



BGS
ASTRONOMY

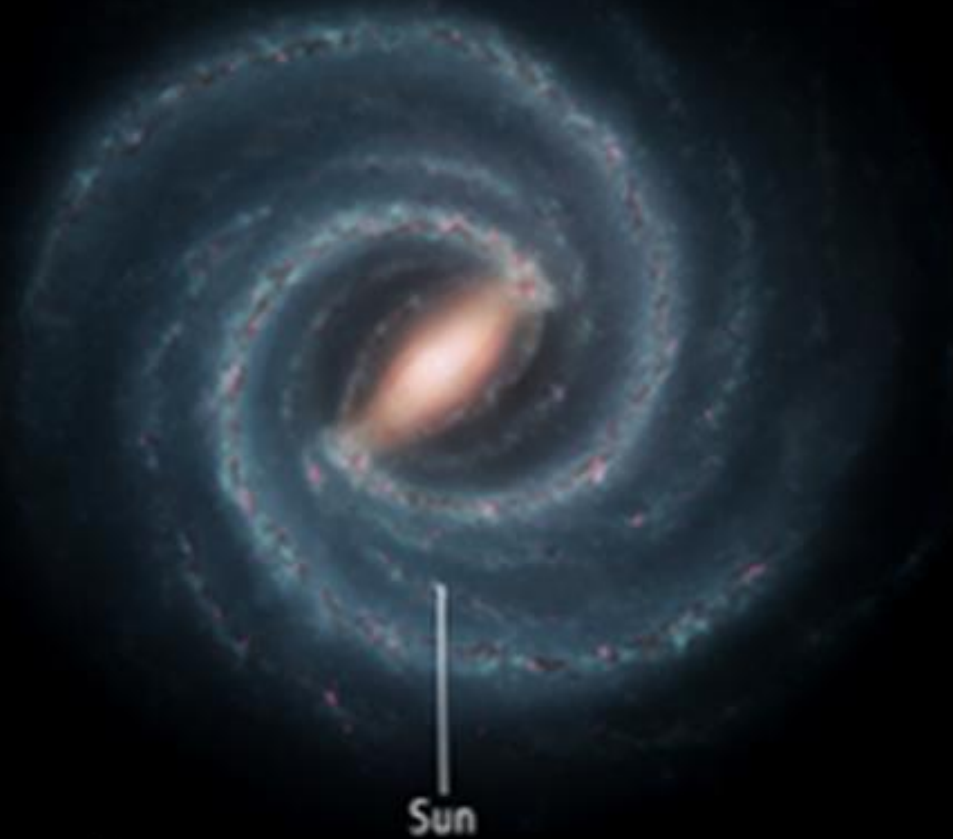
Topic 15: Our Place in the Galaxy

The Milky Way

- Appears as a **faint, milky band** across the sky due to billions of distant stars.
- Best observed with **binoculars or a small telescope** under dark skies.
- Dense regions are part of the **galactic plane**, with dark patches caused by interstellar dust.



