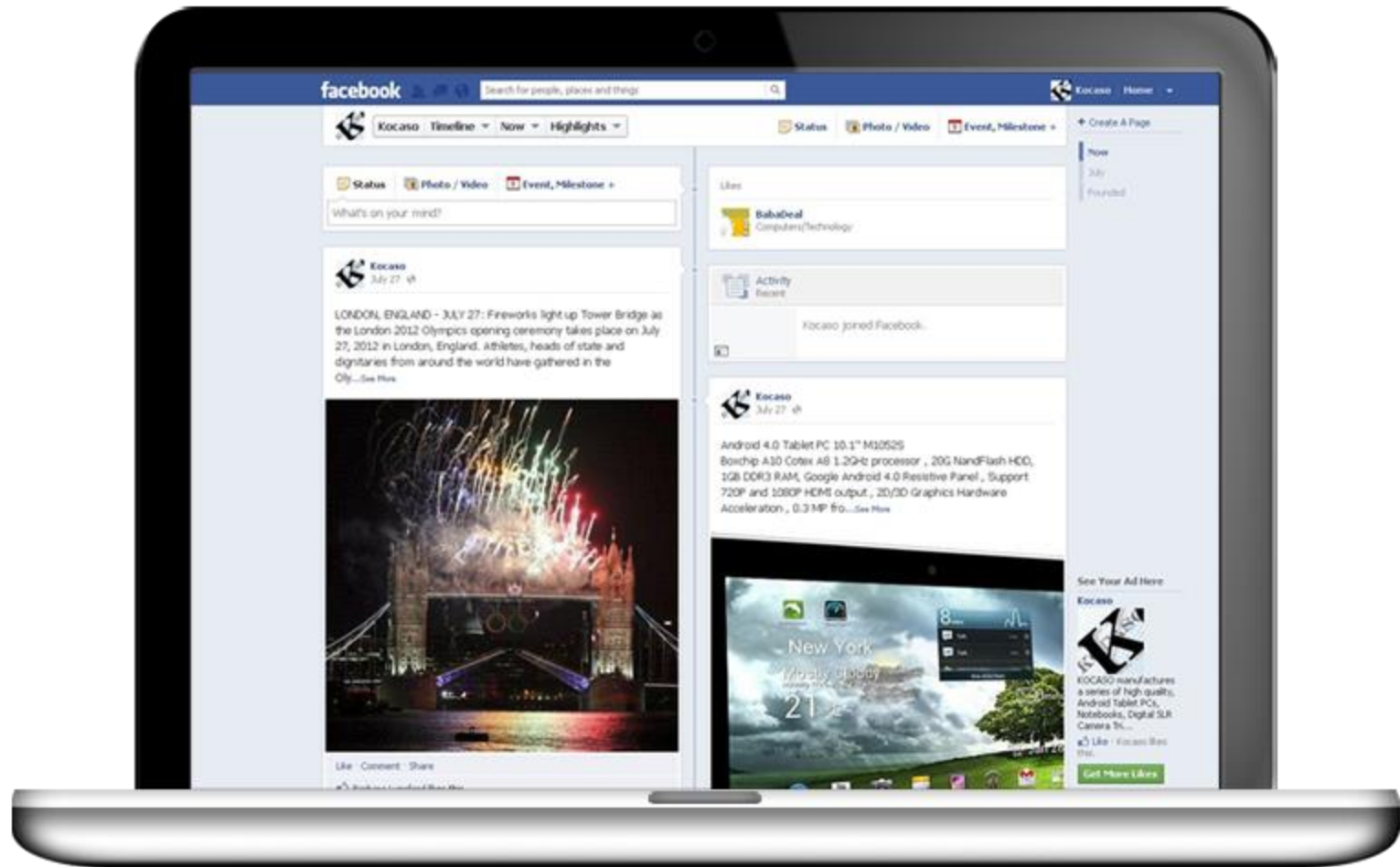


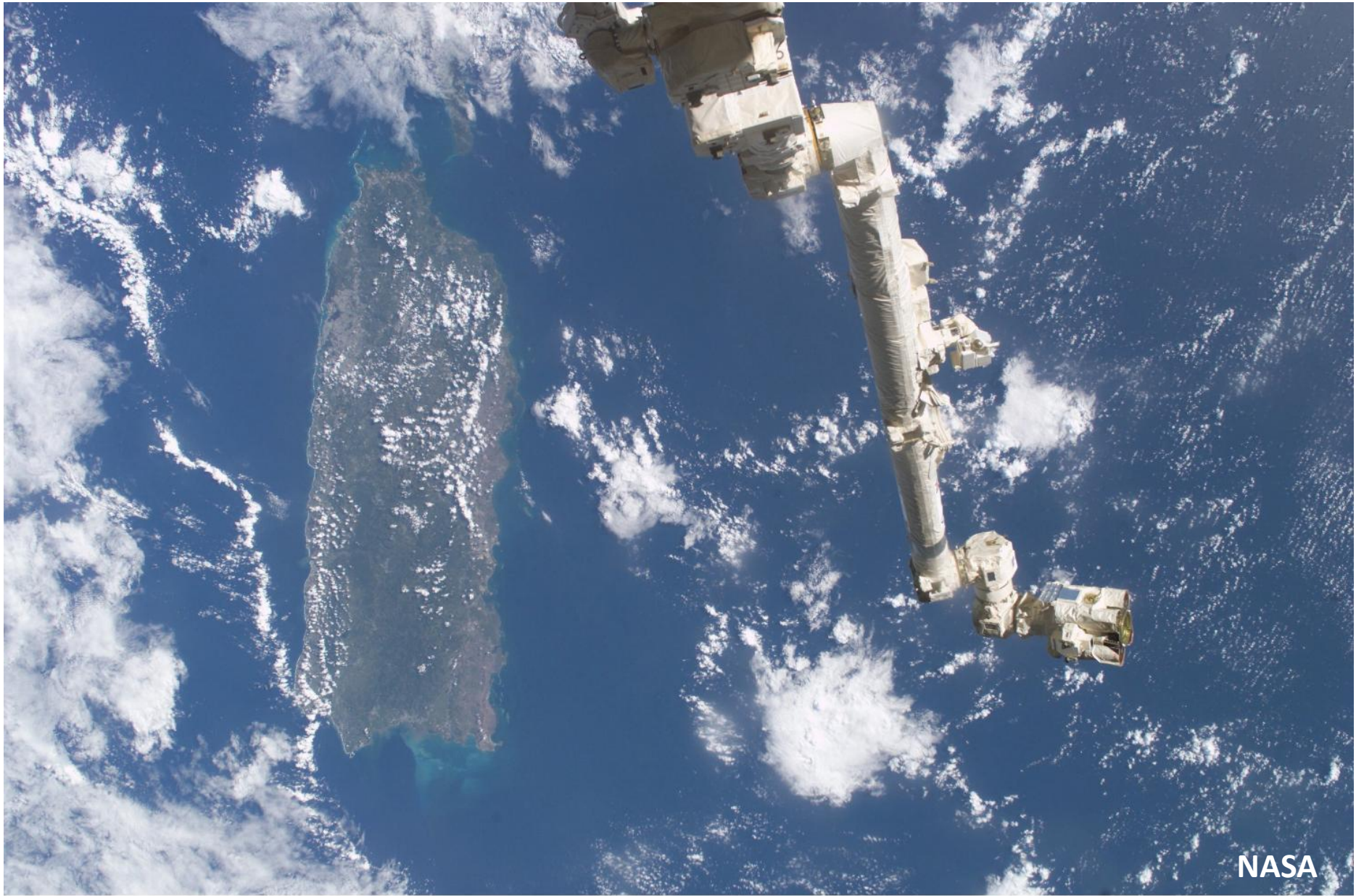
Outline

- Our place in the Universe.
 - The Cosmological Principle.
 - What is the “Local Universe”.
- Types of galaxies and their properties.
- Groups and clusters:
 - The Local Group
 - The Virgo cluster
- ALFALFA’s view of the Local Universe.
- The galaxies we are observing:
 - Where are they?
 - What kind of galaxies are they?

