

Resources for Spectroscopy and Electromagnetism

Activities

Active Astronomy: Classroom Activities for Learning About Infrared Light

A set of four activities that focus on improving student understanding of infrared light. These hands-on and demonstration activities are designed to complement instruction on the electromagnetic spectrum for middle and high school students; they are not a complete curriculum. Each activity has been designed to take 1-2 class periods.

<http://www.sofia.usra.edu/Edu/materials/activeAstronomy/activeAstronomy.html>

Seeing the Moon: Using Light to Investigate the Moon

Through the hands-on inquiry based activities, 5th to 8th grade students experiment with light and color, collect and analyze authentic data from rock samples using a reflectance spectrometer, map the rock types of the Moon, and develop theories of the Moon's history.

<http://m3.cofc.edu/educators.html>

Optics: Light, Color, and Their Uses

The guide contains color and light activities using lenses, prisms and mirrors to create telescopes, periscopes, microscopes and kaleidoscopes. Other activities include finding focal length and understanding reflection, refraction and diffraction. Activities are marked by grade level.

http://www.nasa.gov/pdf/58258main_Optics.Guide.pdf

Materials and Online Resources

ALTA Reflectance Spectrometer

The ALTA is a rugged, simple classroom instrument, designed to help students learn about light, color, and spectroscopy. Using the spectrometer, students can easily and rapidly collect data on the proportions of colored light (including infrared) that reflect from real-world objects.

<http://www.lpi.usra.edu/education/products/spectrometer/>

CRISM (Compact Reconnaissance Imaging Spectrometer for Mars)

Information, activities, games, videos, and more related to spectroscopy and Mars.

<http://crism.jhuapl.edu/education/index.php>

In particular, check out the **Online Spectral Lab**

<http://crism.jhuapl.edu/education/reflectSpectLab.php>

Project Spectra! @LASP

Project SPECTRA! is a science and engineering program for 6th - 12th grade students, focusing on how light is used to explore the Solar System.

<http://lasp.colorado.edu/education/spectra/index.htm>

Song about the Electromagnetic Spectrum:

<http://www.youtube.com/watch?v=bjOgNVH3D4Y>

Science@ESA: The Full Spectrum

In this vodcast, viewers learn more about light and the spectrum, and why we send telescopes into space and what these "eyes in the skies" can tell us about the Universe.

<http://astronomy2009.esa.int/science-e/www/object/index.cfm?fobjectid=44685&fattributeid=885>

WGBH Video: Infrared Search for Origins

Video of young female astronomer detailing how infrared technology is used to do research in space

<http://www.teachersdomain.org/resource/ess05.sci.ess.eiu.irorigins/>

WGBH Video: Infrared: More Than Your Eyes Can See

Short video Introduction to infrared by young female astronomer.

<http://www.teachersdomain.org/resource/ess05.sci.ess.earthsys.infrared/>

Faces of Science: The Invasion of Invisible Waves

This interactive allows students to drag and drop electromagnetism vocabulary terms.

http://www.catie.org.uk/facesofscience/invisible_waves/default.htm

Space Place: Cosmic Colors

This site cosmic colors allows you to see different space objects in different wavelengths of the electromagnetic spectrum.

<http://spaceplace.nasa.gov/cosmic-colors/#>

Astronomy Simulations and Animations

A compilation of various online programs on astronomical topics. This site includes links to blackbody curves, filters simulator, spectrum demonstrator, and more.

<http://astro.unl.edu/animationsLinks.html>

Opportunities

MESDT (Mars Exploration Student Data Teams)

Under mentor guidance, MESDT students have the opportunity to join the science team in the analysis of data from the CRISM instrument. They examine data sets, sometimes never before seen, searching for clues in the mineral fingerprints to the mysteries of the Red Planet's ancient and possibly watery environment.

Application: <http://marsed.mars.asu.edu/mesdt-application>

Other Information

Various NASA missions and telescopes use different parts of the electromagnetic spectrum:

- NASA's Mission page: <http://www.nasa.gov/missions/current/index.html>
- Gamma ray space telescope FERMI: <http://fermi.gsfc.nasa.gov/>
- Chandra X-Ray observatory: http://www.nasa.gov/mission_pages/chandra/main/index.html
- Stratospheric Observatory for Infrared Astronomy SOFIA: <http://www.sofia.usra.edu/Edu/edu.html>

USGS Spectroscopy Lab

The information is written at a level appropriate for undergraduates and high school students; the USGS is using imaging spectroscopy to map mineralogy, vegetation, soils, and more. Maps, data, and background information and articles are available.

<http://speclab.cr.usgs.gov/national.parks/national.parks.html>

Imagine the Universe: The Electromagnetic Spectrum

Higher-level information (high school and above) on electromagnetism and some of the orbiting observatories.

http://imagine.gsfc.nasa.gov/docs/science/know_l2/emspectrum.html

PBS: Astronomical Images in Different Wavelengths

Images of some astronomical objects in different wavelengths, and information (suitable for upper middle school and above) on different telescopes that detect different parts of the electromagnetic spectrum.

http://www.teachersdomain.org/asset/phy03_int_chandra/