→ ANATOMY OF THE MILKY WAY

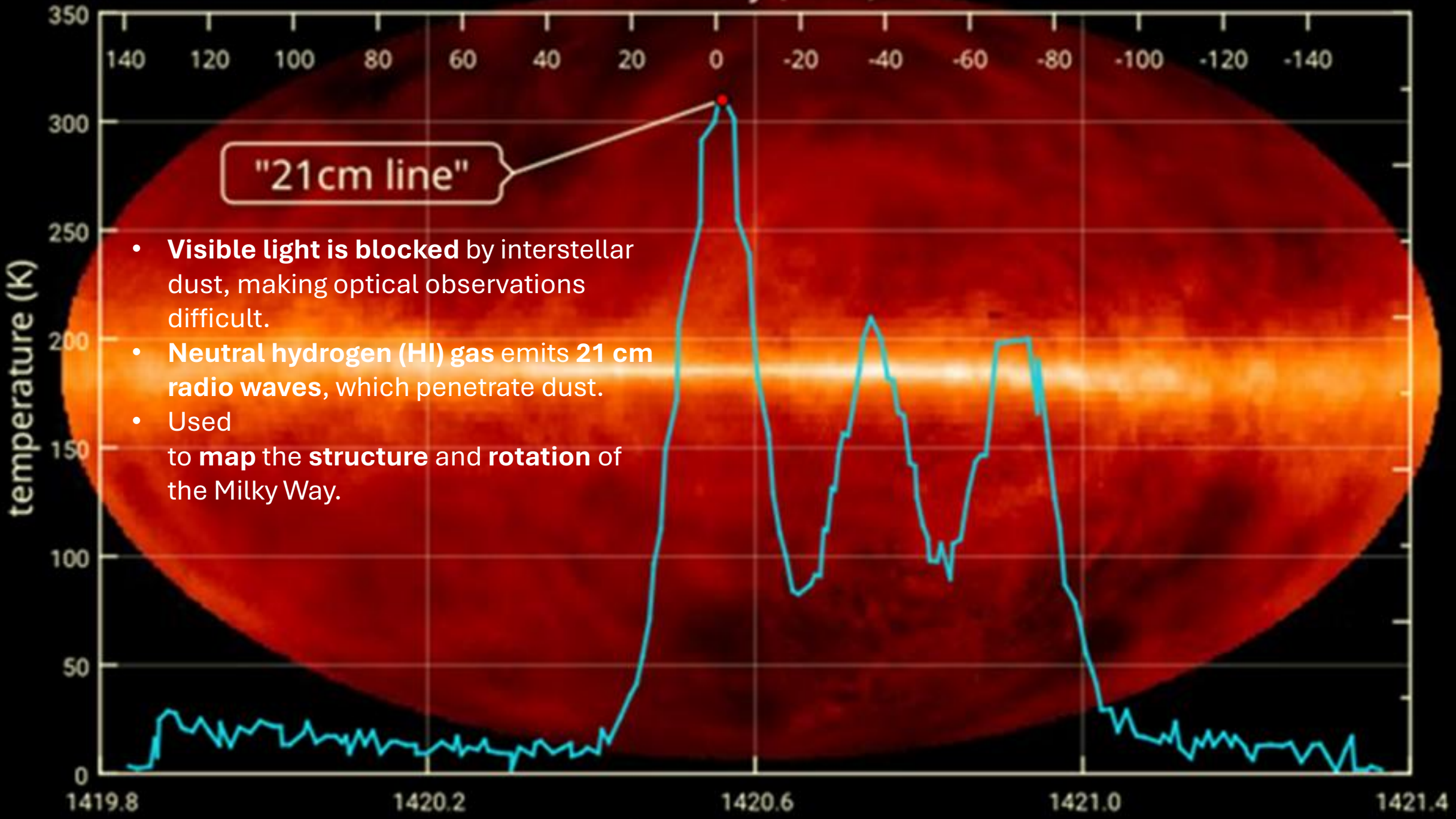


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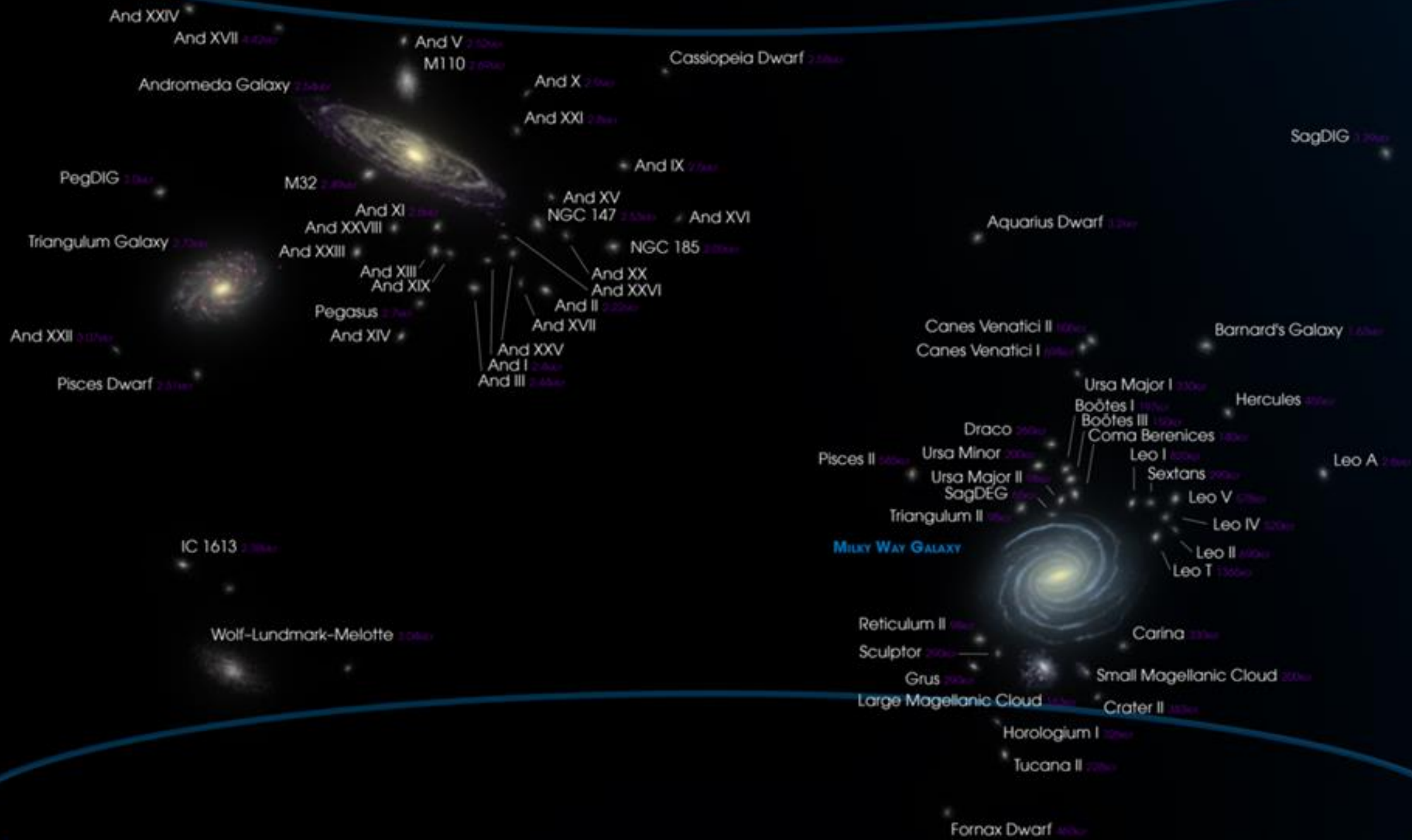
velocity (km/s)