Our Local Universe





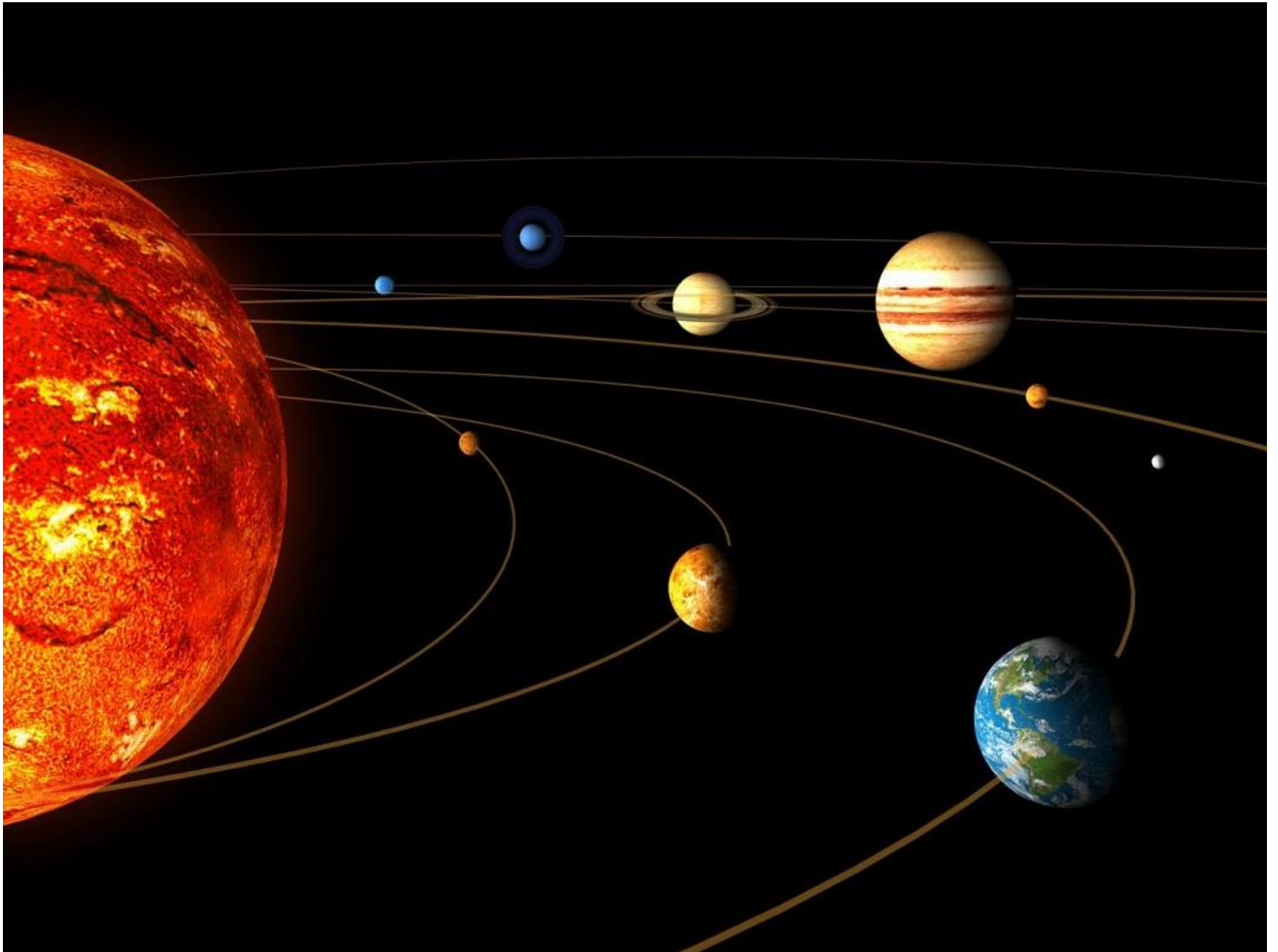


NASA

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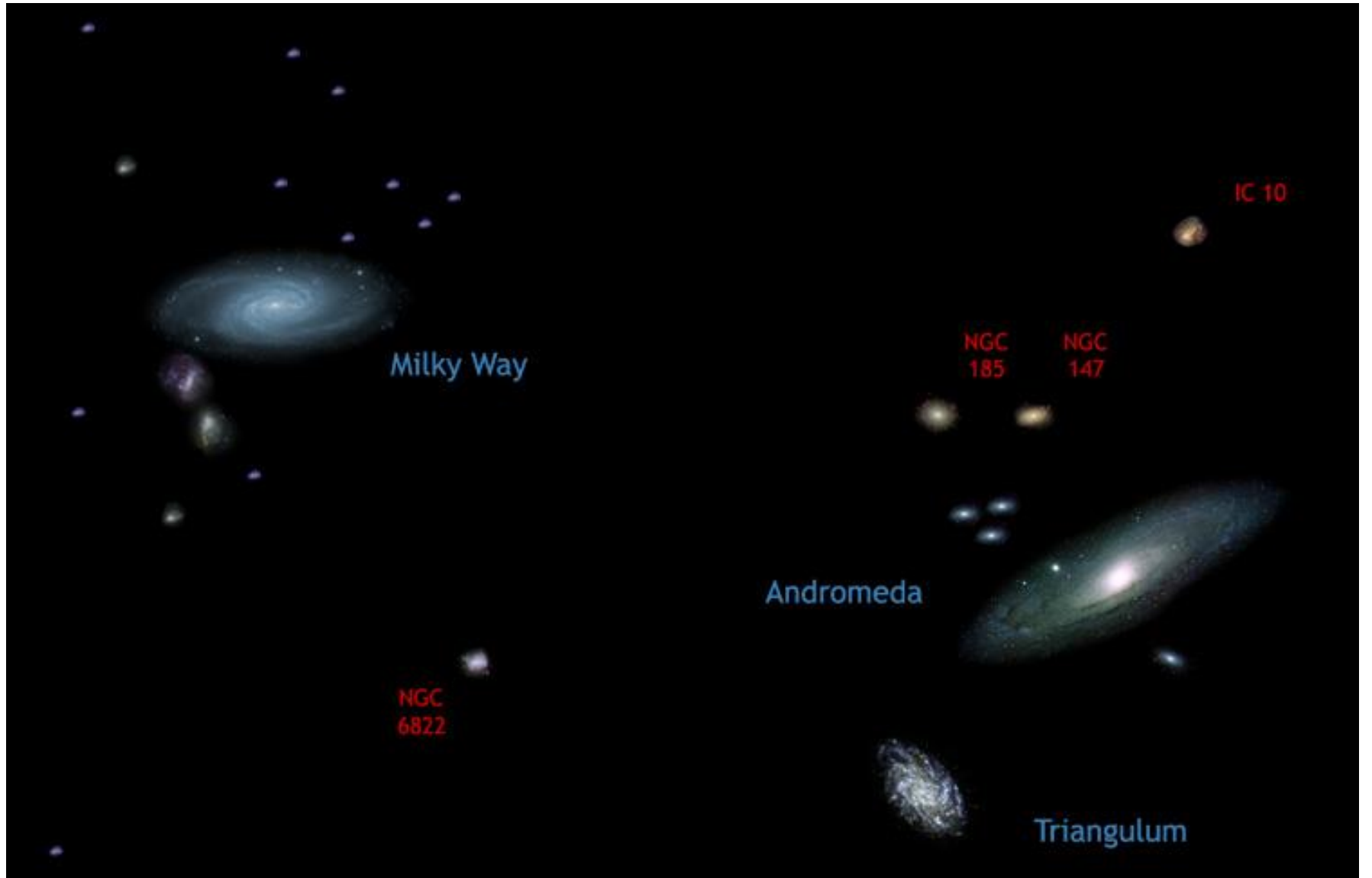


