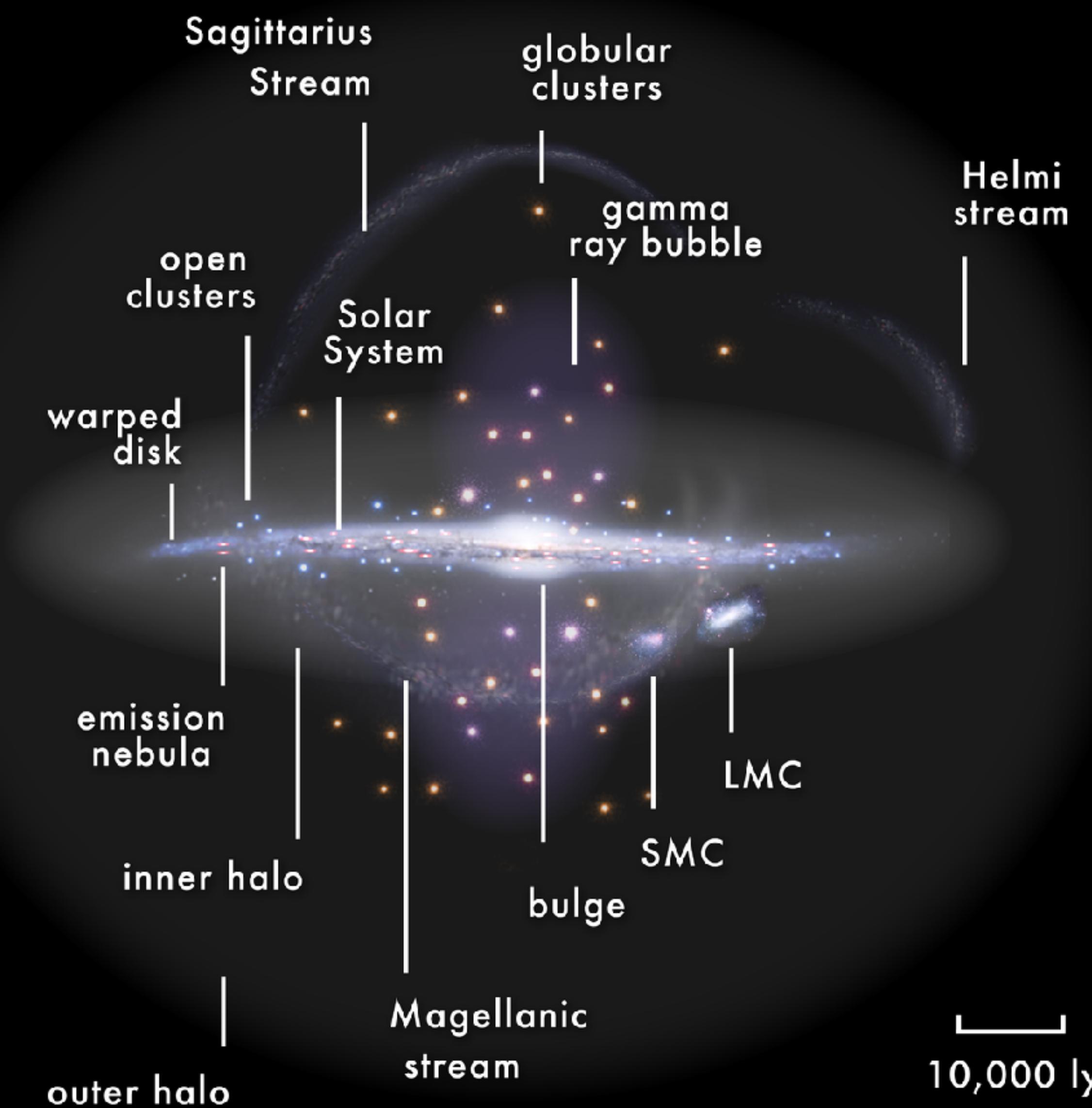
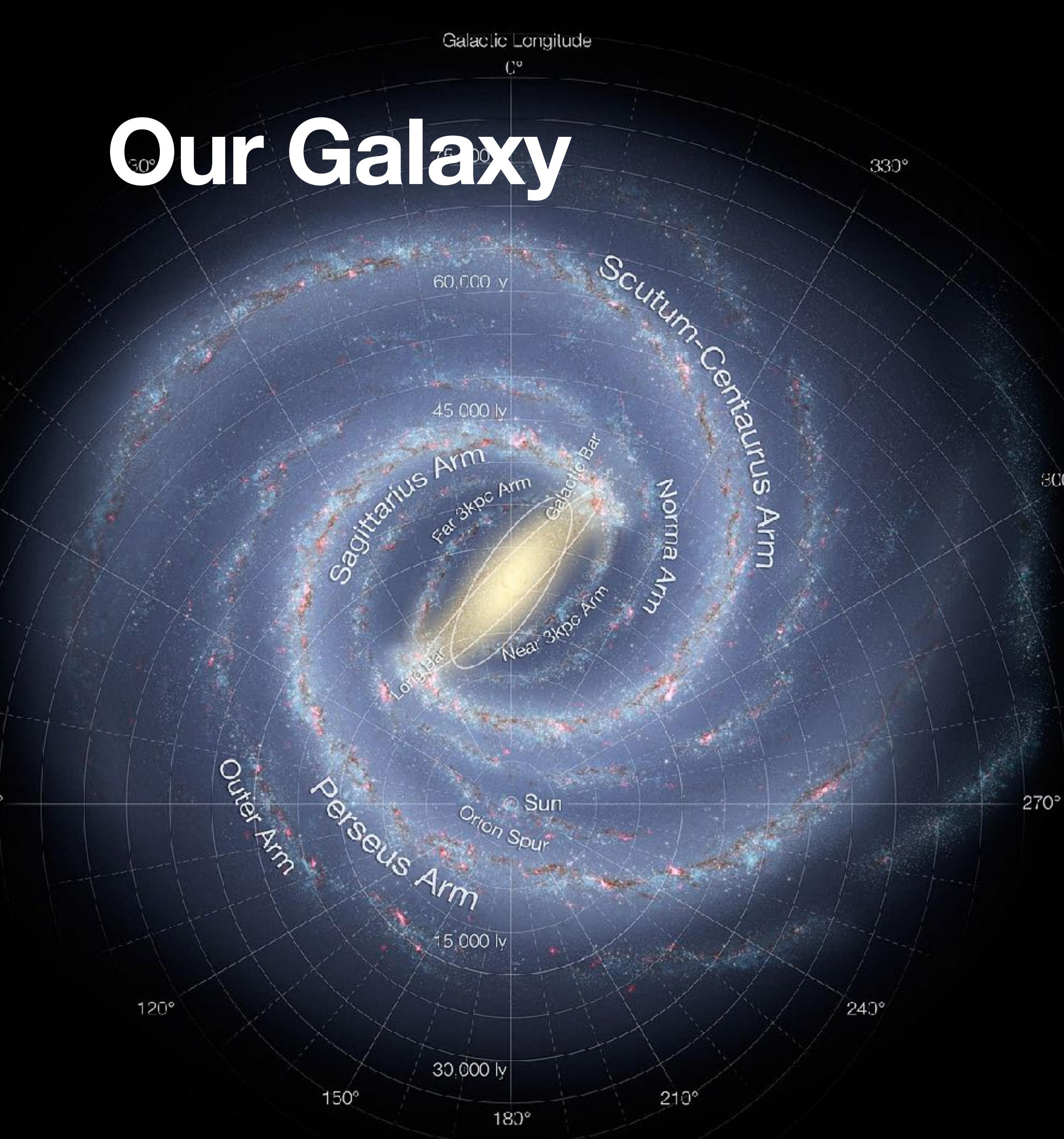
What kind of a galaxy is the Milky Way?