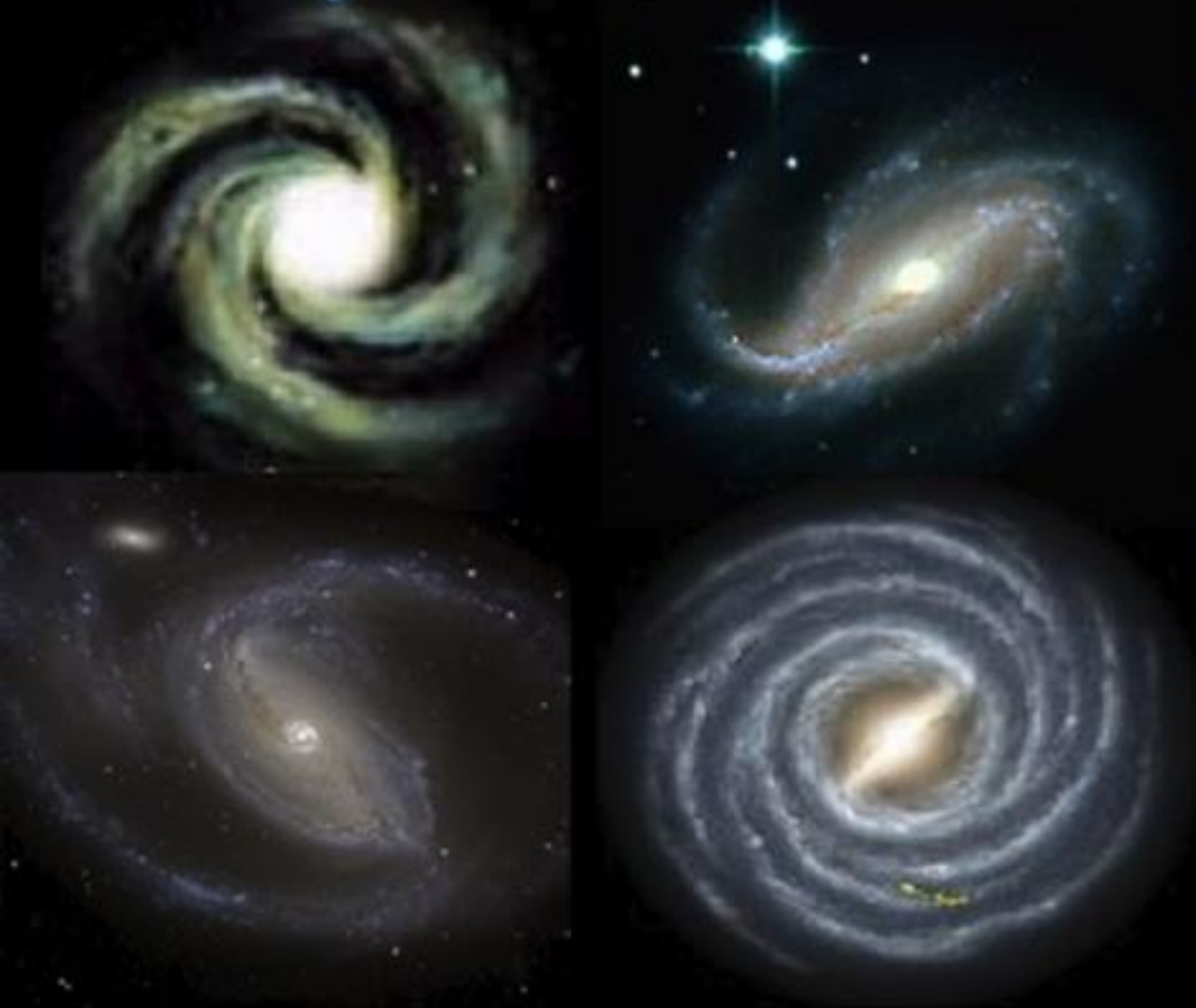
"21cm line"

- **Visible light is blocked** by interstellar dust, making optical observations difficult.
- **Neutral hydrogen (HI) gas emits 21 cm radio waves**, which penetrate dust.
- Used to **map the structure and rotation** of the Milky Way.

