

Explore the images in the collection

Find an image taken with X-rays. What details do you notice about the image?

Image Title:

Find an image taken with visible light. Does this look like the view of the night sky you see when you go outside at night? Why or why not?

Image Title:

Find an image that is a composite of more than one type of electromagnetic radiation. Why do you think creating this composite would be important for astronomers studying the Universe?

Image Title:

Find an image of an object inside our Solar System. What type of telescope was used to take the image? What details do you see in the picture?

Image Title:

Find an image of an object that is outside our Solar System but inside the Milky Way Galaxy. What type of telescope was used to take the image? What details do you see in the picture?

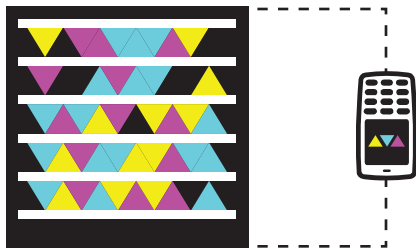
Image Title:

Find an image of an object that is outside of the Milky Way Galaxy. What type of telescope was used to take the image? What details do you see in the picture?

Image Title:

This material is based upon work supported by the National Aeronautics and Space Administration under proposal 08-EPO08-0068 issued through the Science Mission Directorate.

Use your phone to learn more about the pictures in this collection. Get the free application for your phone at: <http://gettag.mobi>



From Earth To The Universe
www.fromearthtotheuniverse.org
 International Year of Astronomy
www.astronomy2009.org
 The Activity Guide was developed by
 the Adler Planetarium and Astronomy
 Museum
www.adlerplanetarium.org

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FROM EARTH TO THE Universe

“From Earth to the Universe” is a collection of astronomical images that showcases some of the most dramatic views of our Universe. The images in this exhibition depict the immense size and scale of the cosmos. The Universe is so vast that the light that astronomers observe may have traveled for millions or even billions of years before reaching their telescopes. The images in “From Earth to the Universe” also represent data collected with the wide range of telescopes, both in space and on the ground, available in astronomy today.

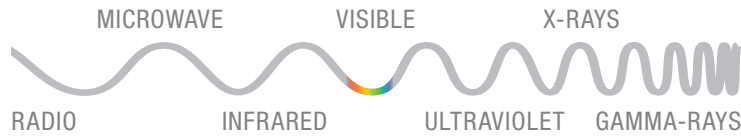
ACTIVITY GUIDE



What is electromagnetic radiation?

It is a form of energy that travels through space as vibrations of electric and magnetic fields; also called light.

What is the electromagnetic spectrum?



The electromagnetic spectrum consists of all the different wavelengths of electromagnetic radiation. From the longest to the shortest wavelengths, this includes radio waves, microwave, infrared waves, visible light, ultraviolet light, X-rays and gamma rays. Different forms of electromagnetic radiation also vary in wave frequency: the number of waves per second. Radiation with higher frequency and shorter wavelength has greater energy.

Why does astronomy use different parts of the electromagnetic spectrum to study the sky?

The telescope that Galileo first used 400 years ago only utilized visual light to study the sky. Over time, the technology that astronomers use has become much more advanced; in the early 20th century and with the advent of the Space Age, they began to use many different types of electromagnetic radiation to observe the Universe, most of which are invisible to the human eye. Using these different types of light to examine the cosmos allows astronomers to achieve a more complete understanding of the Universe.

Why do we send telescopes into space?

Only a few types of electromagnetic radiation can reach the surface of the Earth. The atmosphere of the Earth filters out or distorts many forms of light. To study the Universe using these types of electromagnetic radiation astronomers need to get above the Earth's atmosphere. In these cases they use a variety of tools to help them collect data, such as high-altitude balloons, airplanes or satellites.

SPIRAL GALAXY M101

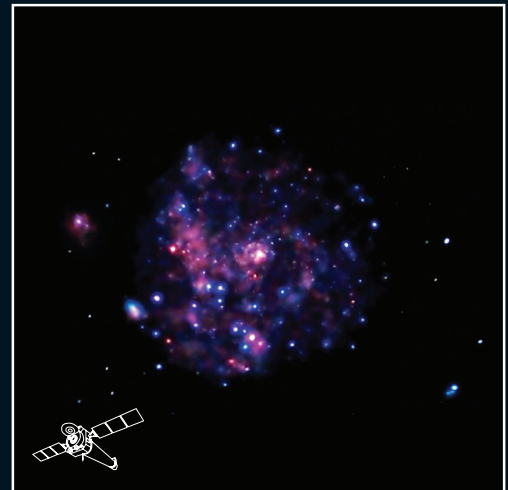
NASA • ESA • CXO • SSC • STScI



SPITZER: INFRARED



HUBBLE: VISIBLE



CHANDRA: X-RAY

Spiral Galaxy Messier 101 is shown in all three pictures above. Using infrared waves, visible light and X-rays, astronomers were able to better understand this galaxy.

Examine the three different pictures

How are all three pictures the same?

Point out something you see in one picture that does not appear in the other two pictures.

How are all three pictures different?

Why do you think it would be important to use three types of telescopes to study the same galaxy?

