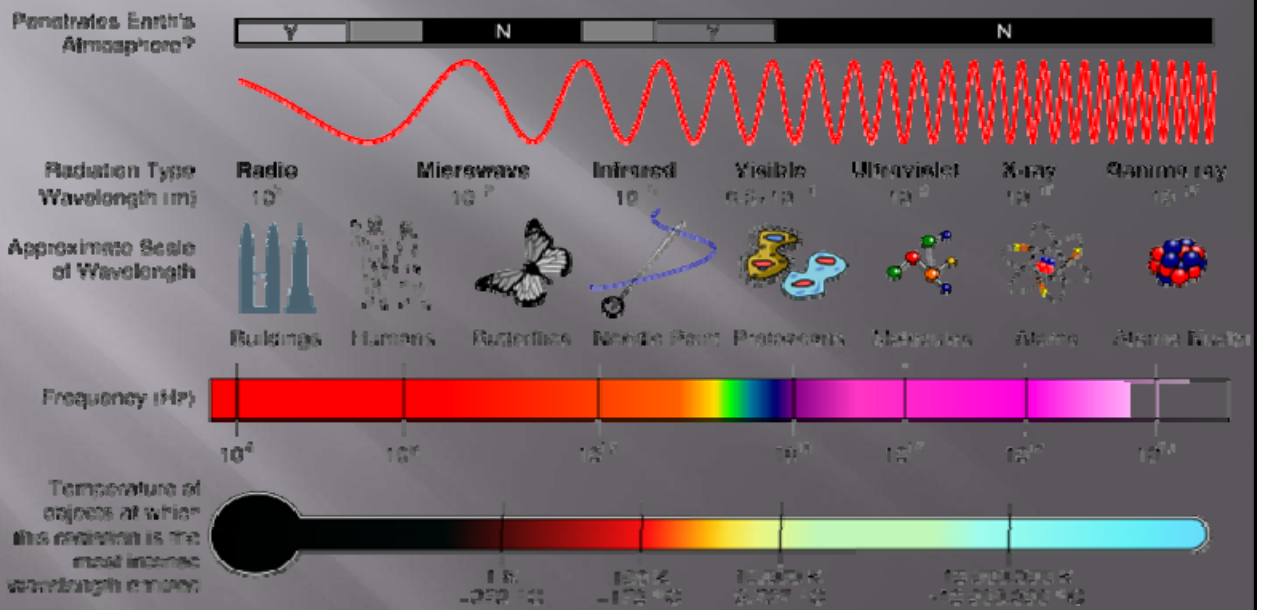


# A NEW VIEW OF THE UNIVERSE

Mike Ford, NASA HEA Ambassador  
Kickapoo Nation School, Powhattan  
Elk Creek Observatory  
Holton, Kansas



# THE ELECTROMAGNETIC SPECTRUM



From Earth, astronomers can use :