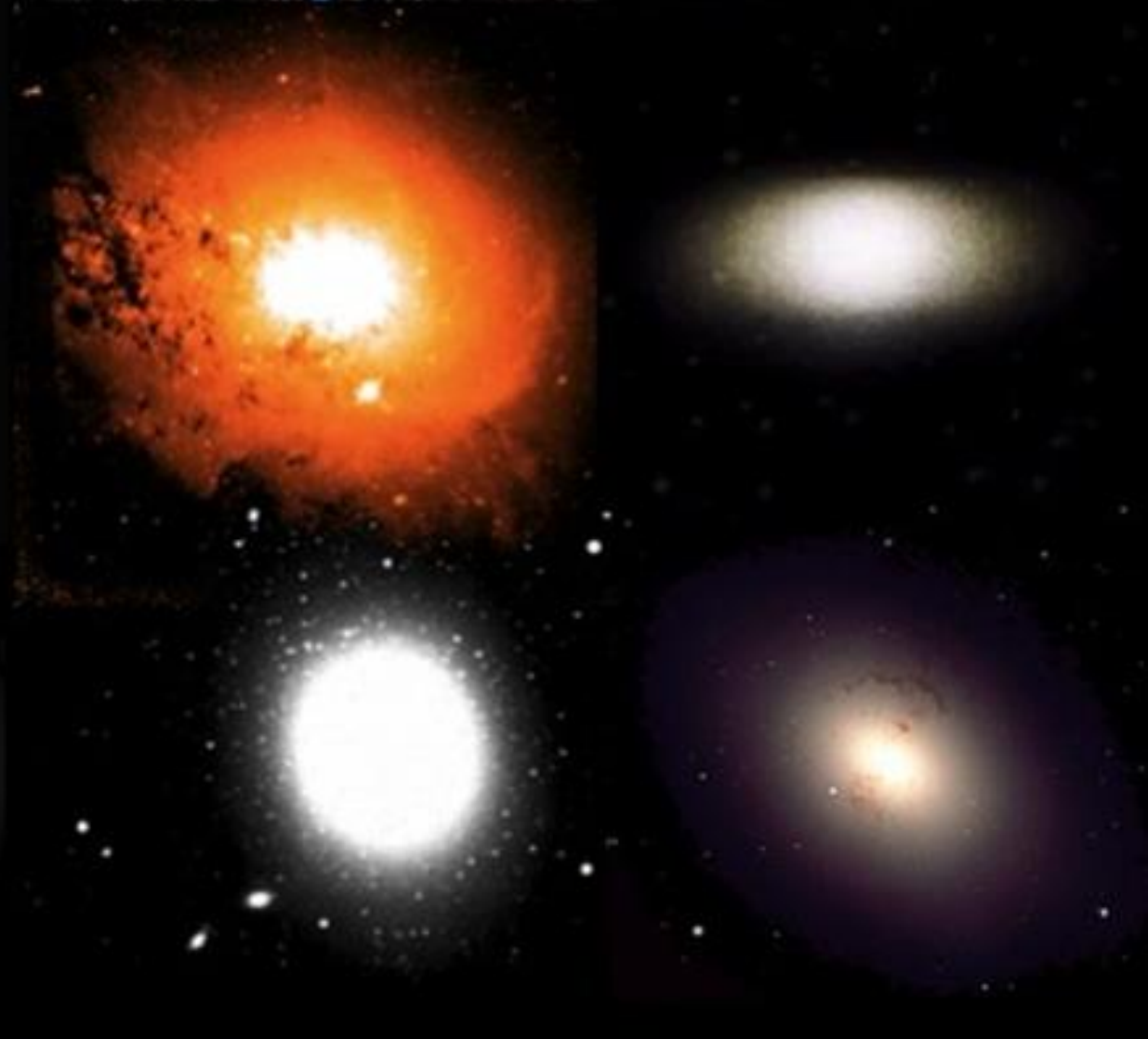
LOCAL GROUP



Spiral Galaxies

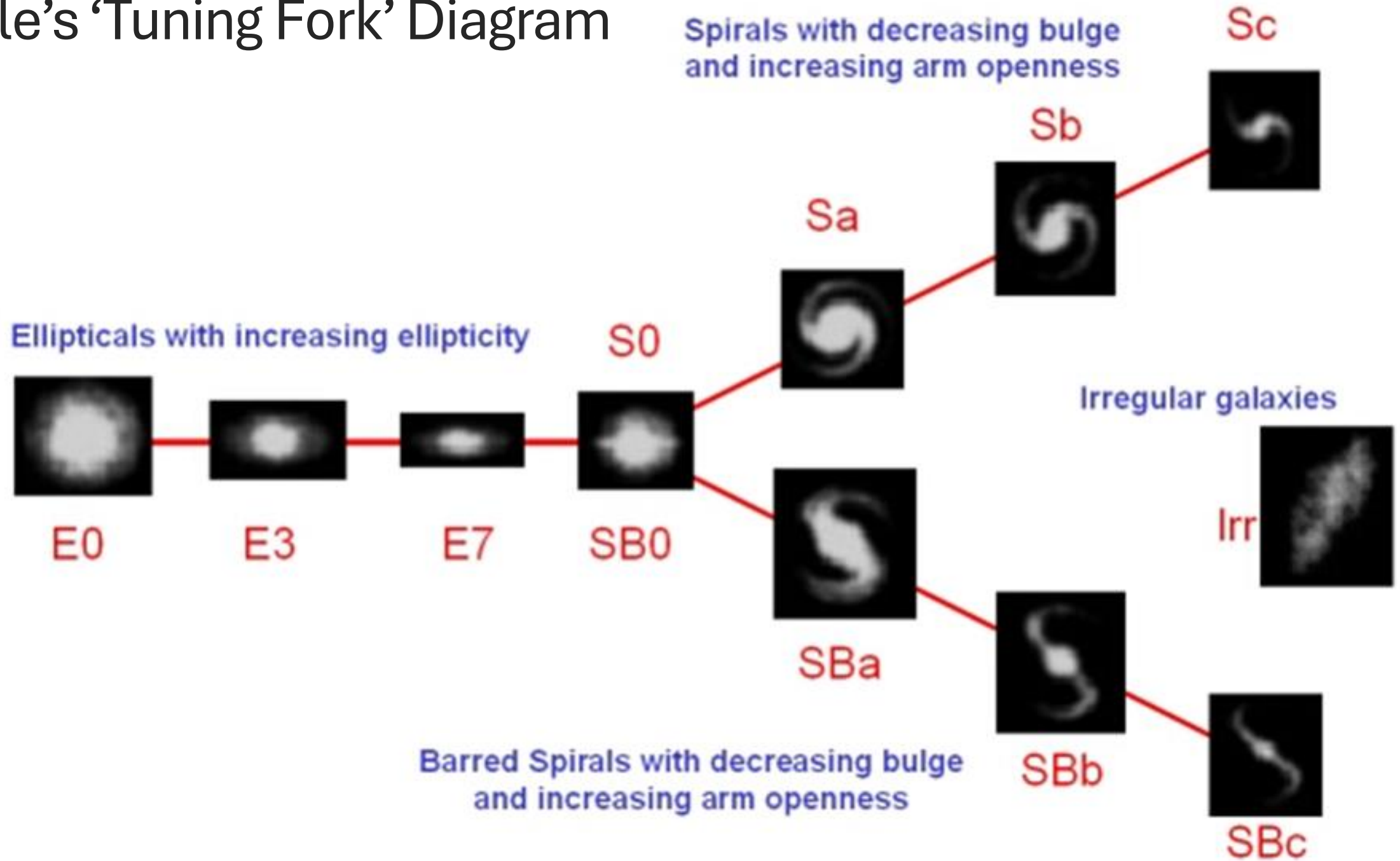


Elliptical Galaxies

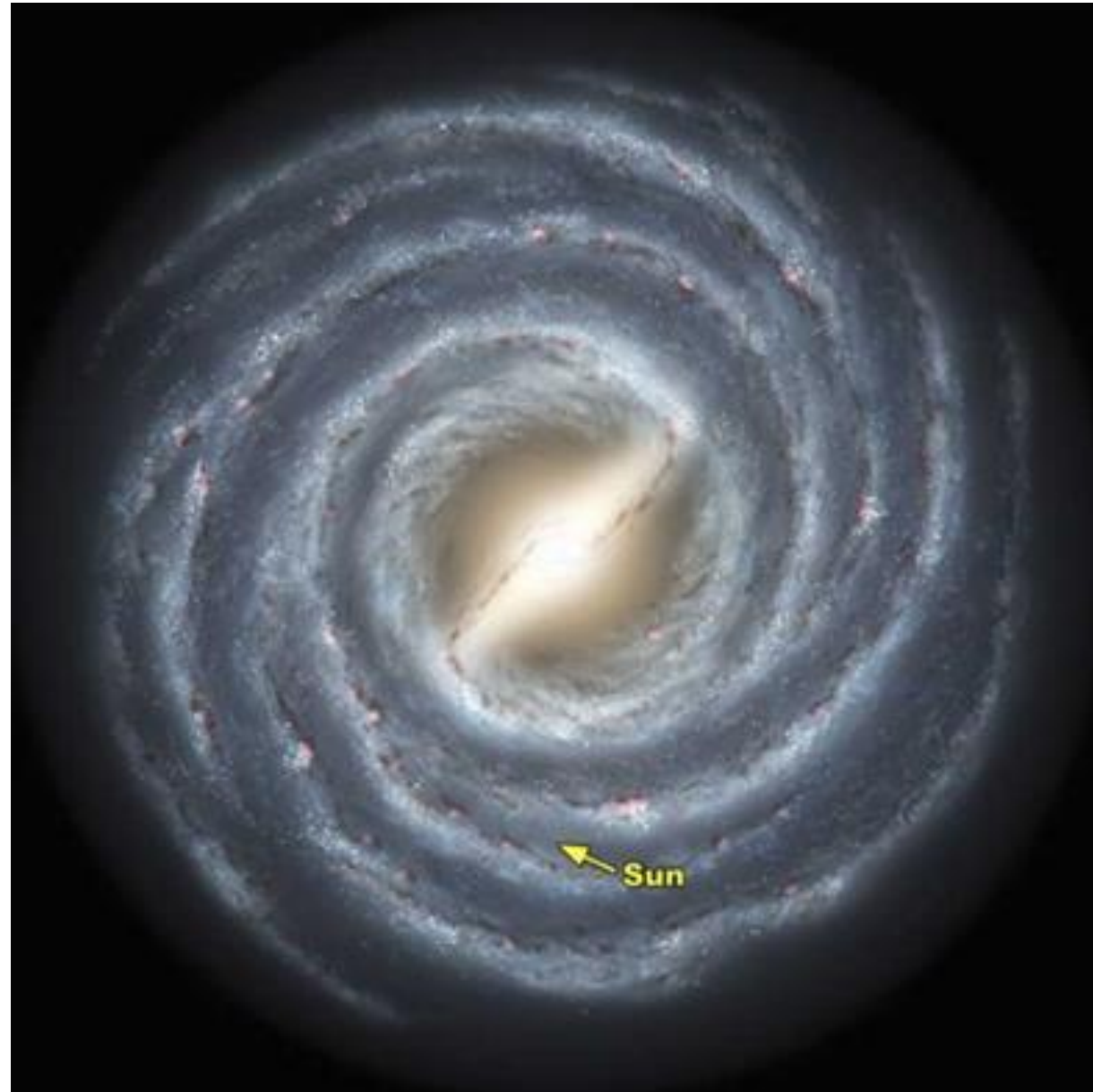


