

The Radio Astronomy Project at LTO

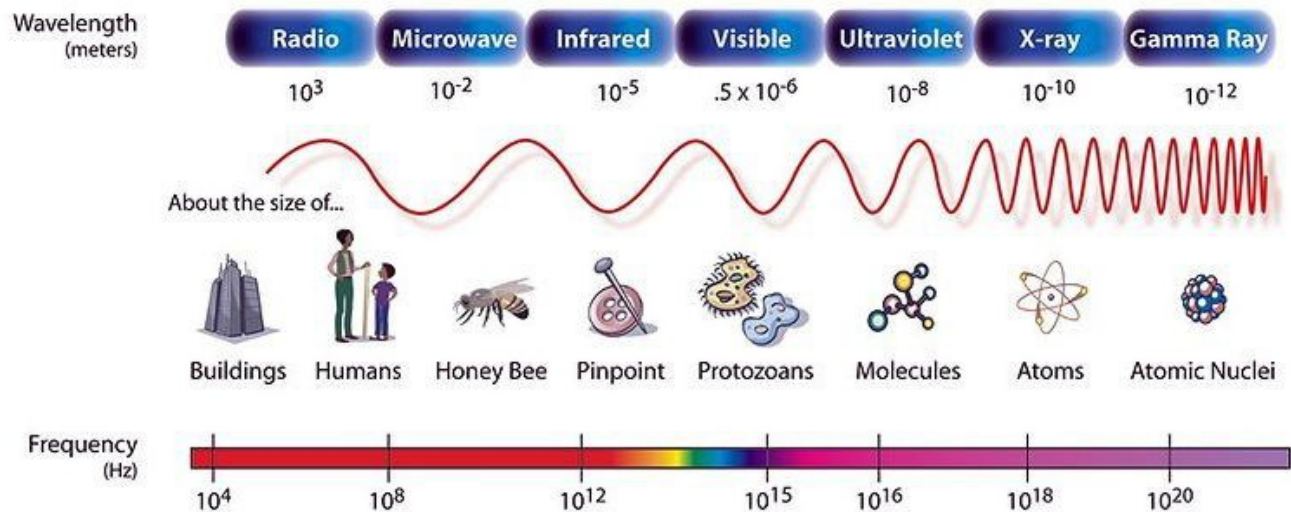
WHAT IS RADIO ASTRONOMY?

Our eyes detect only a very small region of light within the electromagnetic spectrum of radiant energy. When we feel the warmth of sunshine we are sensing infrared wavelength energy, while our suntans are indicators of exposure to ultraviolet wavelengths, both of which are invisible electromagnetic waves. Other radiant energy comes from the sky that we neither see nor feel. Some of this energy is in the form of X-Rays and Gamma Rays that have wavelengths shorter than visible light; other energy comes as microwave and radio with wavelengths longer than visible light. Along with visible light, these are all forms of electromagnetic radiation.

Equipment that is specifically designed to receive and analyze radio waves coming from space is termed a Radio Telescope, and the science of using radio waves to study the universe is called Radio Astronomy.

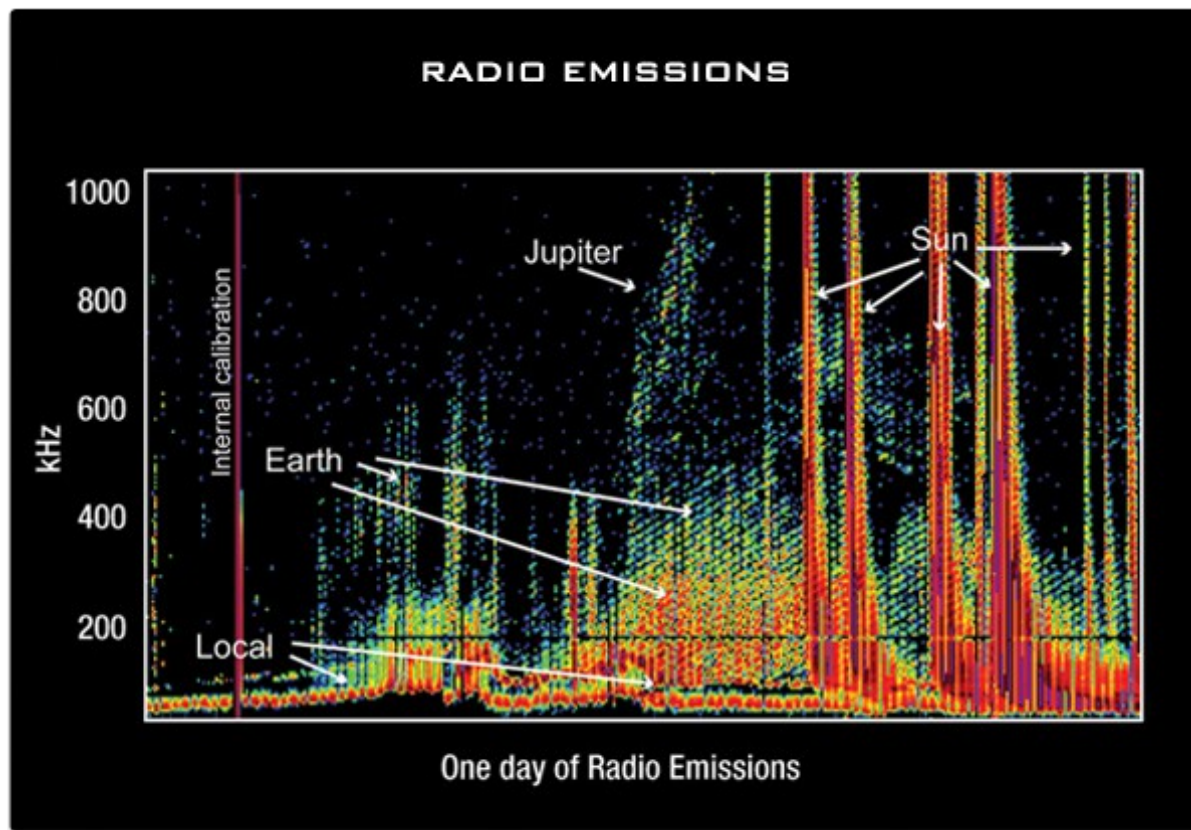
Radio astronomy is a relatively new field of science, emerging out of investigations into causes of radio interference in the early 1930's and growing into its own specialization in the 1950's. Today, original research and discovery are within the reach of even moderate radio telescopes.