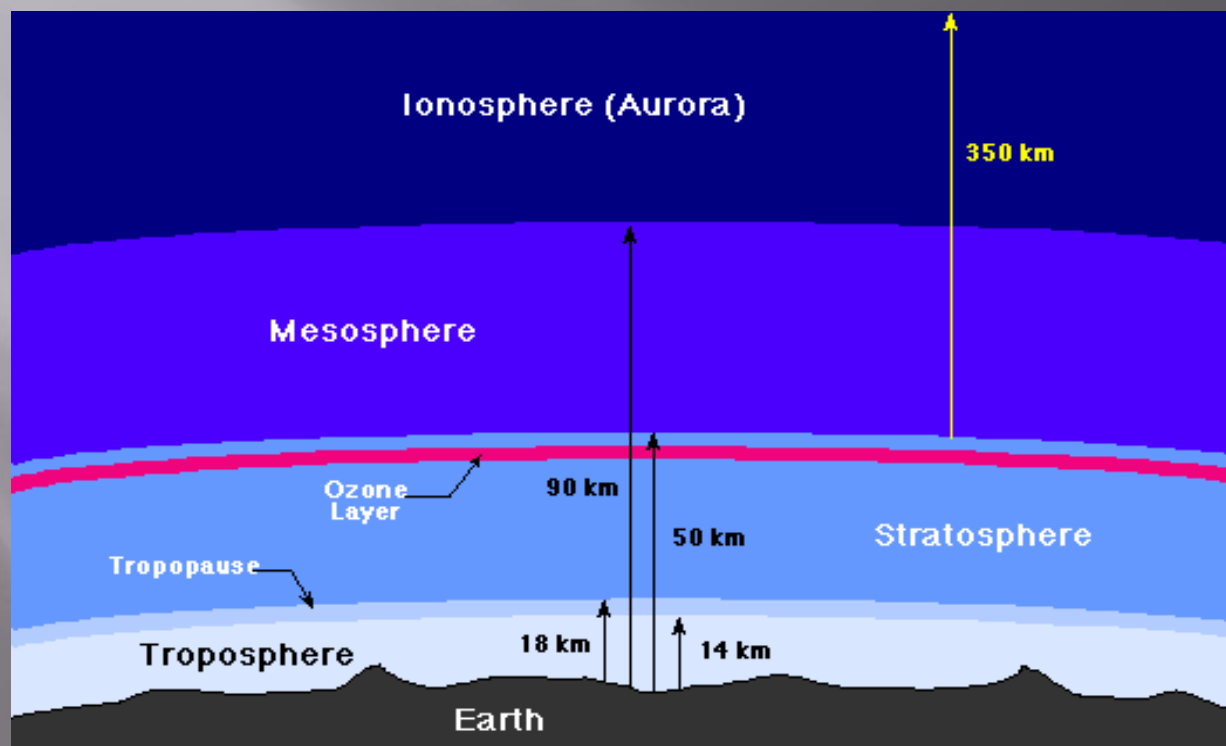


Optical Telescopes

Radio Telescopes



# Earth's Atmosphere



# “Seeing” is best above the Atmosphere!!

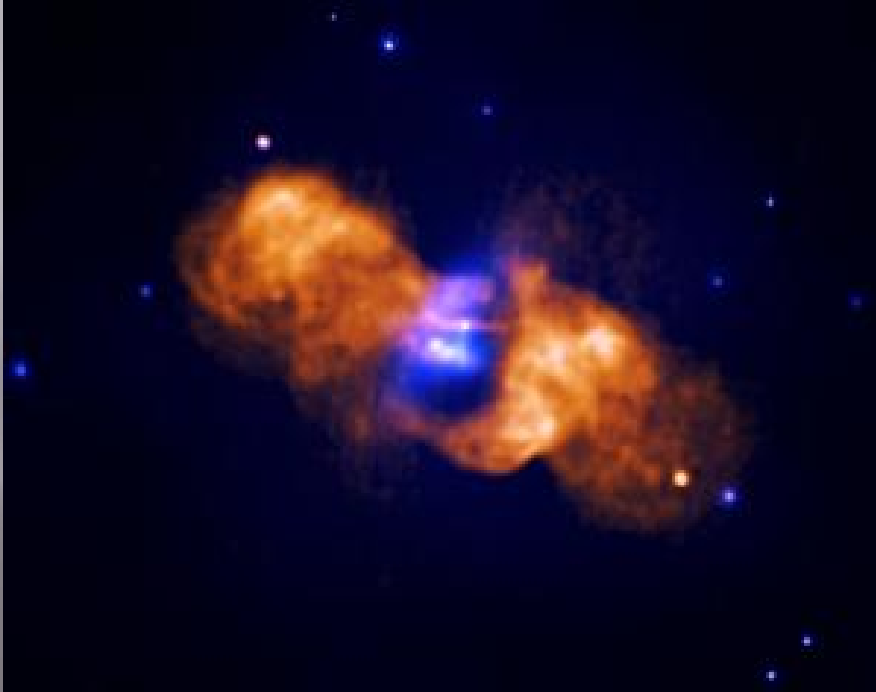
**M101 Galaxy taken from Earth**



**Hubble Space Telescope image of M101**

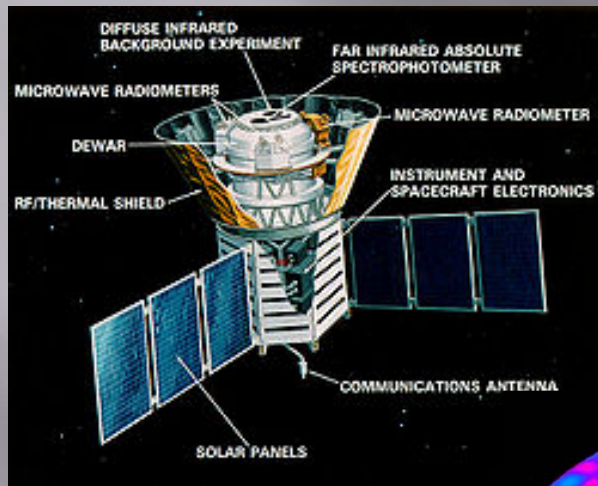


## Radio Astronomy



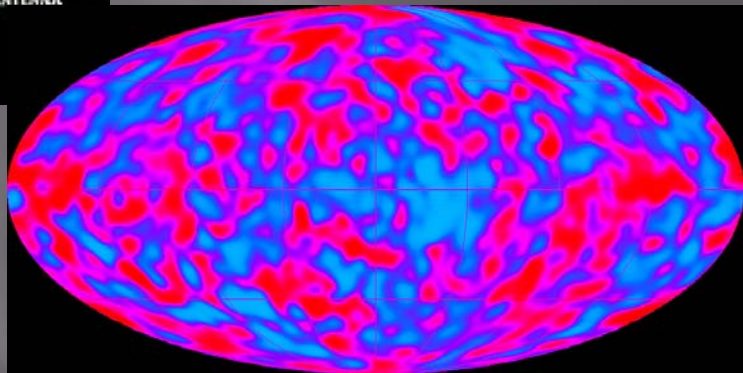
X-Ray and radio observations of quasar 3C442A. This shows the blue hot gas pushing apart the radio-bright gas in orange.

# Microwave Astronomy

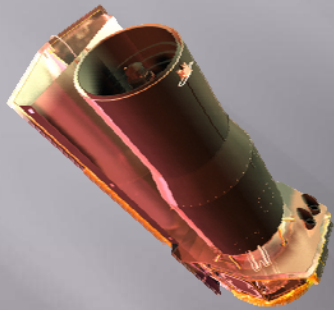


