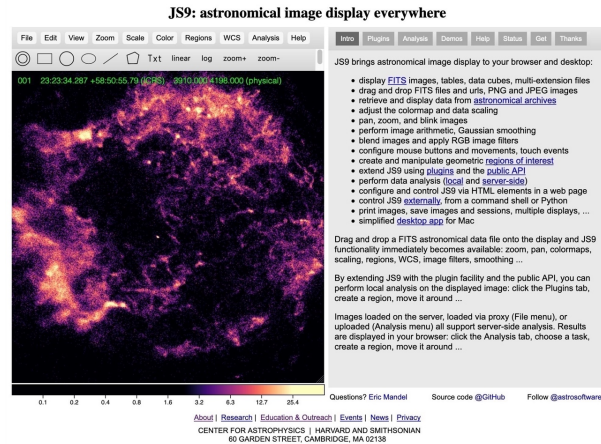# Adopt-A-Supernova with js9
Scientific Research Project

Purpose: To use js9 to view and manipulate astronomical image data of a supernova remnant to highlight its features and determine if it is a type IA or type II SNR and to produce a presentation of the results.

Next Generation Science Standards:

HS-PS4-5 Waves and their Applications in Technologies for Information Transfer
PCommunicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

HS-ESS1-3 Earth's Place in the Universe
Communicate scientific ideas about the way stars, over their life cycle, produce elements.

HS-ETS1-2 Engineering Design
Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Procedure:

1. Choose a supernova remnant to study from Chandra Images by Category: Supernovas & Supernova Remnants or Chandra Catalog of Galactic Supernova Remnants. **NOTE:** Some of these files may not have very many pixels or may be very small. You may need to open several different supernova remnant files in js9 before finding one that you want to study. Please pick a supernova that we have not already examined. Here are some suggestions of ones you might want to try:

   - Kepler's SNR
   - W49B
   - SNR 0103-72.6
   - DEM L71
   - Crab Nebula
   - G11.2-0.3

2. Click on the link to get the ObsID number(s).
3. Go to https://js9.si.edu/ and then **File>Close>This Image**.
4. To load your image, go to **Help>General Help>Accessing Data Archives**. Click "The Unofficial Chandra Archive" and enter your observation ID number under "ObsID" and then "Search."

5. In the results that come up, click on the ObsID of the observation in the bottom left. This is important! Do NOT click on the Title.
6. Right click to copy the *ftp link location* of the *.evt2.fits.gz file. This is the "events" file that contains the actual data. We will now paste that location into JS9, to tell it where to retrieve our observation.
7. In js9, go to **File>open>url via proxy** and paste the link and then click "Load". The image should now be in the js9 viewer.

Prepare a PowerPoint or Google Slide Presentation that documents each of the following:

Note: In js9, go to **File>Save>JPEG** to save your images to use in your presentation. You can also take screenshots.

- In js9, display your supernova with several different color maps (at least 3). Also, make a 3-color composite image (as we did in class) with a key explaining how the colors were assigned. **(15 points)**

- In js9, produce energy spectra for the whole SNR and also various regions. Label each peak on the graph with the corresponding element. **(15 points)**

- In js9, use contrast & bias, event filters based on energy, different color maps etc. to highlight the features of your supernova remnant (for example, inner and outer shockwaves, remaining neutron star at core, element distribution, etc.). Include text with each image explaining what feature(s) it shows. **(15 points)**

- Discuss if your SNR is a type Ia or type 2. Give evidence for your conclusion. **(15 points)**

- What do the scientists say about your SNR? Do some research. Summarize this information. Include a bibliography. Does this agree or disagree with your findings? If it disagrees, what might be the reason? **(20 points)**

- Discuss what a false color image is, talking both about your 3 color composite and the images from js9. Explain the purpose of a false color image and how they are made. Why would astronomers want different false color images for the same data? **(20 points)**