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NITARP Workshop: Astronomical Imaging

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Images in talks and posters



- **Many posters and talks will have astronomical images**
- **Some will be in color and some will be in black and white**
- **This is what you should know about those images:**

VG



What is an image?



- There is nothing unique about an astronomical image
- All images on film or on an electronic detector are a recording of different brightnesses of light
- There is/has never been a color photograph. All present color images, whether taken by your digital camera or from Hubble, are a combination of several black and white images.
- So what is a black and white image?

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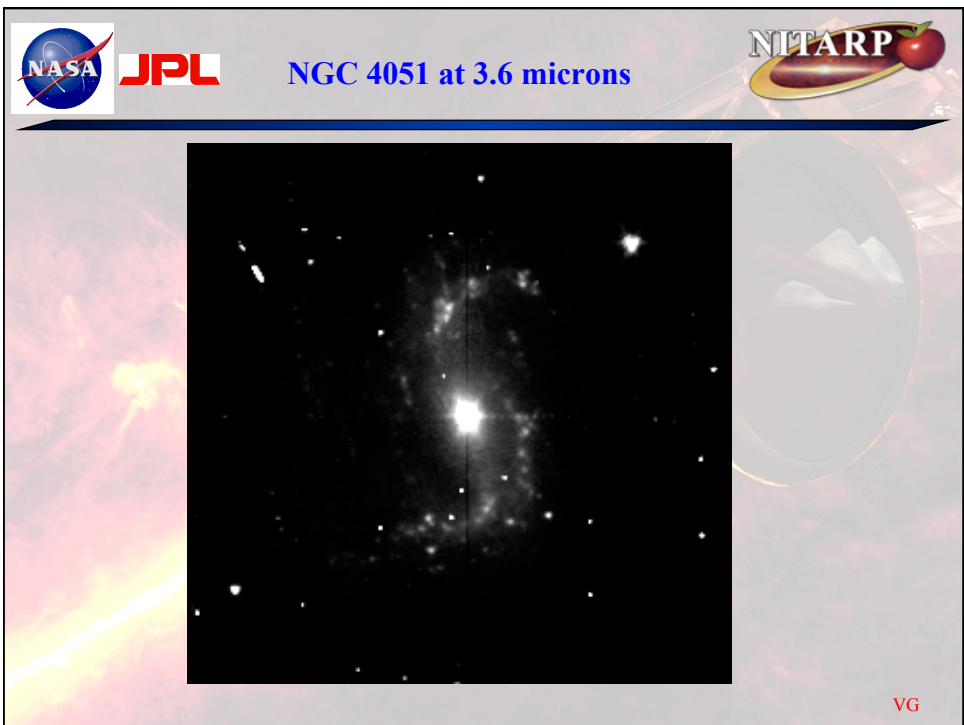
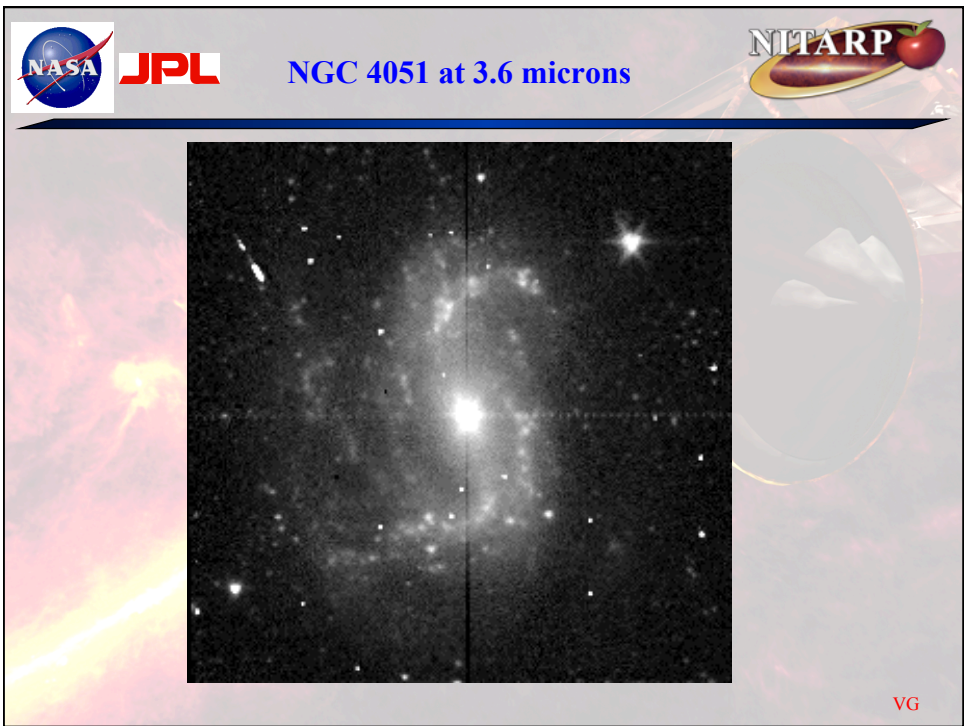