Milky Way over Chimborazo

© Stéphane Guisard

Our Galaxy



Archival data

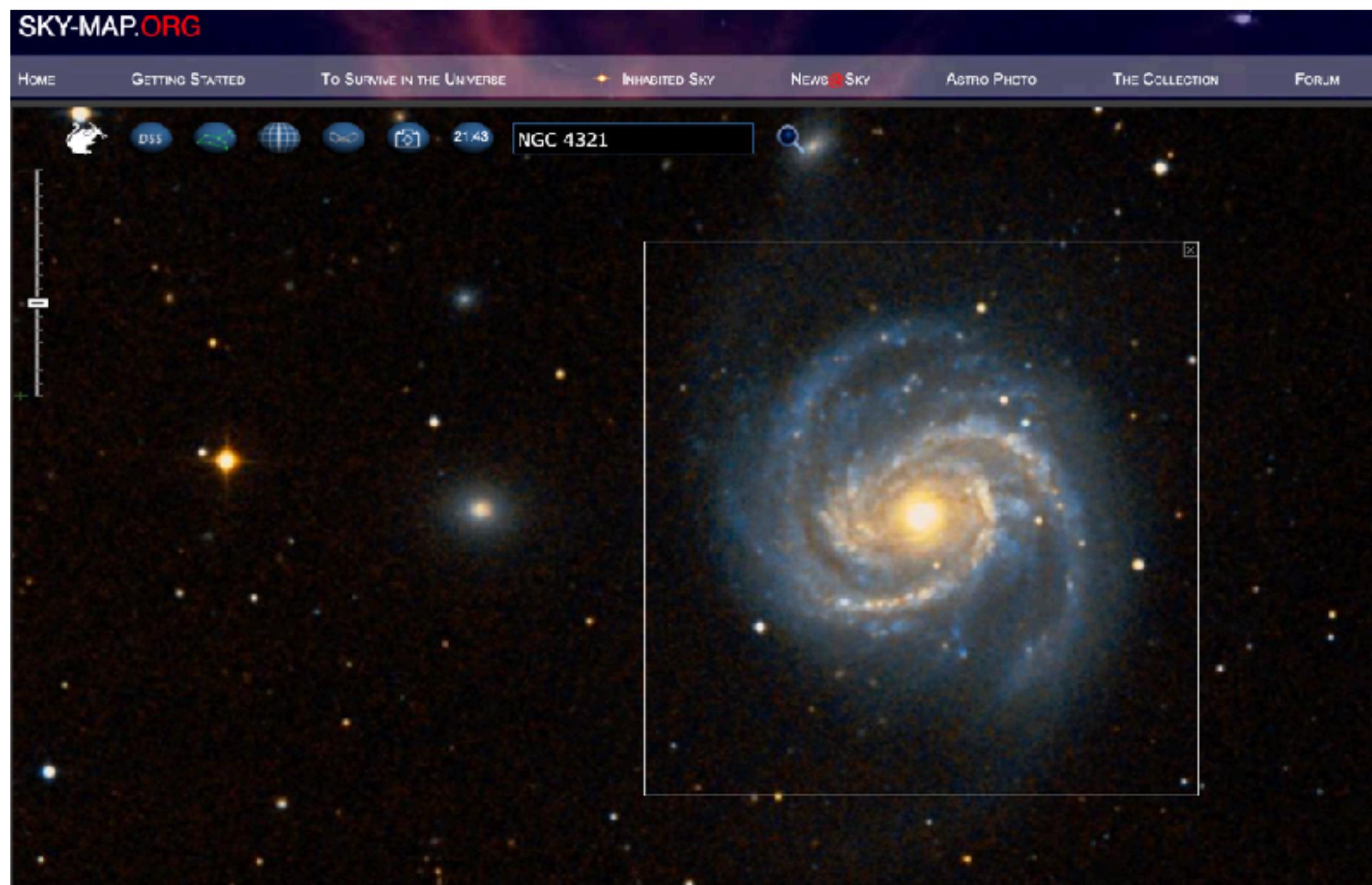
- There is a lot of Astrophysical data available for research.