NASA





2MASS



Milky Way

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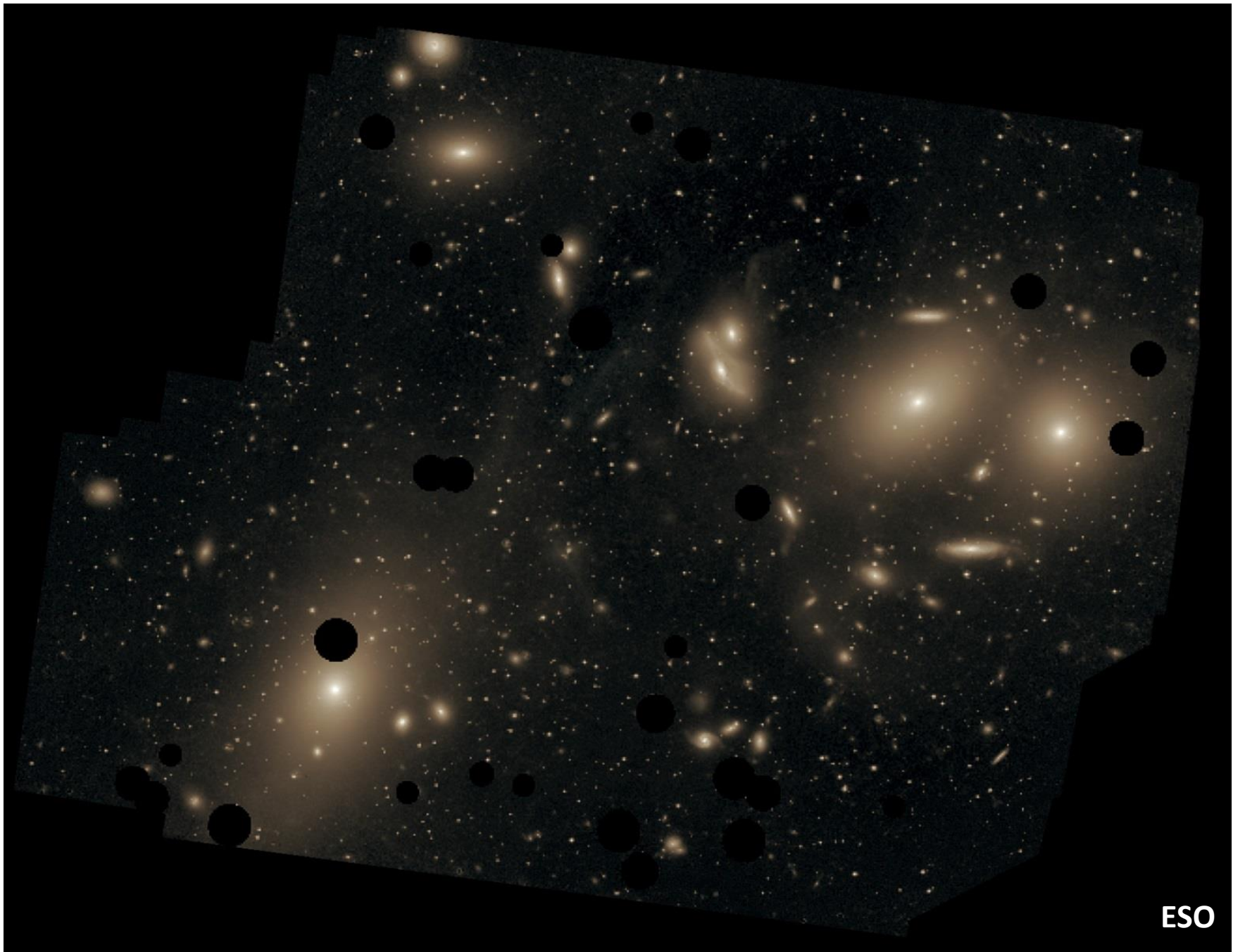
NGC
185