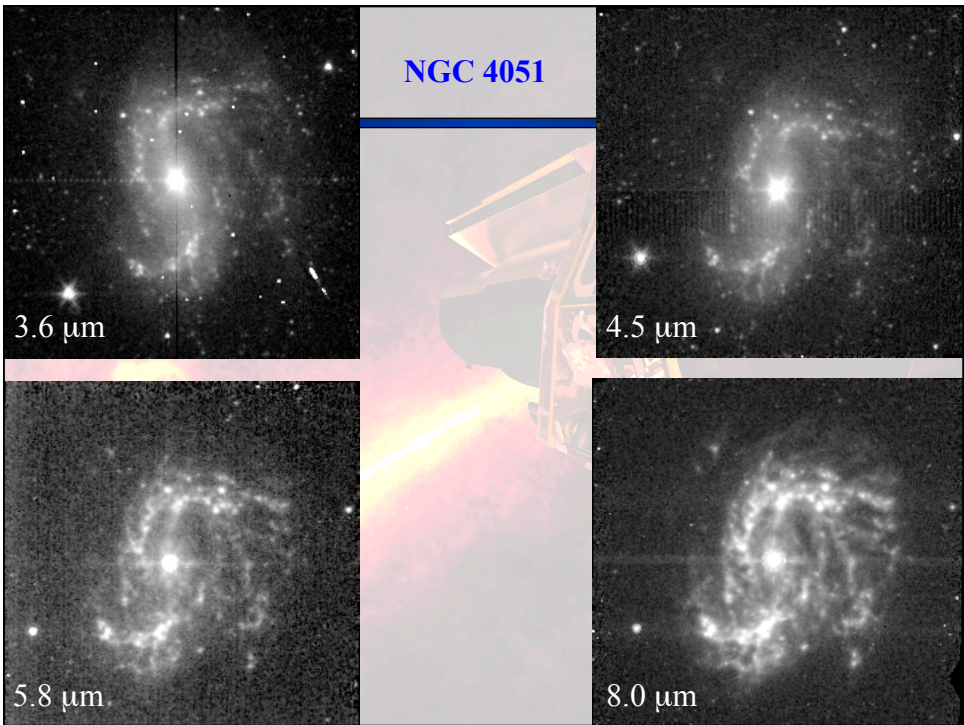
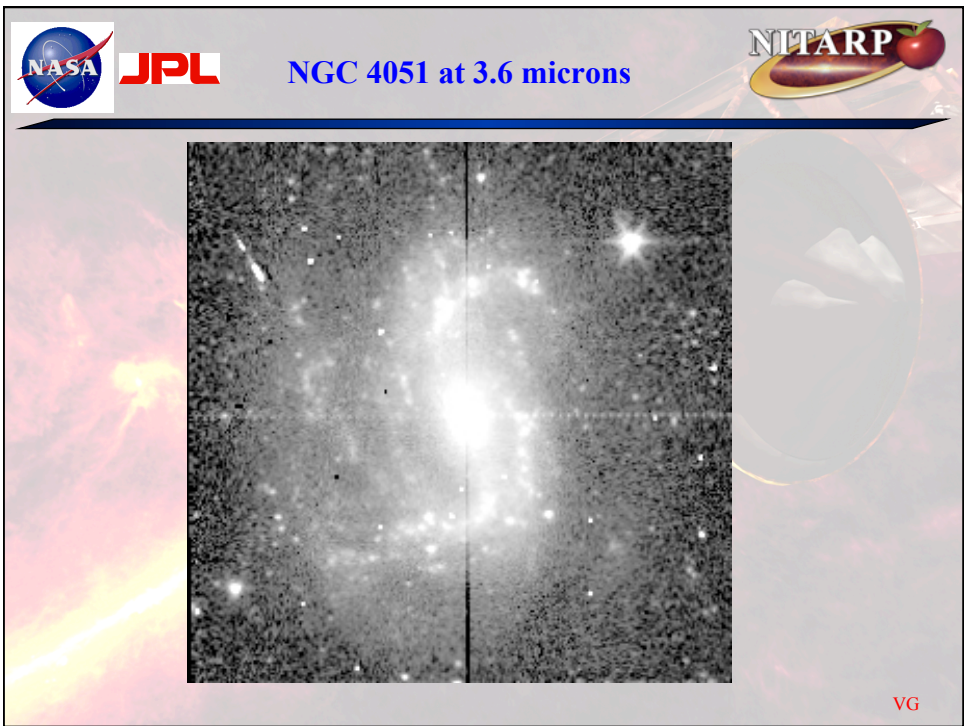
What is a Black and White Image?