Wikisky

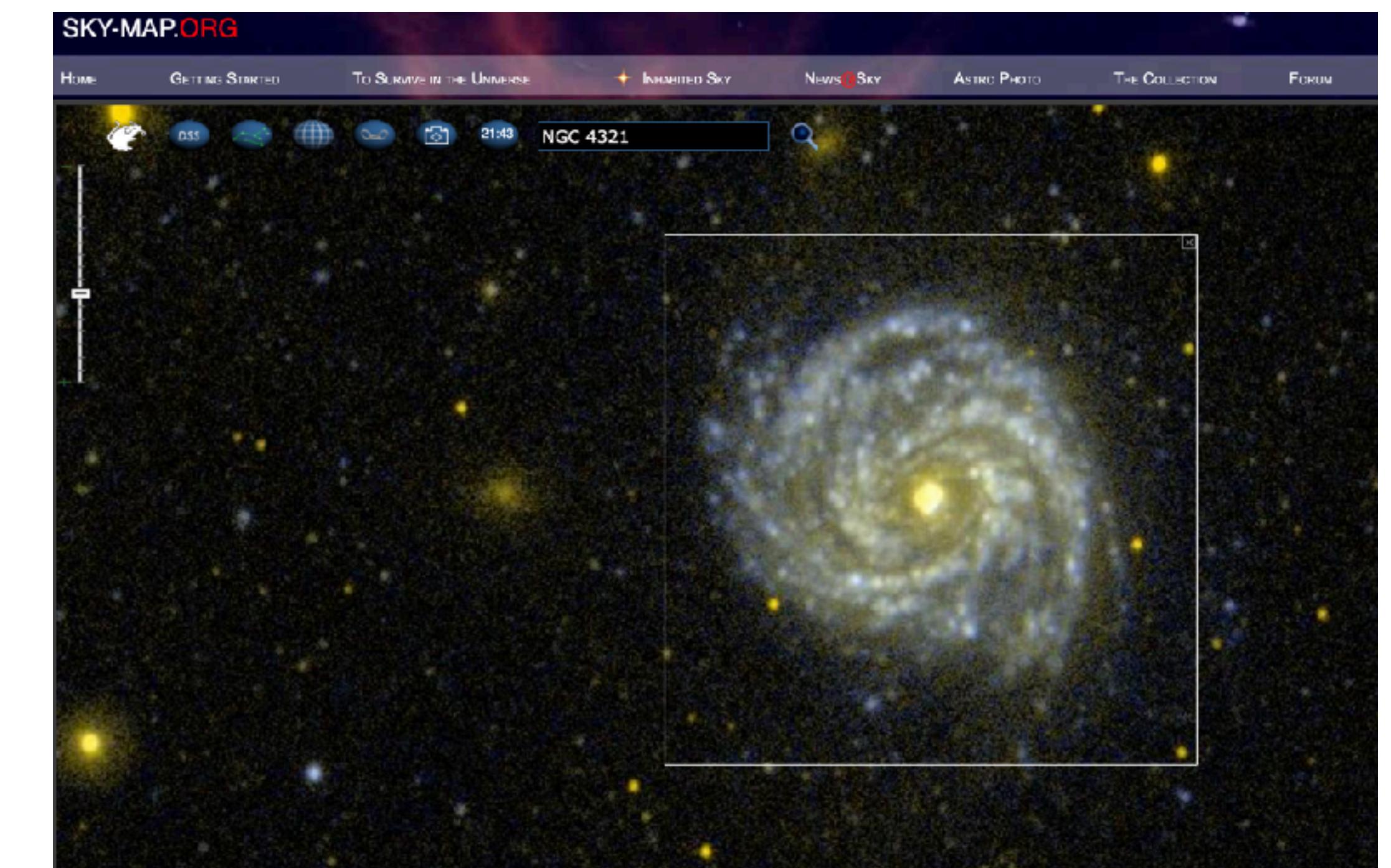
<http://www.wikisky.org/>

Search for data - quick information from a few basic large sky surveys
Example: NGC 4321 a galaxy in the Virgo cluster