NGC
147

Andromeda

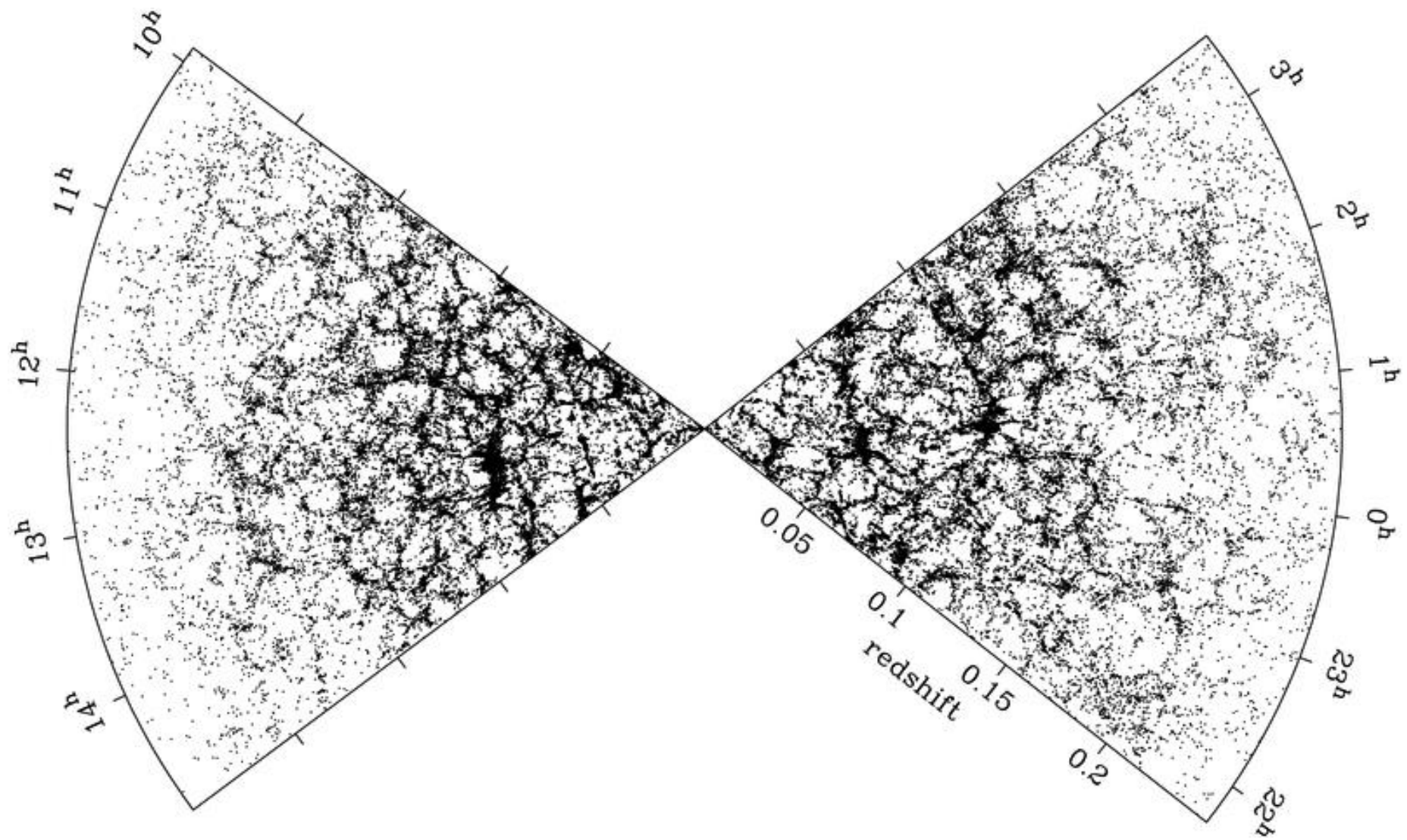
NGC
6822

Triangulum

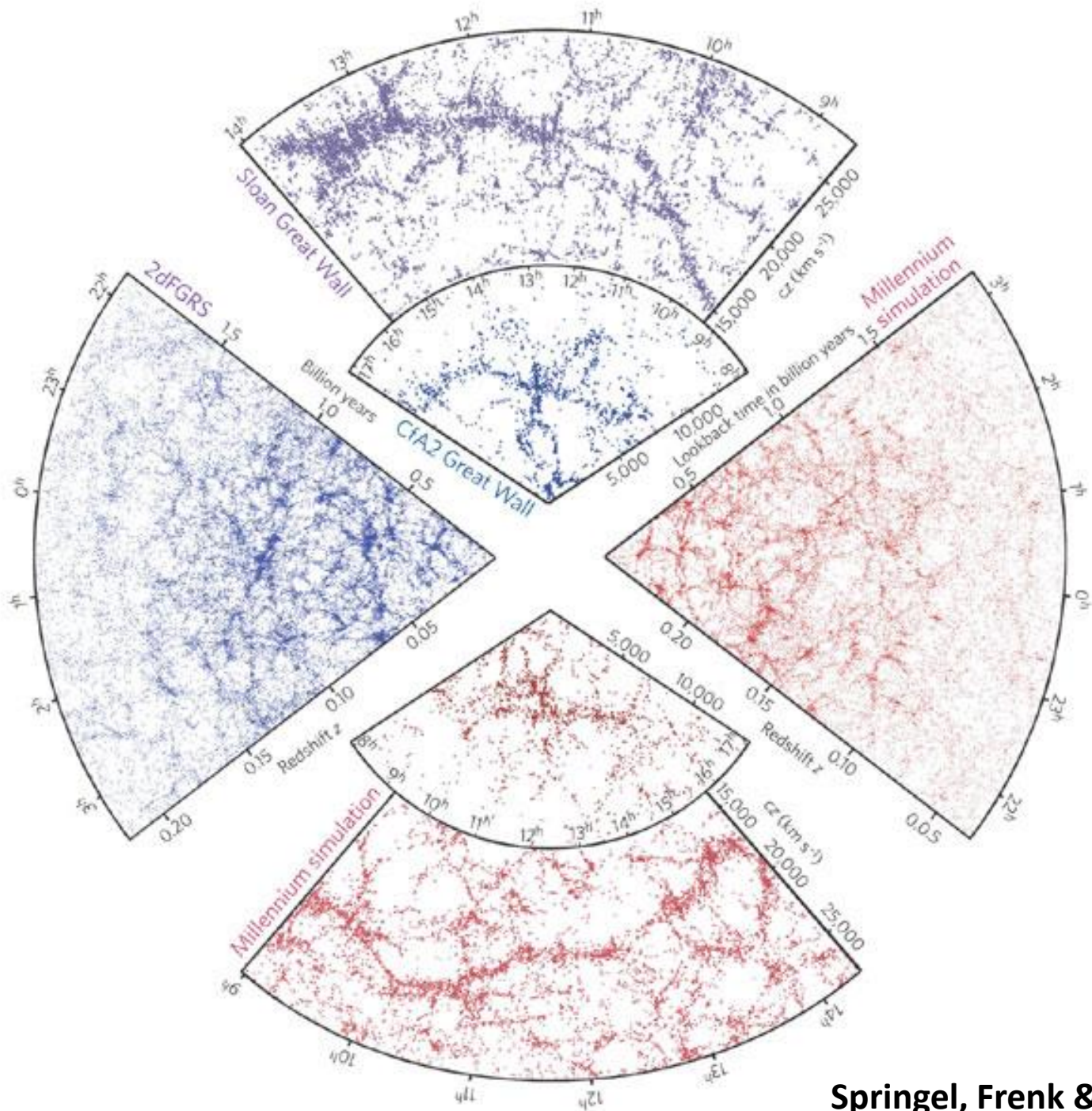


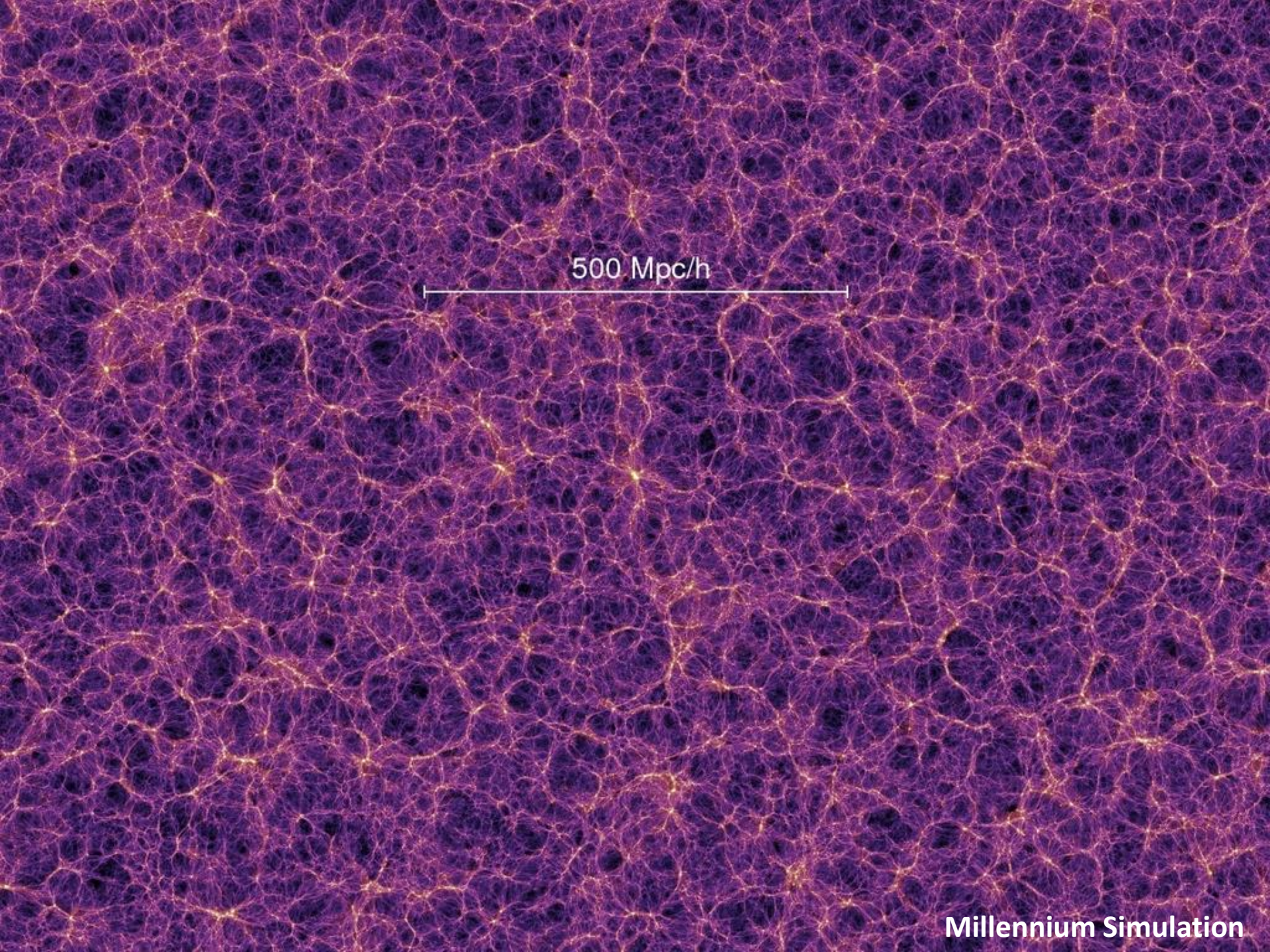


Tony Hallas



2dFGRS





500 Mpc/h

Millennium Simulation

Cosmological Principle

- When viewed on a large enough scale the Universe is both homogeneous and isotropic.
- Homogeneous – Same at all points.
- Isotropic – Same in all directions.