**COBE: Cosmic Background Explorer-  
Launched Nov. 1989**

**Detection of microwave energy from the Big Bang, which occurred about 12-14 billion years ago!**



# Infrared Astronomy



ABOVE: The Spitzer Space Telescope studies IR in deep sky objects.

Galaxy M101 imaged in infrared. This is a face on spiral in Ursa Major, 22-26 million Light Years in distance.





## Visible Light Astronomy



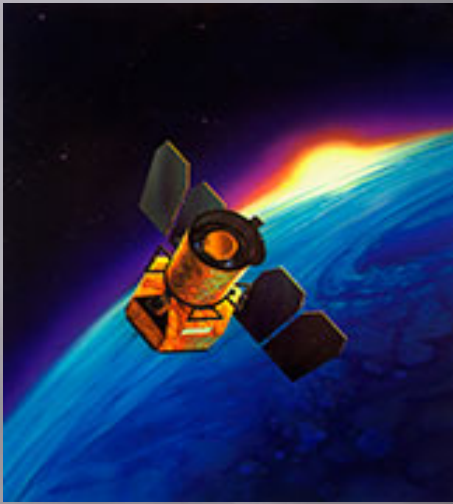
Visible Light Image of a diffuse nebula, M16 taken with a 10" RCOS telescope.