Digital Sky Survey (DSS) - optical image



GALEX - UV image



Archival data

Hubble Space Telescope - optical image



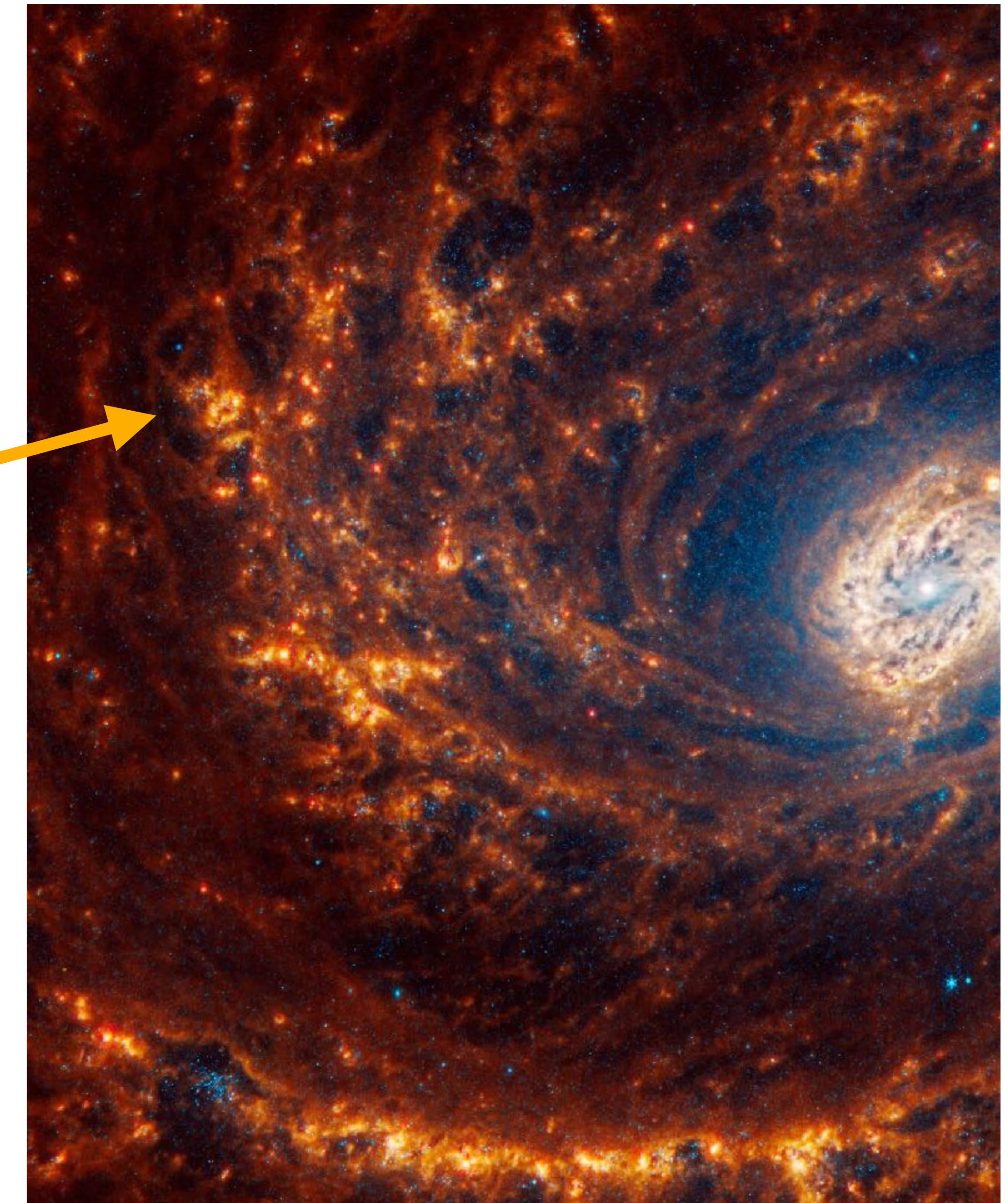
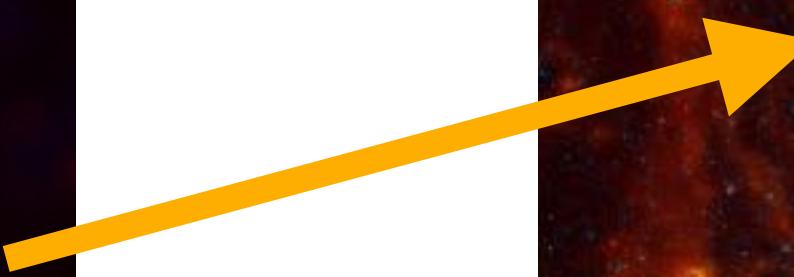
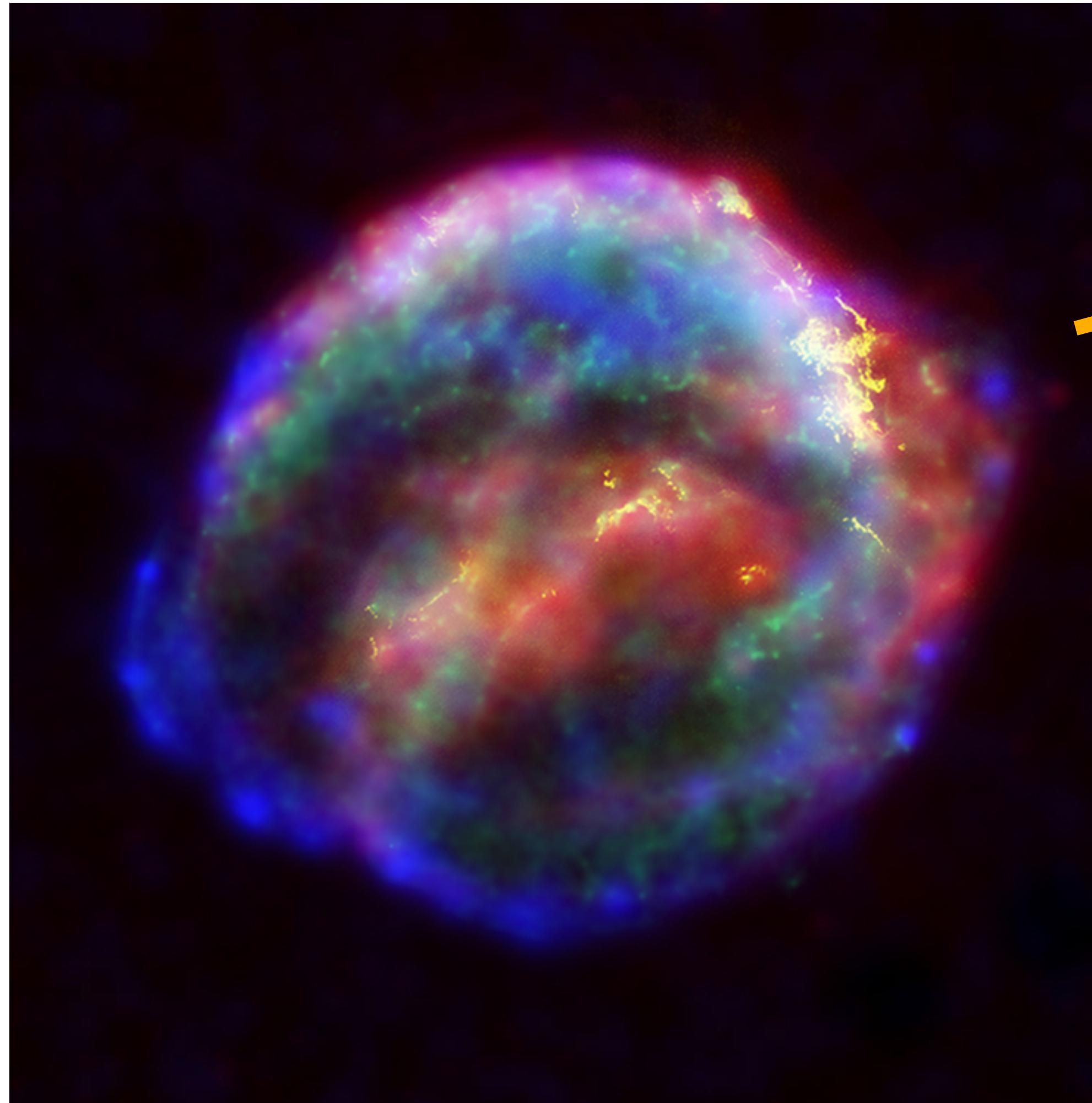
James Webb Space Telescope - Infrared image



