Mass Spectroscopy

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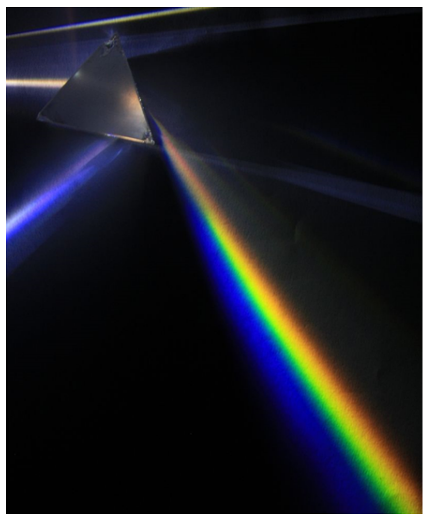
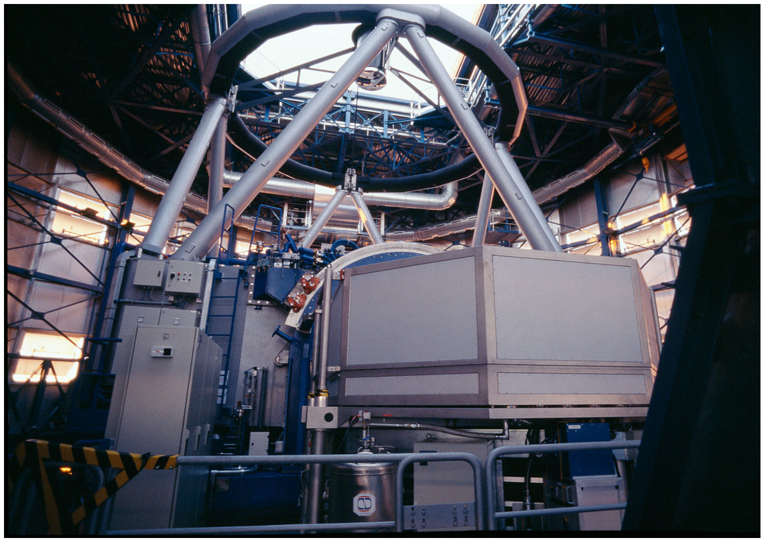


Spectroscopy and spectrography are terms used to describe the measure of radiation intensity a function of wavelength and are sometimes used to describe spectroscopic methods. Spectroscopic studies were designed so that the radiant energy interacts with matter.

Daily observations of color can be related to spectroscopy. Neon lighting can be seen as a direct application of atomic spectroscopy. Neon and other noble gases have colors. Neon lamps use collision of electrons with the gas to increase emissions. Gaseous nitrogen dioxide has a feature, which gives air polluted with nitrogen dioxide reddish brown color. Spectroscopic scattering phenomenon accounts for the color of the sky.

Spectroscopic studies are central to the development of quantum mechanics and explanation of blackbody radiation. Spectroscopy is used in physical and analytical chemistry, because atoms and molecules have unique spectra. These spectra can be used to detect, identify and quantify information about the atoms and molecules. Spectroscopy can be used in astronomy. Most telescopes have spectrographs. Spectra are used to determine the temperature and velocity, for example.



Resonance corresponds to resonant frequency. Resonances were first characterized in mechanical systems. Mechanical systems that vibrate or oscillate will experience large amplitude oscillations when they are driven at a resonant frequency. A plot of amplitude vs. excitation frequency will have a peak centered at the resonance frequency. This plot is one type of spectrum, with the peak, referred to as spectral line.

The analogous resonance is a coupling of two quantum mechanical stationary states of one system, as an atom, for example, via an oscillatory source of energy. The coupling is strongest when the energy of a source matches the energy difference of the two states. The energy of a photon is related to its frequency, where h is Planck's constant, so a spectrum of the system response to photon frequency will peak at resonant frequency. Particles such as electrons and neutrons have a comparable relationship. Also, wavelength and frequency can excite resonant interactions.

Spectra of atoms and molecules often consist of a series of spectral lines. Enigmas drive the development and acceptance of quantum mechanics. The Rutherford-Bohr quantum model of the hydrogen atom first successfully explained the hydrogen spectral series. Spectral lines can be well separated and distinguised, but spectral lines can also overlap and be a single transition. Named series of lines include the principal, sharp, diffuse and fundamental series.