

Name: _____

Date: _____

Class Period _____

Cool Cosmos: Infrared Astronomy Tutorial

Purpose

This lesson will introduce you to infrared light – from its history to how it is used to help us discover more about our universe.

Procedure

1. Go to the Cool Cosmos website: <http://coolcosmos.ipac.caltech.edu//>
2. You will see a window like this:
3. Use the scroll buttons on the site navigation tool to go to the Cosmic Classroom menu. (This is what you see selected in the image to the right!)
4. Click on Infrared Astronomy Tutorial. You will get a new window with a menu of options like that shown in the image below. Start with the Discovery of Infrared lesson and work through each of the following lessons. Be sure to answer the questions on the worksheet that follows this introduction!



Questions begin on the next page!

Lesson One: Discovery of Infrared

1. When did Herschel discover Uranus?
2. How did Herschel discover infrared light?
3. What did Herschel call infrared light at first?

What is Infrared?

1. What types of light make up the electromagnetic spectrum?
2. What is the only difference between these types of light?
3. What are the three categories of infrared light?
4. What wavelength in the infrared do humans radiate?
5. Name an animal that can “see” in the infrared.

Infrared Astronomy Overview

1. Define infrared astronomy.
2. What is the range of sensitivity of infrared detectors?
3. When were infrared telescopes first launched into orbit?
4. What was the name of one of the first of these IR telescopes?
5. How many new astronomical IR sources did it find – increasing the number of catalogued objects by 70%?
6. Why are many objects in space hidden from view in optical telescopes?
7. What types of “cool” objects are only visible to IR telescopes?
8. Why will the study of our universe’s origins benefit from IR astronomy?

Atmospheric Windows

1. What types of light does our atmosphere block out?
2. What types of light does our atmosphere allow through?
3. What absorbs most of the IR coming into Earth's atmosphere?
4. What other problem does Earth's atmosphere challenge IR astronomers with?
5. What bands in the IR spectrum is the sky the most transparent to?
6. Is the sky also dim in these same bands?
7. Would these bands be useful for ground based IR astronomy?
8. How have astronomers gotten their instruments above Earth's atmosphere to study the universe in IR?

Near-Mid and Far Infrared

1. What determines the borders of the 3 IR bands?
2. What does the wavelength that an object emits depend on?
3. Summarize the temperature range and what we can see for each of the IR bands.

The Infrared Universe

Our Solar System

1. What bands of the IR spectrum do the planets emit in?
2. What can IR light tell us about the atmospheres of planets?
3. What is the likely source of Jupiter's internal heat?
4. What are zodiacal light bands?