James Webb Space Telescope - Infrared image

Archival data

Kepler's supernova remnant, SN 1604



Archival data

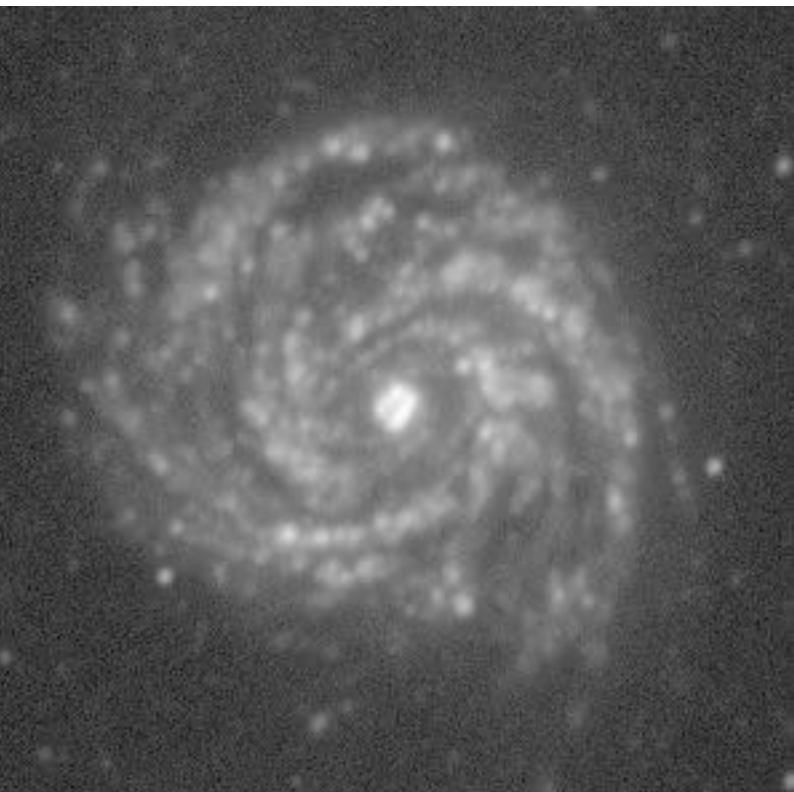
Skyview

Search and download data from sky surveys

Example: NGC 4321 a galaxy in the Virgo cluster

<https://skyview.gsfc.nasa.gov/current/cgi/query.pl>

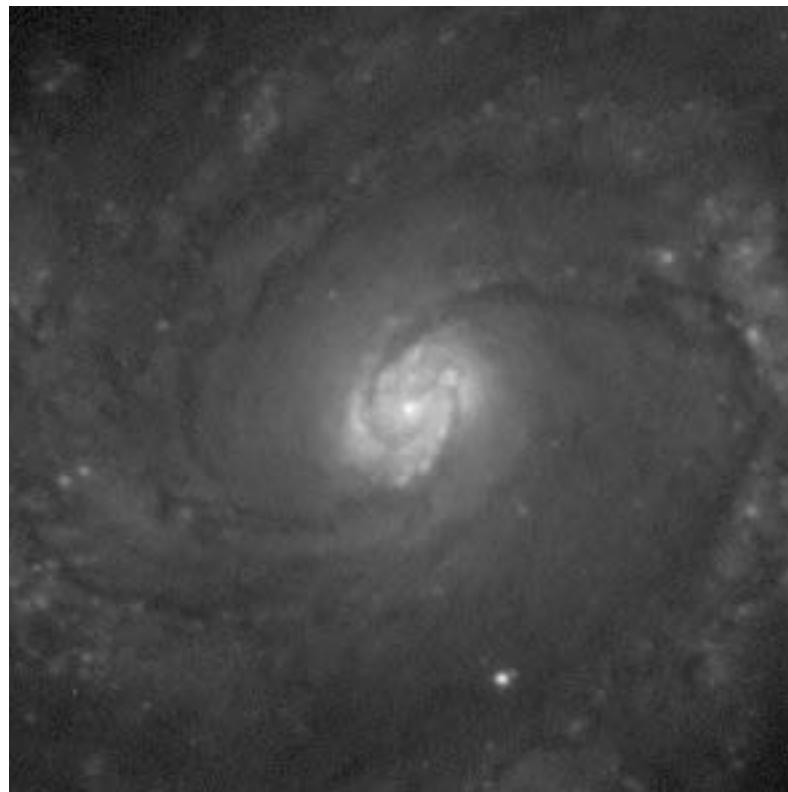
GALEX
Near UV



DSS 2 blue
Optical blue



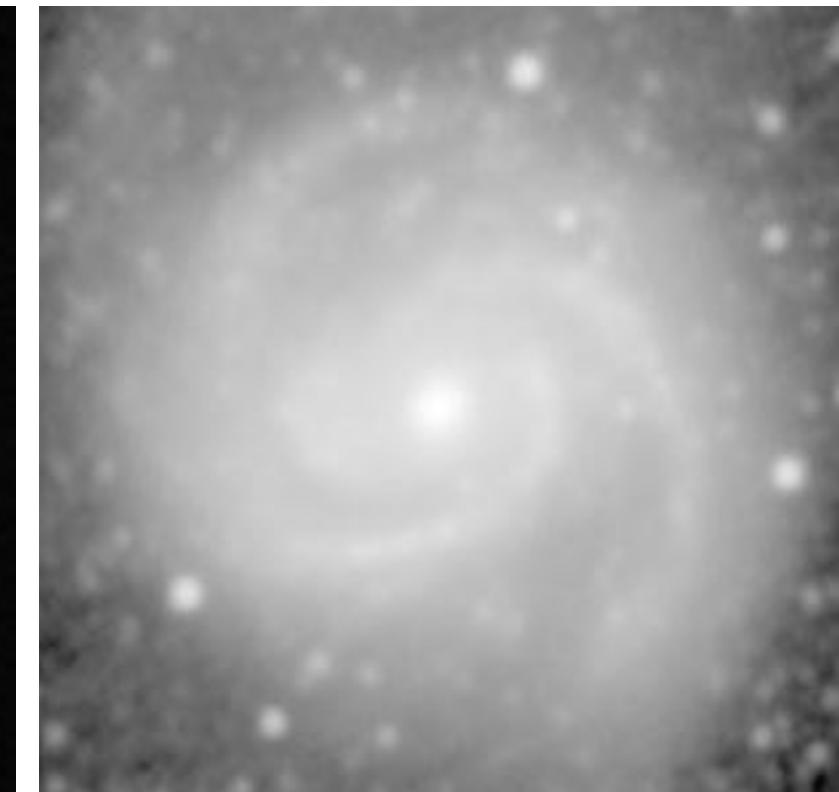
SDSS r
Optical red



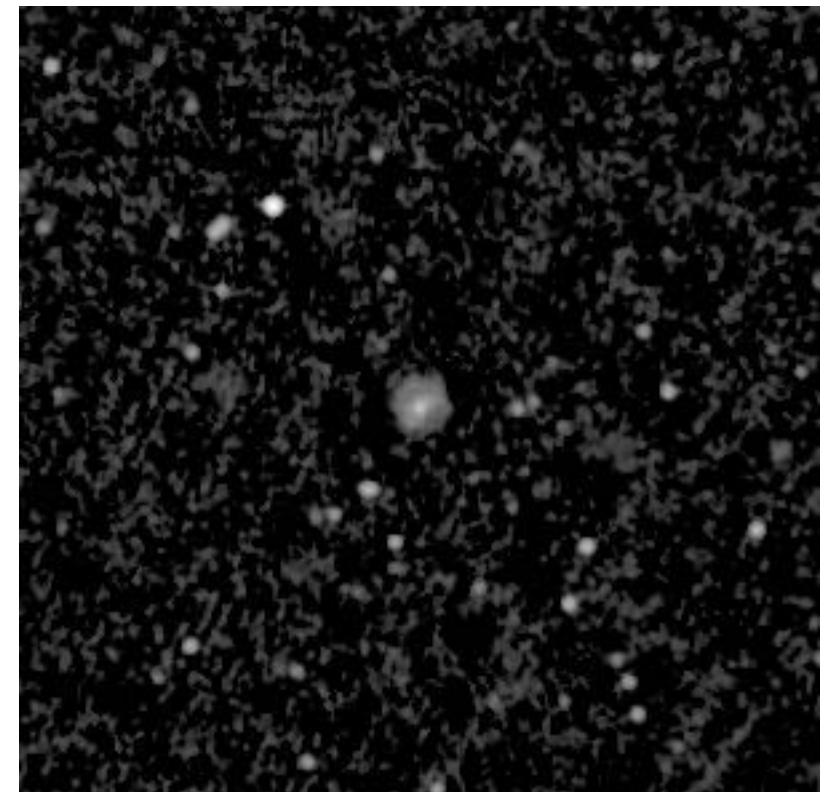
2MASS
Near infrared



WISE 3.4 micron
Infrared



NVSS
Radio



Archival data

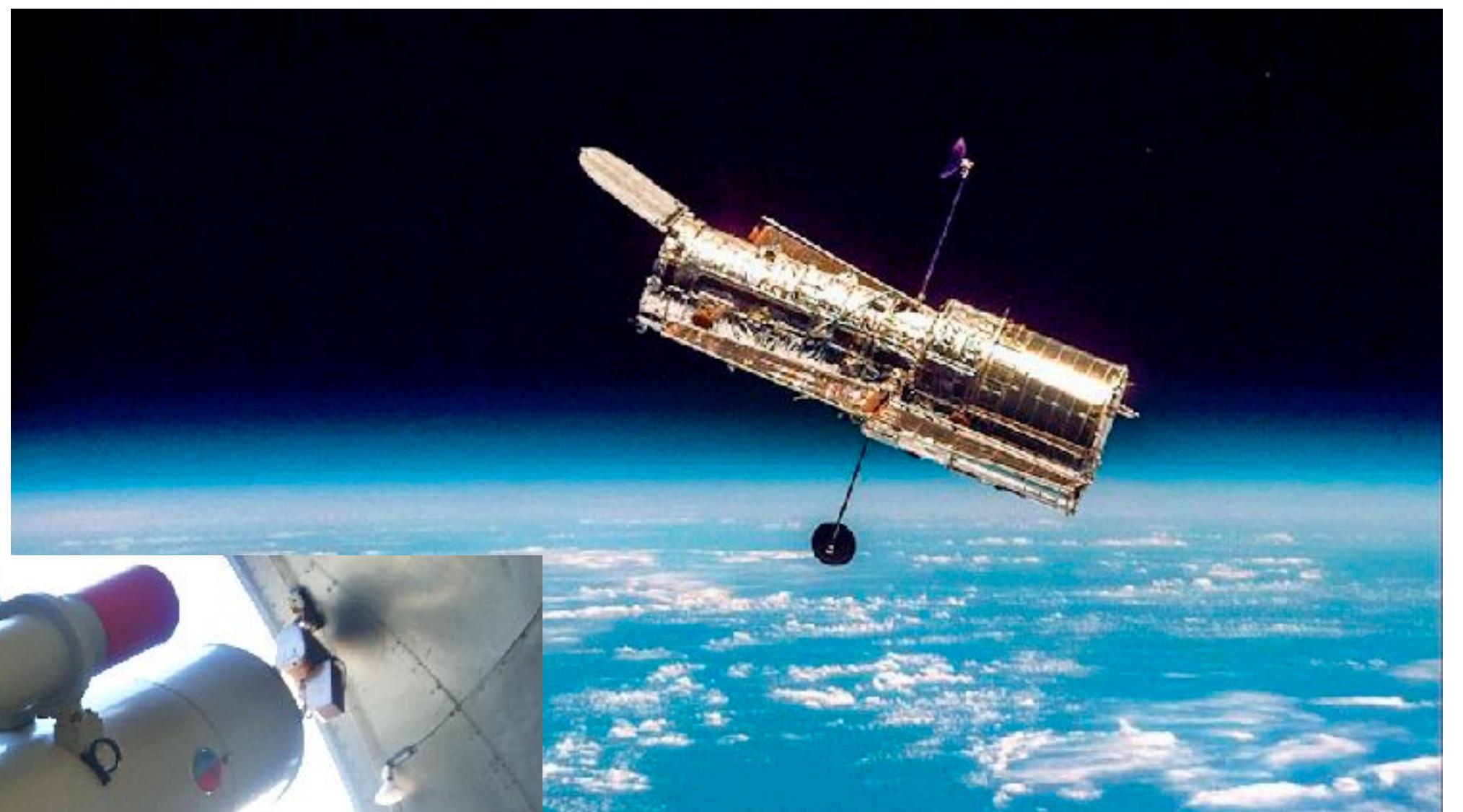


Palomar Observatory, USA



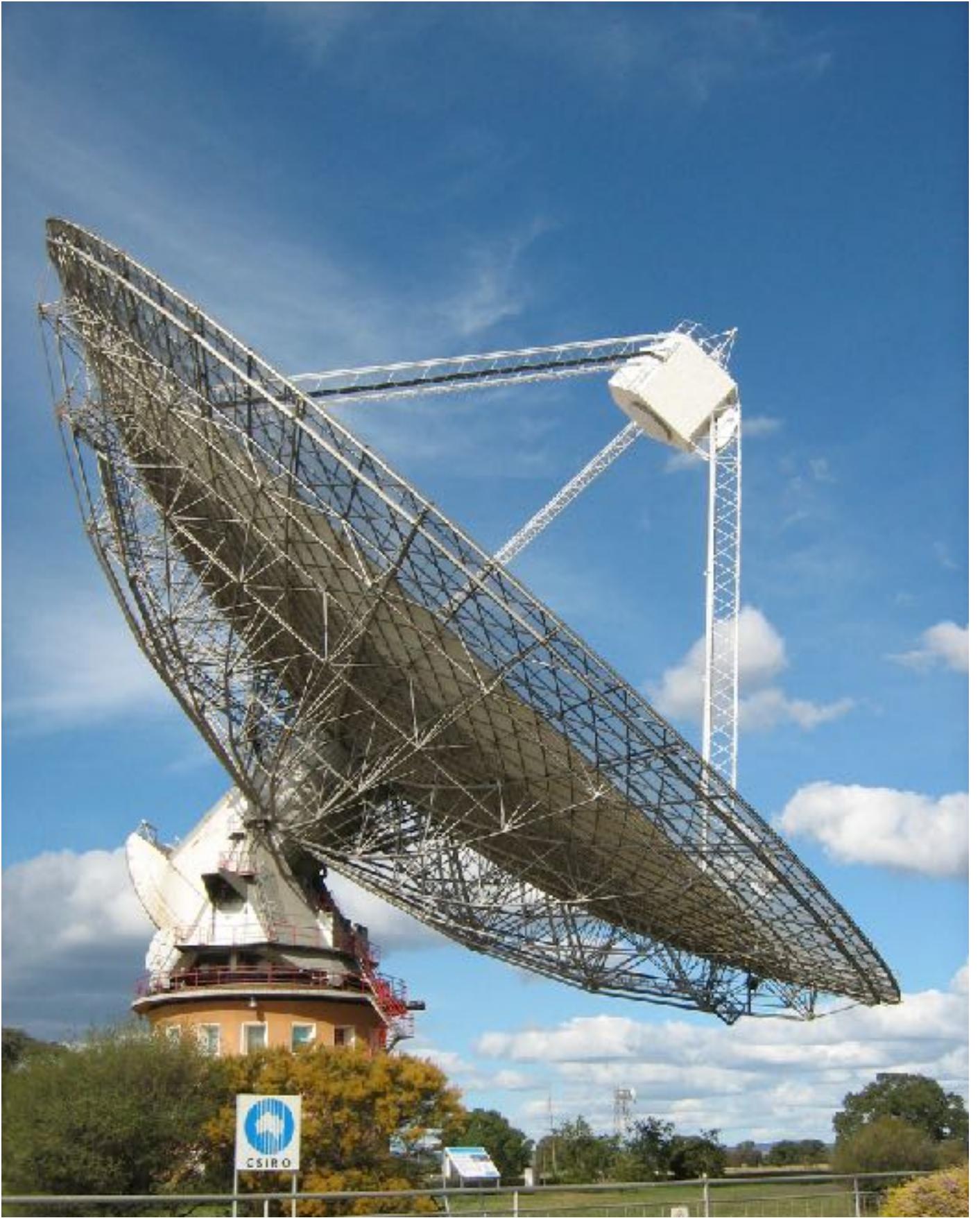
Siding Spring Observatory, Australia

Hubble Space Telescope

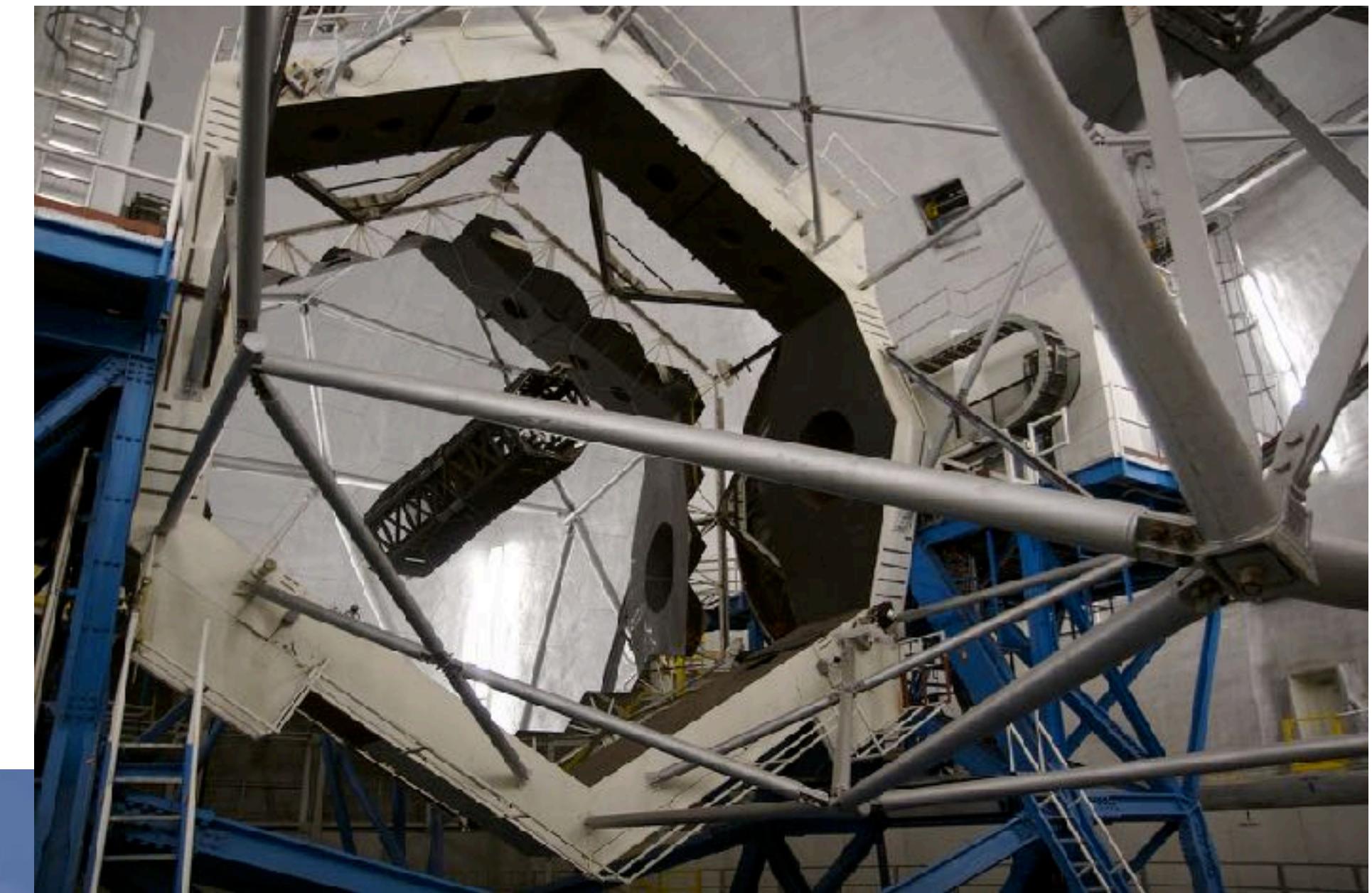


Archival data