1.0	1.3	1.2	1.2	0.9
0.8	4.3	4.0	3.8	0.7
1.1	3.7	6	4.1	1.5
0.9	4.2	4.3	3.9	1.0
1.2	1.4	1.1	0.8	1.3

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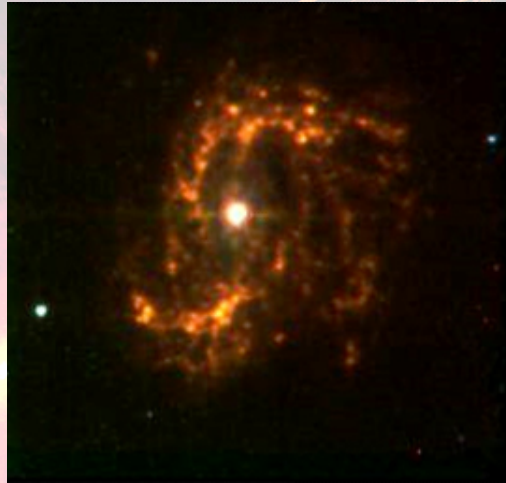


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NGC 4051 in Combined IR Colors



This is often called a “false color” image. But there is nothing false about it. It is simply an image that is representing the IR colors with optical ones. So it is a representative color image.



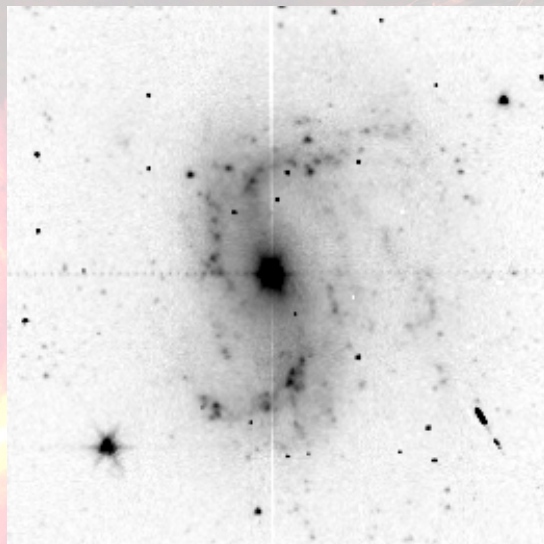
Blue=3.6 μ m
Green=4.5 μ m
Red=8.0 μ m

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NGC 4051 at 3.6 microns



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Photometry



- So how do we get information from these images?
- Since the electronic detectors ultimately record the amount of light as numbers, the process to measure that amount of light is just a matter of adding numbers.

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Photometry



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0.8	4.3	4.0	3.8	0.7
1.1	3.7	6	4.1	1.5
0.9	4.2	4.3	3.9	1.0
1.2	1.4	1.1	0.8	1.3

So what is the brightness of the central pixel in this image?

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Photometry



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0.8	4.3	4.0	3.8	0.7
1.1	3.7	6	4.1	1.5
0.9	4.2	4.3	3.9	1.0
1.2	1.4	1.1	0.8	1.3

Well the amount of light recorded made for 6 units. But is that an actual physical measurement?

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Photometry



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0.8	4.3	4.0	3.8	0.7
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0.9	4.2	4.3	3.9	1.0
1.2	1.4	1.1	0.8	1.3

Well the amount of light recorded made for 6 units. But is that an actual physical measurement? NO!

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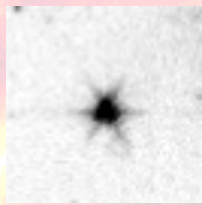


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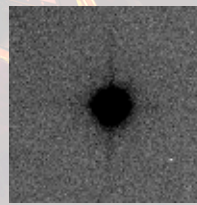
Point Spread Functions



- Any optical system has a finite limit to how small an image it can generate. That is how the optics and the atmosphere spread out the light from a point hence the name Point Spread Function or PSF.



Spitzer PSF



Typical Ground Based PSF

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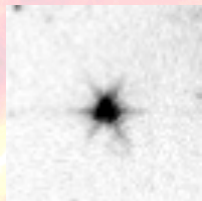


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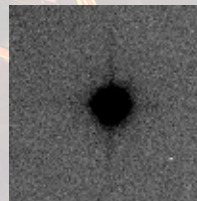
Noise and Background



- Also any image is the sum of the light from what you are imaging combined with noise from your detectors as well as light which is not from your object: sky, telescope, etc.



Spitzer PSF



Typical Ground Based PSF

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An aside on Images in talks and posters



- Many posters and talks will have astronomical images
- Some will be in color and some will be in black and white

- Now you have a sense of what astronomical images are in posters and in talks that you will see during the conference

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End



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