Irregular Galaxies

Hubble's 'Tuning Fork' Diagram

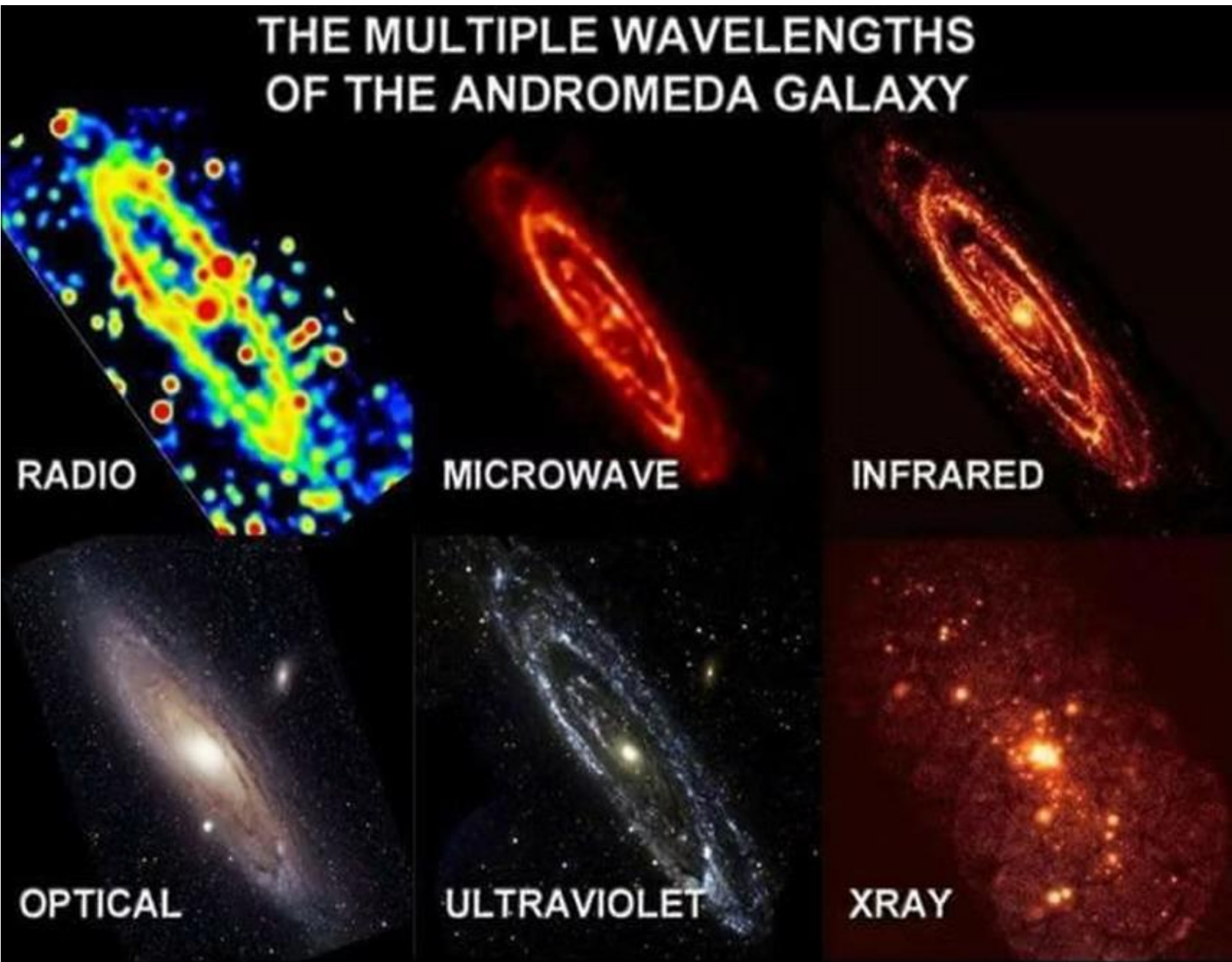


The Milky Way – SBb Type Barred Spiral Galaxy



Galaxies That Emit High Energy Radiation

- Some galaxies **emit large amounts of radiation** beyond visible light.
- Detected in **radio, X-ray, and gamma-ray wavelengths**