This cloud of gas and dust is where huge stars form in our Milky Way galaxy.

From this nebula, 20 or more stars will be forming in a few million years!

Electronic image of Messier 16, a diffuse nebula, 7000 light years away.

# Ultra-Violet Astronomy



GALEX: The Galaxy  
Evolution Explorer

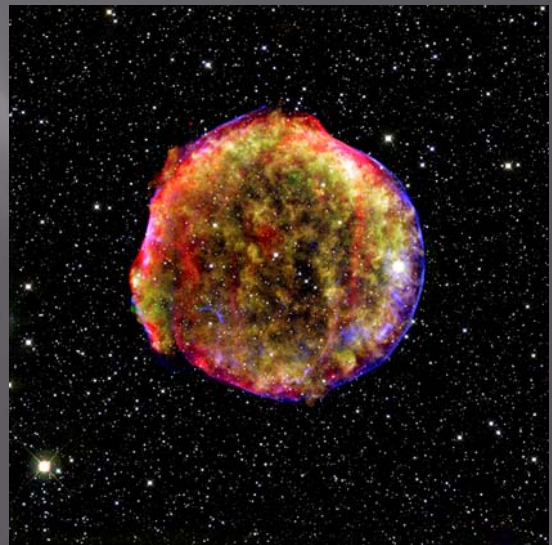
Galaxy M101 imaged in UV.



# X-Ray Astronomy

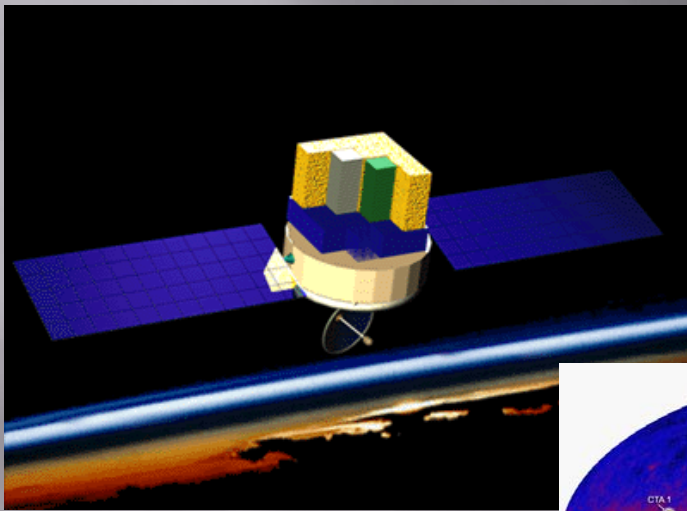


BELOW: An X-Ray image of Tycho's Supernova taken with Chandra.



The Chandra X-Ray Observatory was named after Nobel Prize Recipient Dr. S. Chandrasekhar

# Finally!!! Gamma Ray Astronomy

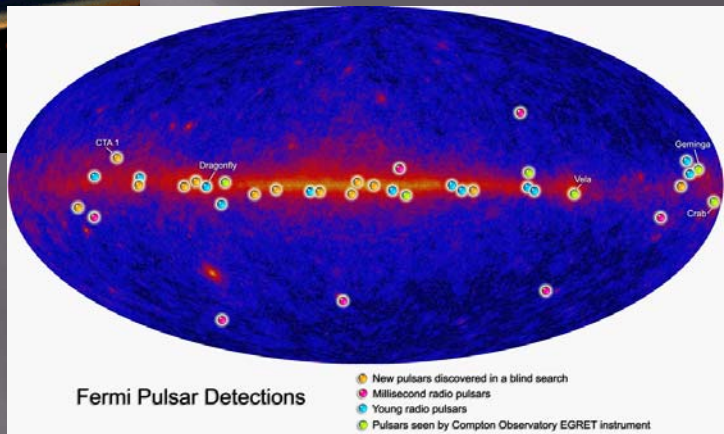


Fermi Gamma Ray Space Telescope, launched in June 08.