Muriyang telescope, Australia



Kek telescope, Hawaii



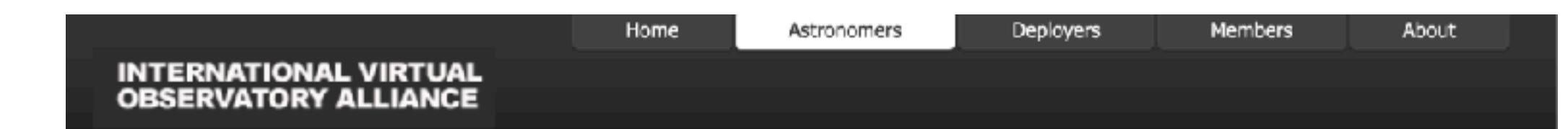
Gemini telescope, Hawaii

The Keck Telescope, with a **10m mirror**, made out of hexagonal segments

Virtual Observatory

- The **Virtual Observatory (VO)** is the vision that astronomical datasets and other resources should work as a seamless whole.
- The International Virtual Observatory Alliance (IVOA) is an organisation that debates and agrees the **technical standards that are needed to make the VO possible**.

<https://ivoa.net/>



- The goal is to have a unified online data repository with free to access astronomical data.
- There are several Software tools that can be used for this.
- These days most astronomical surveys aim to release their data sets in a VO format, so that it is easy to find and use for astronomers.