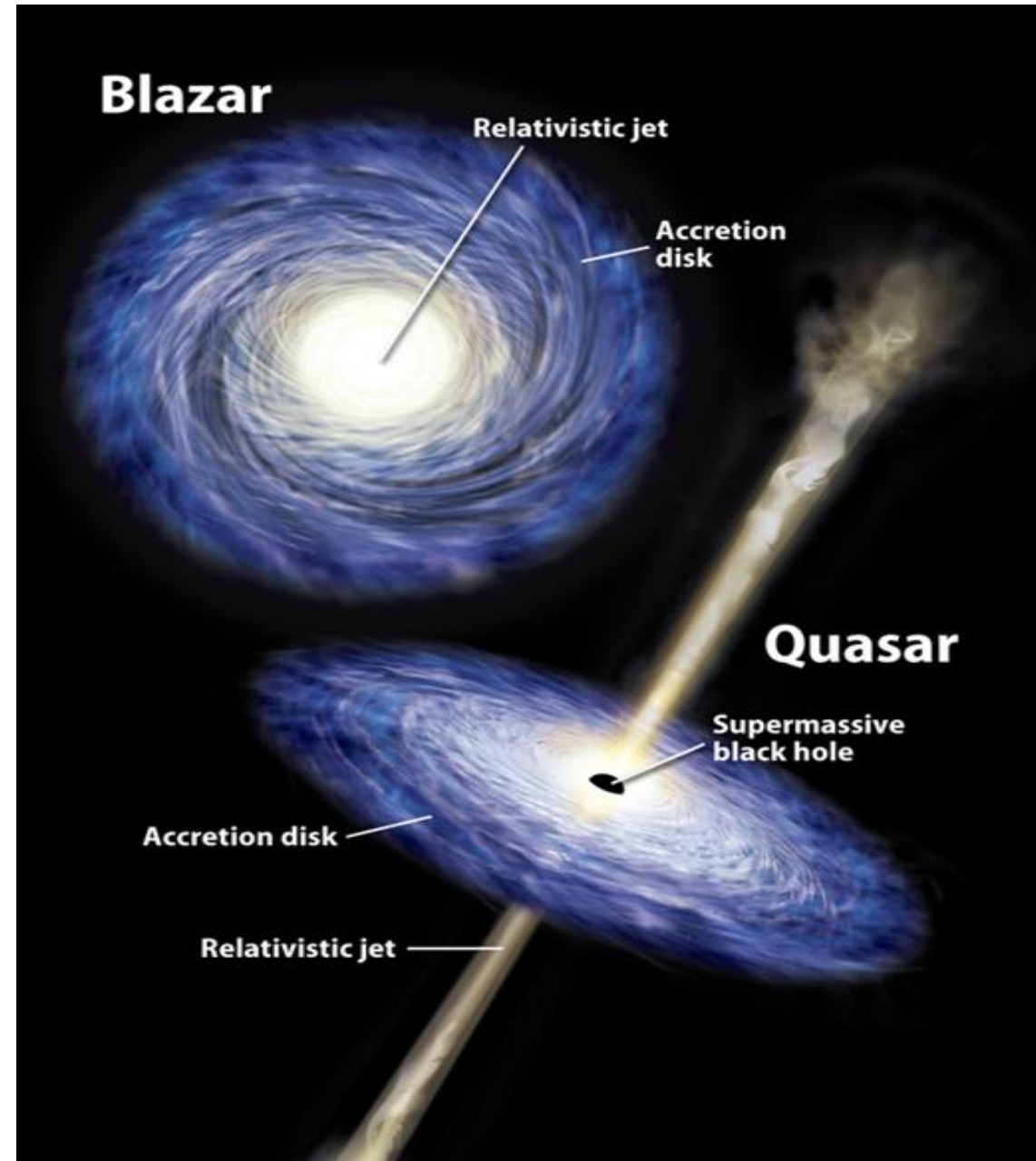
ORIGINAL BY ROB SIMPSON.
ANNOTATED BY CALLUM C. J. SUTHERLAND FOR MILKYWAYMUSINGS.COM

Active Galactic Nuclei (AGN) and Supermassive Black Holes

- AGNs are found in the centre of some galaxies
- They are **bright central regions** powered by material **falling into a black hole**.
- Extremely energetic due to **accretion disks** around black holes.