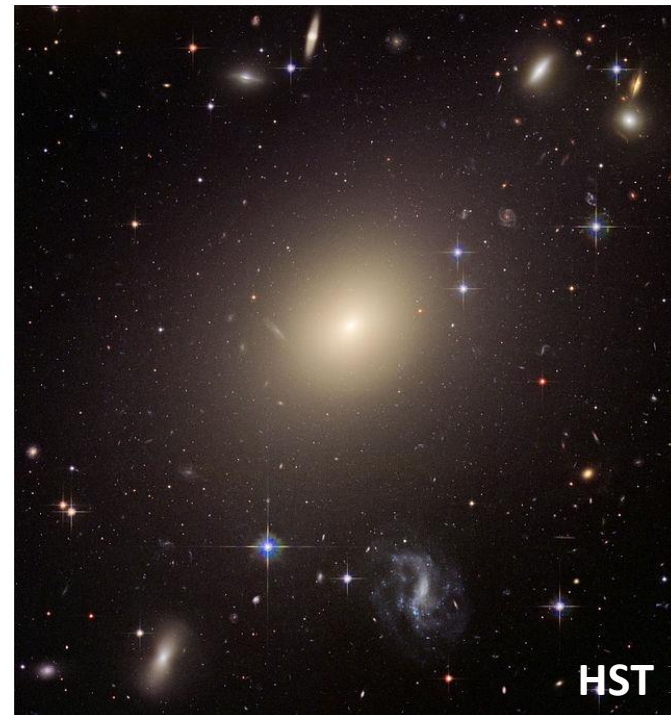
- The Local Universe covers a volume large enough that this *just* begins to be true.

Kinds of Galaxies in the Local Universe

Spiral:



Elliptical:



Spirals

- Colour – Blue (usually)
- Stellar Age – Young (and old)
- Stellar Mass – Typically 10^{11} solar masses
- HI Mass – Typically 10^{10} solar masses
- Found where? – Mostly in the field
- HI rich? – Yes
- Metallicity – Medium