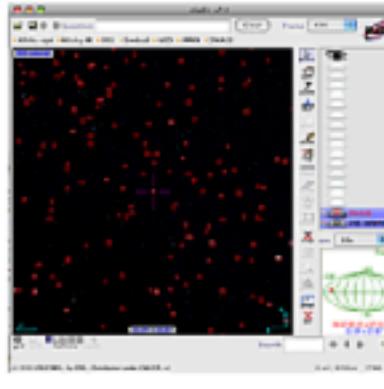
Getting Started

Here are three simple blow-by-blow examples of using VO tools and services : [browsing Images](#), [searching catalogs](#), and [finding available data for an object](#).

Browse all sky Images

Several image analysis tools, such as DSS, Aladin, and Gaia, can browse VO image services, as well as loading local files. As an example, try Aladin.

1. If you don't already have it, [download](#) it and start it up.
2. Type "3c 227" into the box at the top and press return. That text string is sent to the Simbad name resolver which returns the RA/Dec of 3c 227 and you get a DSS image of the region surrounding 3c227. You can zoom in and out, and pan over the whole sky.
3. Next, from the row below, click on "2MASS". This overlays objects from the 2MASS catalog. If you click on one of these, you get information from the 2MASS catalog. Leave this displayed while you try the next example.



Getting a UKIDSS catalogue with Topcat

Topcat is a tool for fetching, manipulating, and plotting tables of data. If you don't have it already, [download](#) it and start it up.

1. Go to the "VO" menu and choose "cone search". Around the world, thousands of different datasets are set up as cone search services, and listed in registries of VO services. Topcat can find the one you want and then search it.
2. In "keywords" type "UKIDSS" and then click "submit query". Topcat returns a longish list of conesearch services with a UKIDSS connection.
3. Scroll down to UKIDSS DR4 and click on that. The window below lists several different tables available within UKIDSS DR4.