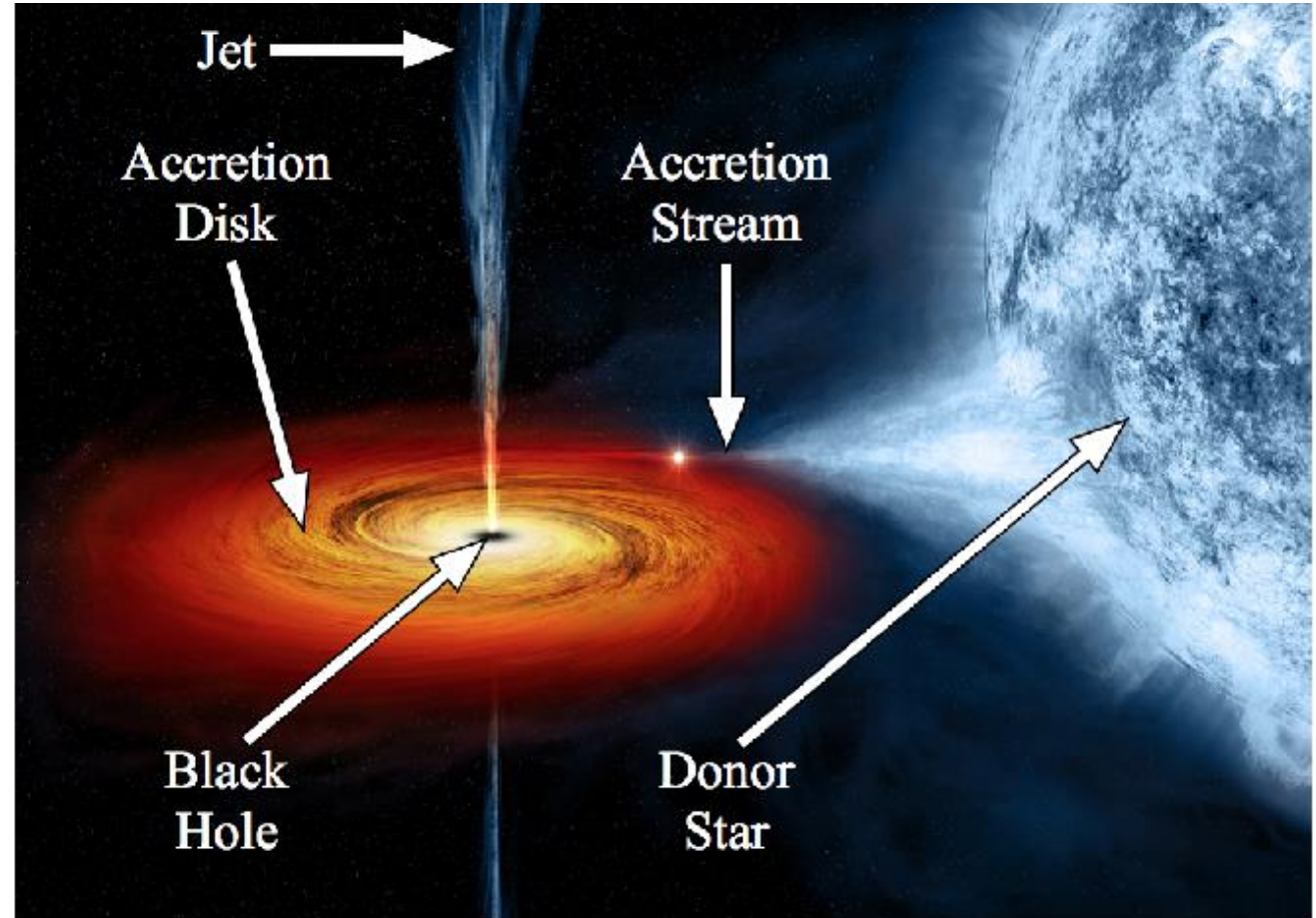
Types of Active Galaxies

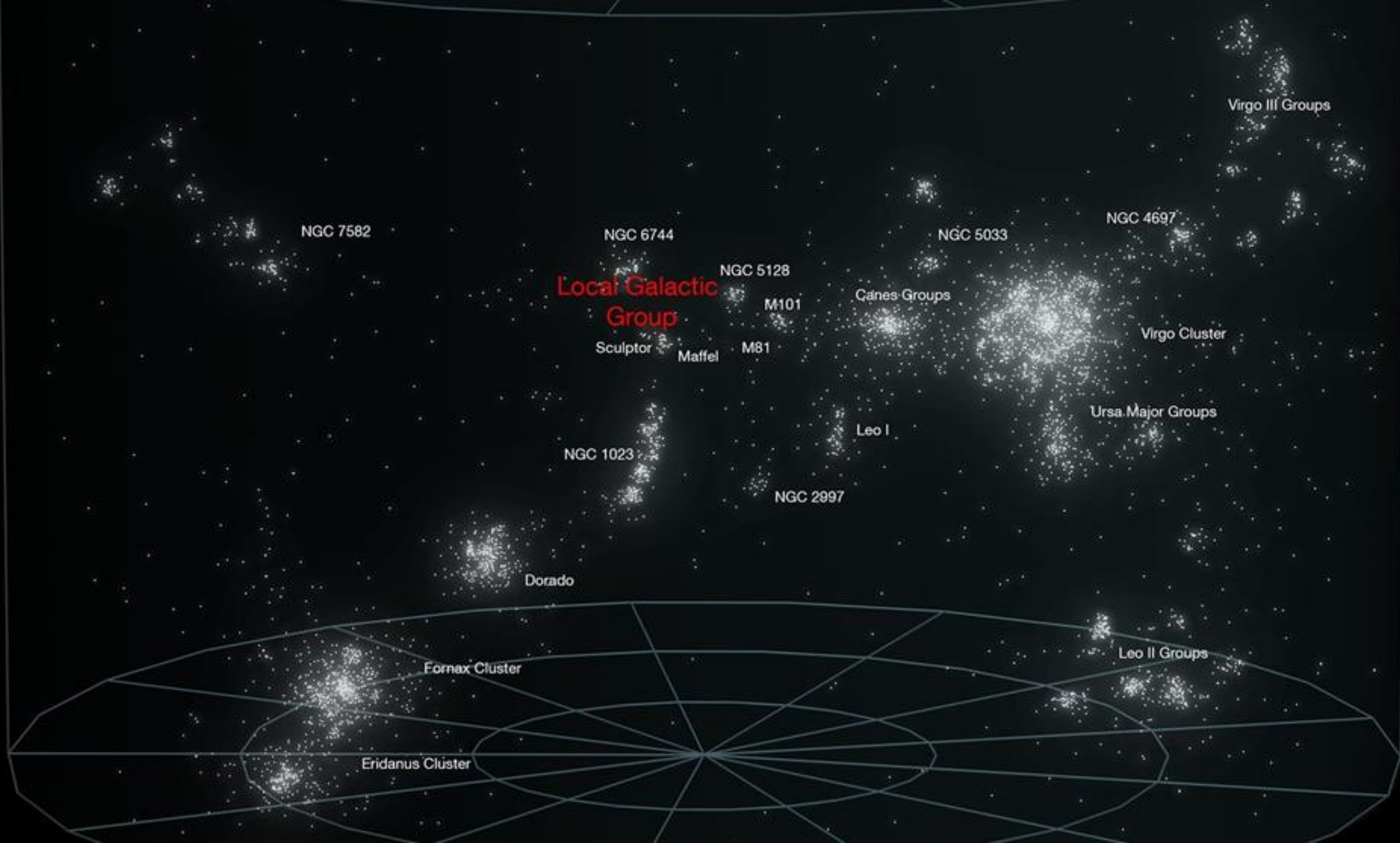
- **Seyfert Galaxies:** Spiral galaxies with **bright central AGNs**.
- **Quasars:** **Most luminous AGNs**, extremely distant.
- **Blazars:** A quasar viewed from **directly along its jet**, making it appear even brighter.



How We Study AGNs Across the Electromagnetic Spectrum

- **Radio waves** detect jets.
- **Infrared** shows dust and warm material.
- **Visible light** studies stars and gas clouds.
- **X-rays & Gamma rays** detect matter falling into black holes.





LANIAKEA