BELOW: A view of the Milky Way by Fermi. This is one of the first light images taken by Fermi.



Italian physicist and Nobel Prize Recipient Enrico Fermi.

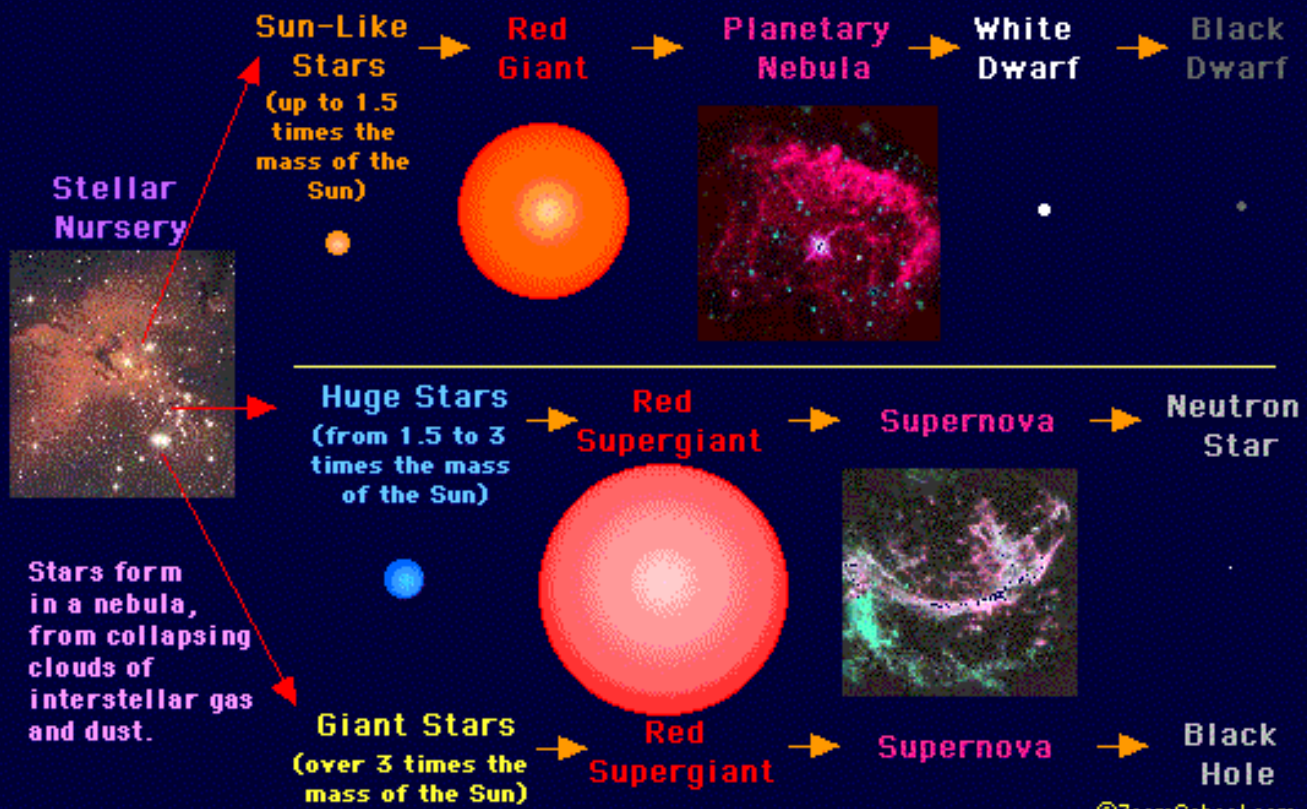


Now, everyone's  
favorite outer space  
thingies:



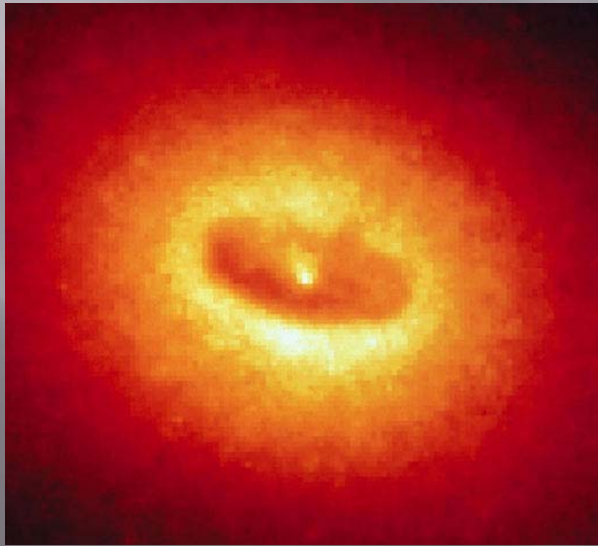
**BLACK HOLES!!!!**  
The Cannibals of the Universe

# The Lifecycle of Stars



## Can we SEE Black Holes???

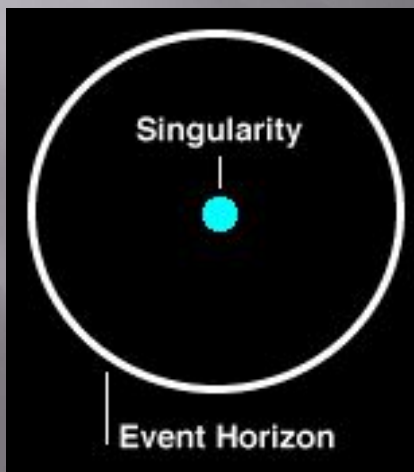
**NO, but we can  
DETECT THEM!!!!**



NGC 4261 – A massive galaxy that has a **SUSPECTED** black hole in its nucleus! The diameter of the dark, oval part of the disk in the middle is approximately 400 light years in diameter!!

Black holes can only form from stars that are at least **FOUR** times the Mass of the **SUN**, but can be **MILLIONS** of times larger than the sun!!

They are caused when the massive star explodes into a supernova and the gravity is so great that the star collapses into nothing and leaves behind, a large area of very intense gravity. This is **SO DENSE** that light cannot escape!



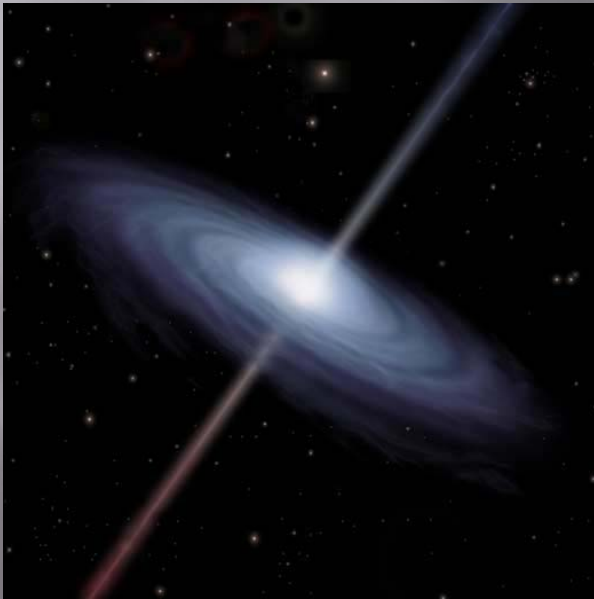
There are two main parts of a black holes:

