



# What is a quasar?

A very distant energy source which gives off vast amounts of electromagnetic radiation, including radio waves and X-rays

# The Discovery of Quasars....

- The discovery of quasars was really spread over time.
- In the late 1950s, several radio sources were matched with very dim optical objects that looked like fuzzy, blue stars, but had strange spectra with a lot of ultraviolet excess.
- One of them, 3C273 had its position very accurately measured by C. Hazard and co-workers, using lunar occultations.
- In 1962, M. Schmidt obtained a spectrum of this “object”, which showed a large redshift of 0.158, indicative of being very far away according to Hubble’s Law.

# Discovery Continued...

- This is when the term QSO was coined, because this was a very distant object that was masquerading as a star, a quasi-stellar object.
- They were first measured to be very small in angular size, but have immense power output.
- It is now known that they are actually very luminous galactic nuclei.
- Quasars are so bright that they can be seen from a great distance, but the rest of the galaxy is too faint to be easily detected.

# Properties of Quasars

Galactic nuclei have different degrees of activity in the sense they emit variable and intense radiation.

- Quasars are the brightest type of active galactic nucleus.
- The viewpoint now is that a supermassive black hole is consuming stars and gas and dust clouds in their near vicinity and creating an accretion disk of matter which is compressed and accelerated to near luminous speeds (the speed of light) as it spirals into the black hole.
- Frictional heating and compression of the gases in the disk would lead to the production of visible light and other types of radiation.
- In addition to radio waves and visible light, quasars emit ultraviolet rays, infrared waves, x-rays, and gamma-rays.

# Just how large and bright are these quasars?

- Quasars give off more energy than 100 normal galaxies combined.
- Quasars give off such enormous amounts of energy that they can be a trillion times brighter than the Sun.
- Quasars are so bright that they drown out the light from all the other stars in the same galaxy.
- Most quasars are larger than our solar system.
- A quasar is approximately 1 kiloparsec in diameter (1 kiloparsec = 1000 parsecs; a parsec equals 3.26 light years).

# Everything you wanted to know about quasars...

- The word “quasar” is derived from the term “quasi-stellar radio source,” which means star-like emitters of radio waves.
- This name was given because this type of object was first identified as a source of radio waves.
- The name is retained today, even though astronomers now know most quasars are faint radio emitters.
- Quasars also are called quasi-stellar objects (QSOs).
- Due to their great distance from Earth, no quasars can be seen with an unaided eye.
- Energy from quasars takes billions of years to reach the Earth’s atmosphere.
- Therefore, the study of quasars can provide astronomers with information about the early stages of the Universe.

# Types of Quasars



These images were taken with the Hubble telescope

- Quasars can be found in...
- Left- Normal Galaxies
- Center- Colliding Galaxies
- Right- Peculiar Galaxies



# What are the differences between normal, colliding and peculiar galaxies?

- **Normal Galaxy**- the quasar's energy is derived from a massive black hole at the nucleus of a galaxy that feeds on gas and stars.
- **Colliding Galaxy**- eventually, the black hole will stop emitting radiation once it consumes all nearby matter. It then needs debris from a collision of galaxies or another process to provide more fuel
- **Peculiar Galaxies**- sometimes contain irregular shaped spiral arms, suggesting that the host galaxy has interacted with a passing galaxy

The End