FAULKES TELESCOPE

Galaxies
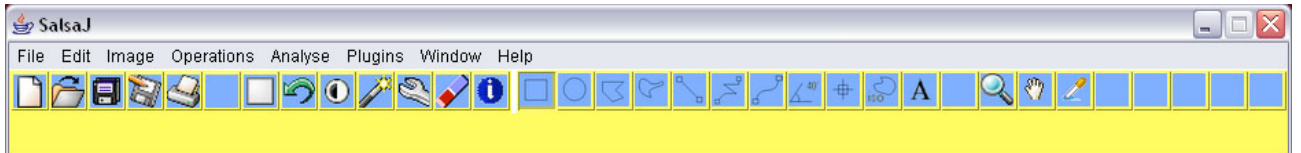
Measuring M87 with SalsaJ

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Galaxies

Measuring M87 with SalsaJ

1. First, launch SalsaJ

When the program opens, you will see two windows appear. The first is the Menu bar which contains many options and shortcuts that you can use.


The second is a Window Command window. You do not have to do anything with this window but **do not close it**. If you do, SalsaJ will close and you will lose all your unsaved work.
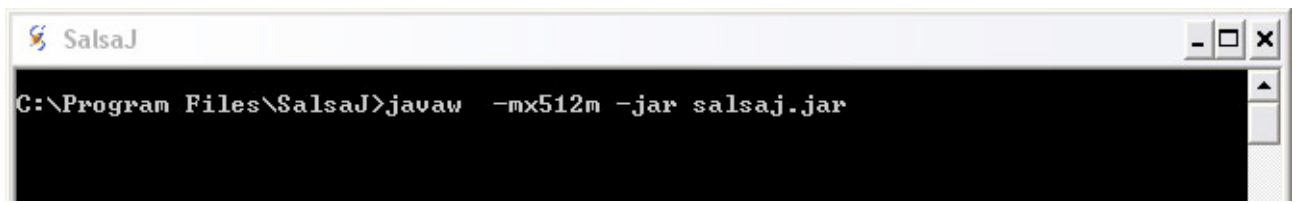
2. Open your image by going to **File > Open** and choosing your image.

**3**. To make the jet clearer, invert your image by going to **Edit > Invert**.

4. Select the line tool (circled below) and draw a line all the way down the edge of the image, ensuring that you cover all 1024 pixels. You can check this by looking at the information on the menu bar as you draw your line.
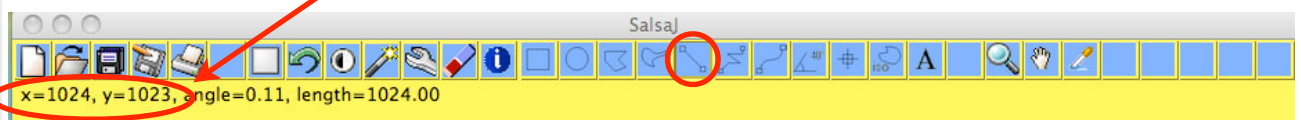
5. Go to **Analyse > Set Scale...**.

A pop-up window will appear. Input the values given below, into the relevant boxes in the window, as shown on the right, and click **OK**.

- Distance in pixels: should automatically be set to 1024.00

- Real Distance: 276

- Width/Height Ratio: 1.0

- Unit of Length: arcsec
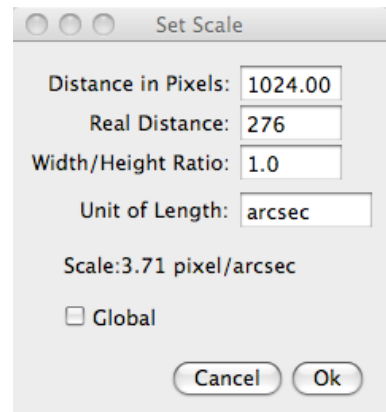
6. Select the Zoom tool and zoom into the region of the image which contains the jet by left clicking on the image.
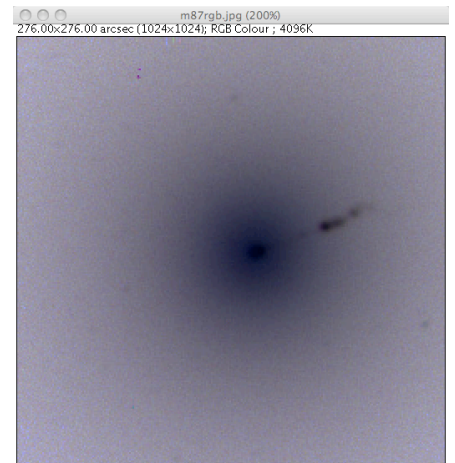
7. Select the line tool once again and draw a line extending from the centre of M87 to the end of the jet.

8. Go to **Analyse > Measure**. A pop-up Results window should appear. If it does not, go to **Window > Results** and it should appear. The value given in the Results window is the length of the jet in arcseconds.

Galaxies
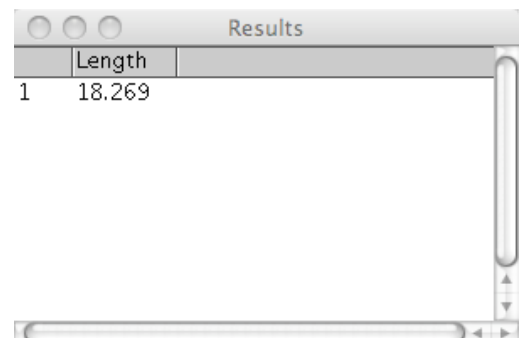
9. Using the small-angle formula given below, and your value for the length of the jet as given in the Results window, calculate how far the jet extends from the centre of M87 in light years (D).

The small-angle formula is given as:

$$D = \frac{xd}{206265}$$

where: D = linear size of object

x = angular size of object in arcseconds (as given in Results window)

d = distance from observer in light years (M87 is 50 million light years away)