**Event Horizon:** area of the black hole where gravity is so strong, that light is pulled into it.

**Singularity:** area of the black hole with the most intense gravity and virtually pulls **EVERYTHING** apart!!



**Artists conception of an  
Active Galaxy**



**Galaxy M 87 with jets that  
could be caused by a massive  
black hole**



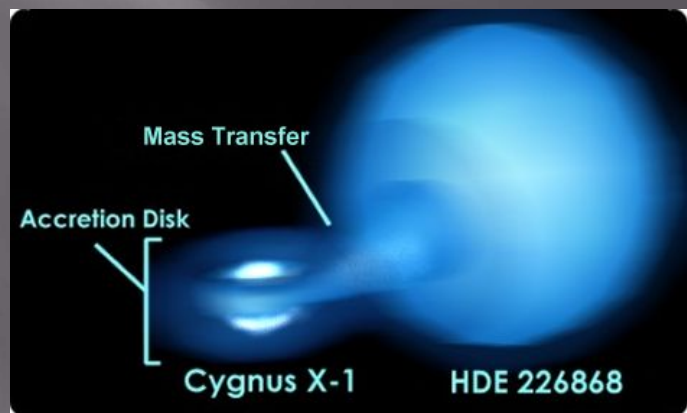
## Frequently Asked Questions About Black Holes

1. Do black holes really suck? YES

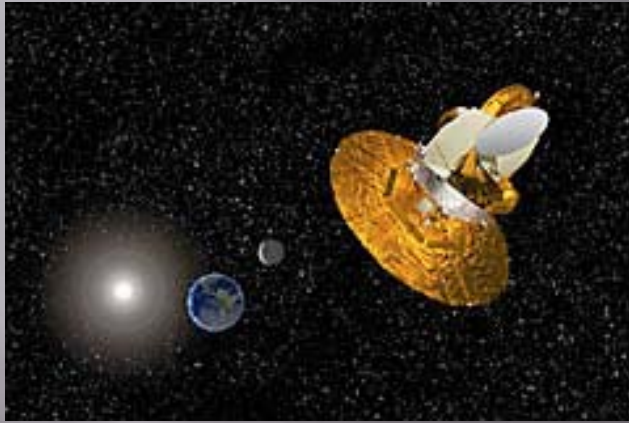
2. Is there ANY chance that a black hole will destroy Earth? NO. First of all, our Sun is too small to be a black hole. It will have a nice, calm death. It is believed that there is a massive black hole in the center of our galaxy, The Milky Way. Even though it could be millions of times more massive than the Sun, it is about 30,000 light years in distance and will not bother us.

3. What was the first black hole ever discovered? It was called Cygnus X-1 discovered in 1972 (SEE BELOW)

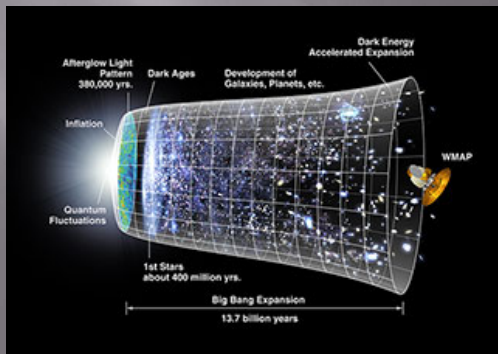
X-Ray Binary Star being slowly destroyed by black hole, Cygnus X-1. This is another method black holes are discovered. When the mass of a star is slowly stripped away from the star, the star will emit X-rays, which can be detected from Earth.



# What Else Is There????



WMAP: Wilkinson Microwave Anisotropy Probe. Refined the model of the expanding universe and big bang.



## For More Info on Astronomy:

- ▣ Contact me: [mford@holtonks.net](mailto:mford@holtonks.net)
- ▣ Google anything in astronomy!!!! There are thousands of links for anything and everything you want to know about.
- ▣ **THANK YOU FOR YOUR ATTENTION!!!!!**



Live Long and Prosper!!!