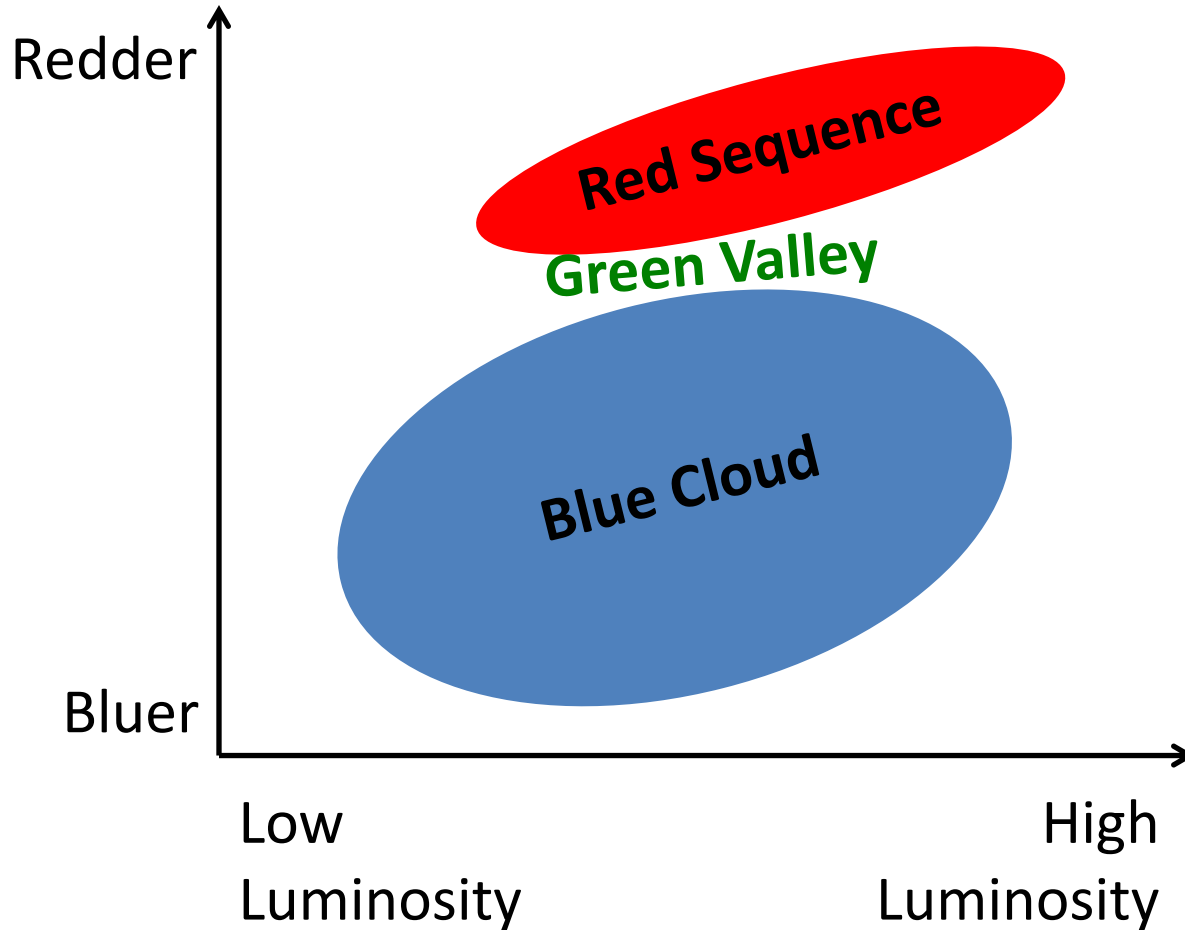


Elliptical

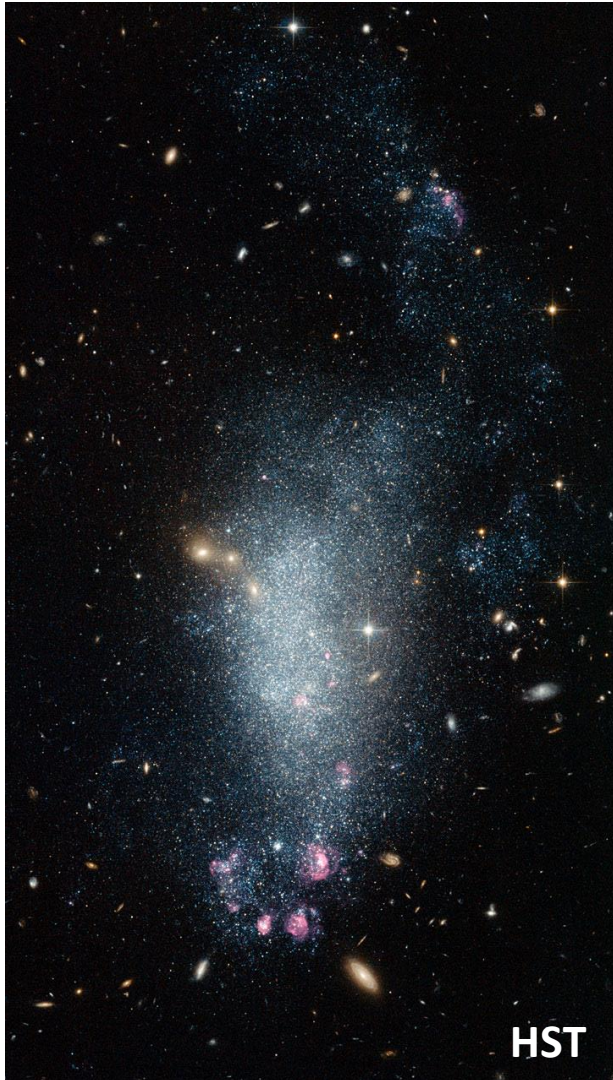
- Colour – Red
- Stellar age – Old
- Stellar Mass – Typically $>10^{11}$ solar masses
- Found where? – Mostly in clusters
- HI rich? – No (very gas poor)
- Metallicity – High



Colour and Magnitude of E and S



... there are also Dwarfs and Irregulars



Dwarfs & Irregulars

Dwarfs:

- Usually blue when in field.
- Low surface brightness.
- Low metallicity.
- Usually very HI rich.
- Often also irregulars.
- By number, most galaxies are dwarfs.



Irregulars:

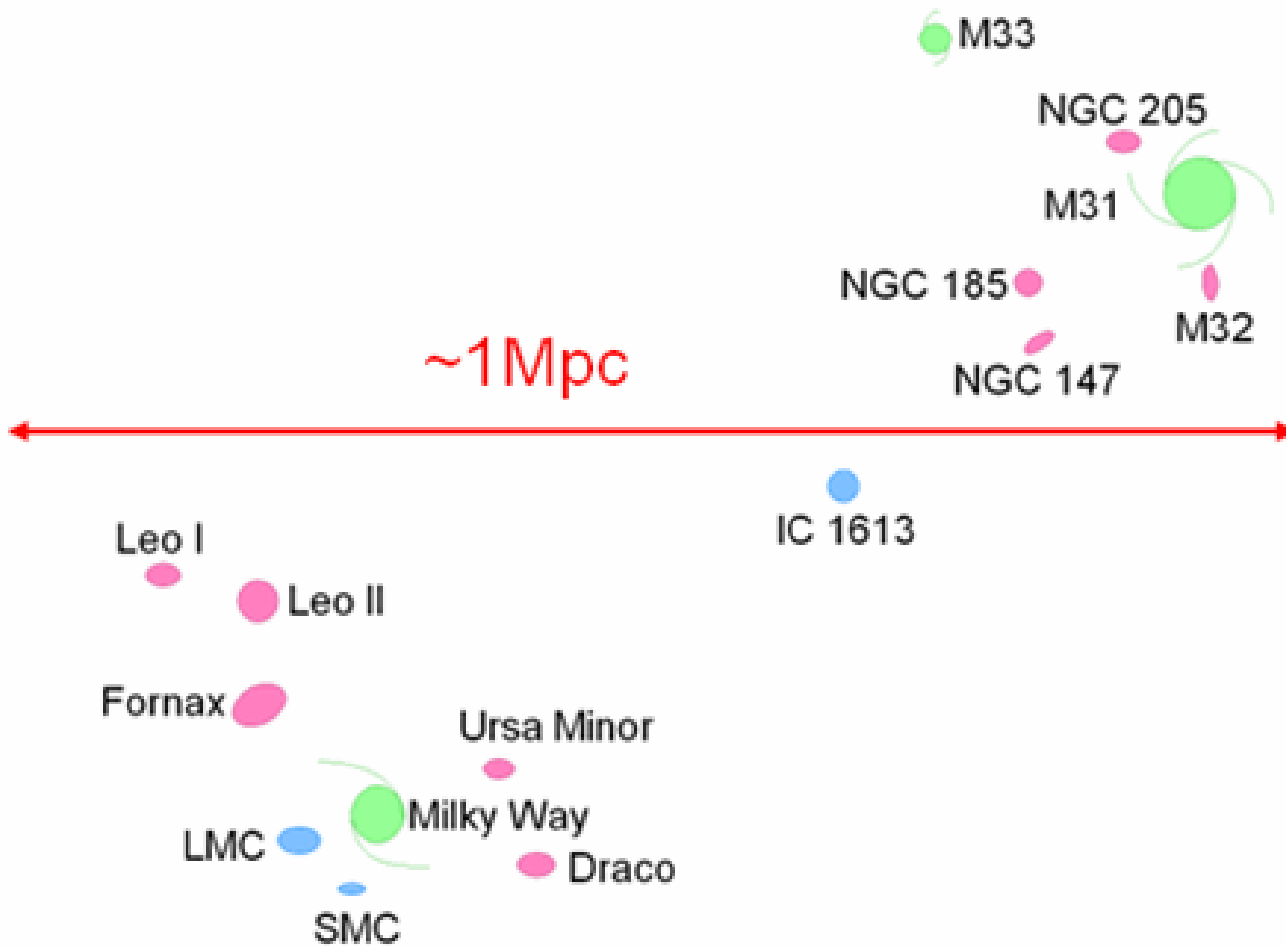
- Usually blue.
- Mainly in the field.
- Often HI rich.
- Often violently star forming.
- Often the result to mergers/interactions.



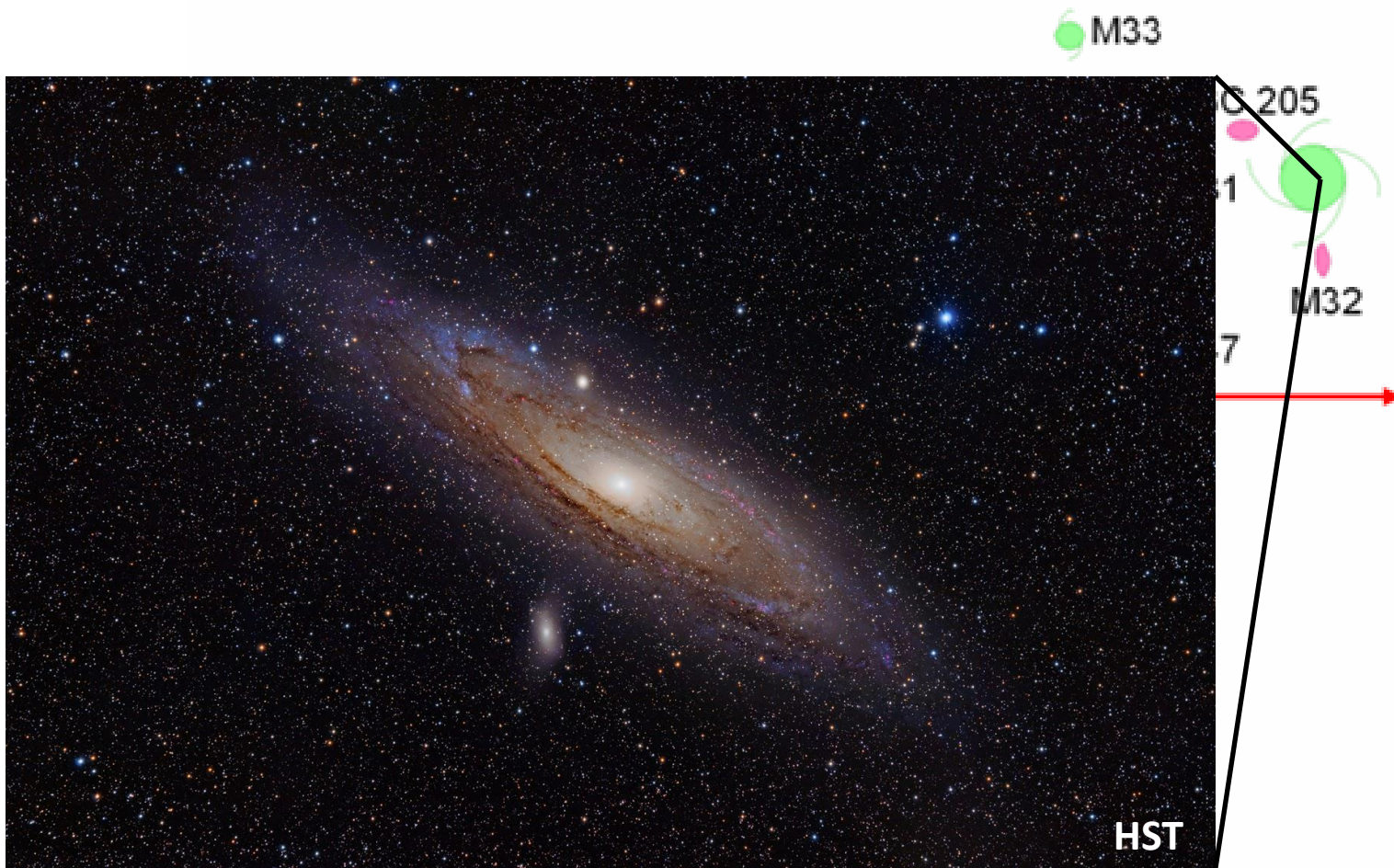
Galaxy Groups

- A few to tens of galaxies.
- Loosely gravitationally bound.
- Can be compact – a few galaxies very close together.
- Galaxies can be of any type.
- Velocity dispersions of a about 100 km/s.