THE ELECTROMAGNETIC SPECTRUM

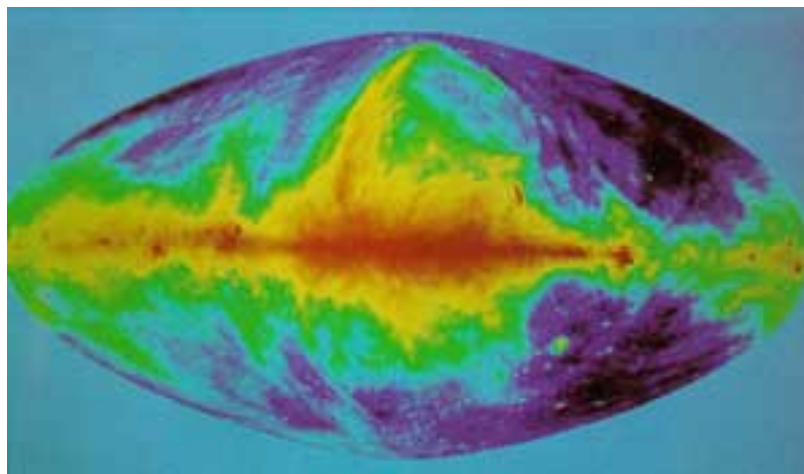


WHAT A RADIO TELESCOPE “SEES”

The Solar System



The Milky Way in Radio Wavelengths



WHAT IS THE LTO RADIO ASTRONOMY PROJECT?

LTO is installing radio and data processing equipment to give students and amateur researchers the opportunity of conducting sky surveys and highly sophisticated personal experiments. Over the next year, we will also link our equipment with other radio telescopes to provide expanded research capabilities. Current projects include:

Meteor studies. By analyzing radio signals reflected by ionized trails left by meteors in the upper atmosphere, researchers can study the frequency, relative size and velocity of objects entering earth's atmosphere. Meteors occur around the clock, so research is not limited to nighttime viewing. LTO meteor ionization detection equipment receives radio waves having a wavelength of about five meters.

Jovian studies. Jupiter and its moons function much like a huge electric generator, emitting a very complex set of radio waves that can be received and analyzed using LTO equipment operating on a wavelength of about fifteen meters.

Solar studies. The sun not only generates radio waves which LTO equipment can directly receive and analyze, but emissions from the sun significantly affect the earth's ionosphere, which LTO equipment can track on a range of frequencies with wavelengths of 10 meters to 10,000 meters.

Deep space studies. The center of the Milky Way Galaxy is a powerful source of radio emissions, with nearly endless opportunities for research and discovery. In addition, many thousands of objects such as Pulsars, Quasars, radio nebula and sources yet to be categorized emit radio energy with wavelengths in the ten centimeter to one meter range. This frequency range is also useful for reception of emissions from elemental hydrogen and oxygen, which allows LTO users to study many aspects of deep space. LTO is installing a 1.5 meter parabolic dish antenna for reception and will soon be linking our receiver with one at the Memorial Observatory in Estes Park, Colorado in an interferometer configuration.

EDUCATIONAL OBJECTIVES

- 1) Demonstrate to students and the community that serious science can also be a lot of fun
- 2) Educate students in the basics of radio astronomy and instill a desire for further knowledge
- 3) Provide students and amateur researchers with a highly capable radio telescope for both guided and independent research
- 4) Inform visitors and the public concerning the basic principles and scientific value of radio astronomy
- 5) Promote advanced learning and research opportunities by collaborating with other institutions to share resources and develop new capabilities

LTO RADIO TELESCOPE ANTENNAS

Dipole for meteor ionization studies



Dish for deep space mapping



Yagi for Solar and Jovian analysis



HOW CAN YOU HELP?

Share Your Expertise

LTO depends entirely on volunteers for everything we do. Whether you live locally or far away, we would appreciate your help with this project.

Donate Equipment

Please let us know if you have radio or electronic equipment, telescopes, antennas, test equipment or computers that would be useful for any of our projects. Equipment that is excess to our local needs will be shared with other science outreach activities in our network or exchanged for upgraded equipment.

Contribute Money, Securities, Other Valuables or Establish an Endowment

No gift or grant is too small to be of help, nor too large for our mission.