

2.6: The Universe

Atomic absorption spectra

- used to identify gases from a given absorption spectrum and additional data
- Absorption lines arise from gas atoms in a star's atmosphere absorbing wavelengths of visible light that are specific to the elements present in a star
- used by scientists in the nineteenth century to reveal the chemical composition of stars

Cosmological red shift

- revealed initially by Edwin Hubble's measurements on the spectra of distant galaxies
- revealed that the wavelengths of the absorption lines are increased and that this effect increases with distance
- attributed to the increasing space between the distant source and observers on Earth (as opposed to Doppler red shift)
- The recession velocity increases with the distance of the galaxy and it is this that implies that all galaxies originated from a single point.
- Light from further galaxies shows the most red shift due to it having travelled for a greater amount of time through an expanding universe, therefore increasing the wavelength.
- supports the Big Bang model of the origin of the Universe, as if expansion of the Universe is reversed, then everything would revert to one single point.

CMBR (Cosmic Microwave Background Radiation)

- supports the hot Big Bang model of the origin of the Universe
- The wavelength of the early radiation in the form of short wavelength radiation (gamma rays) has become longer wavelength (microwave) radiation that presently pervades the Universe. This increase in wavelength is believed to be due to the expansion of space.