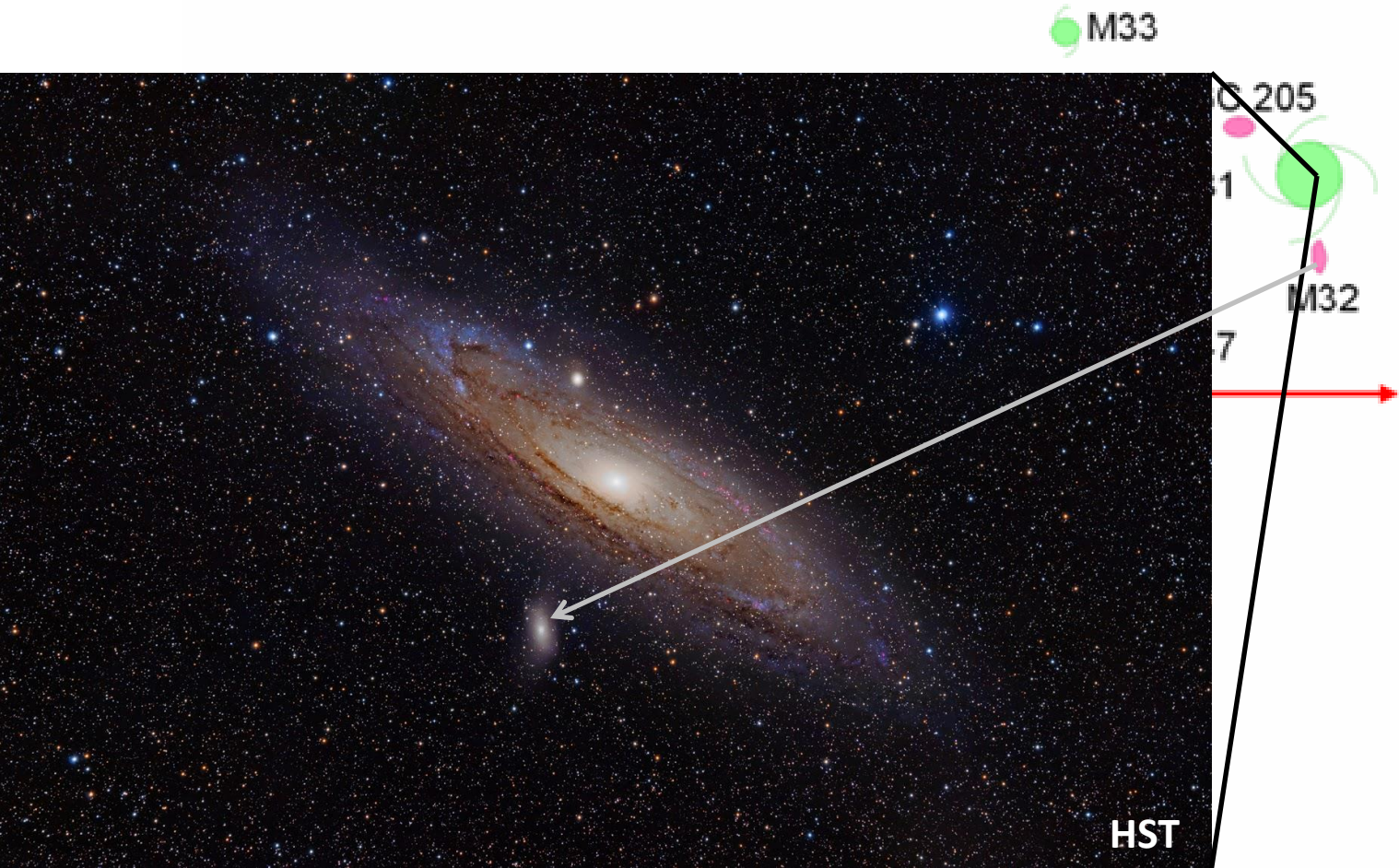
The Local Group



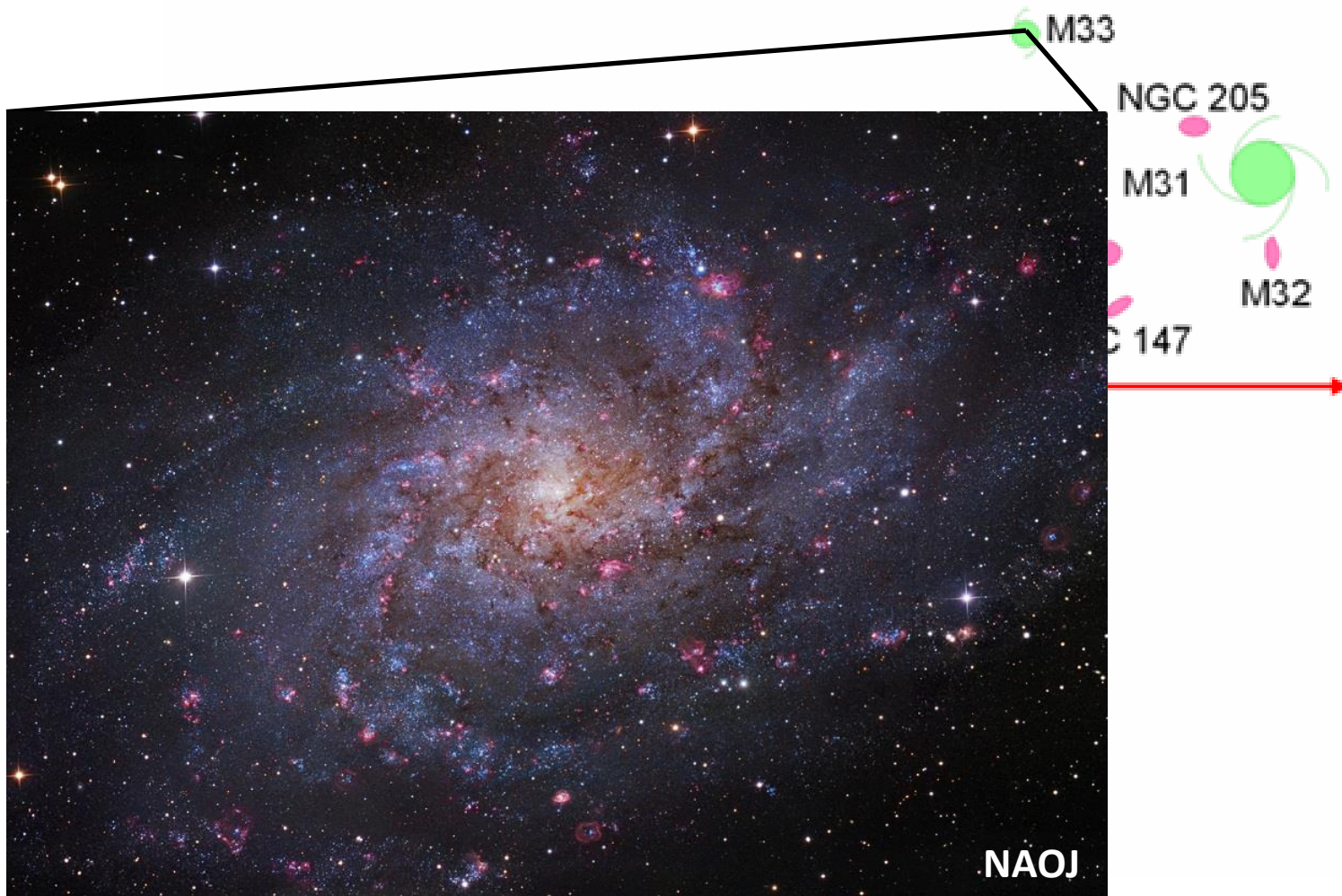
The Local Group



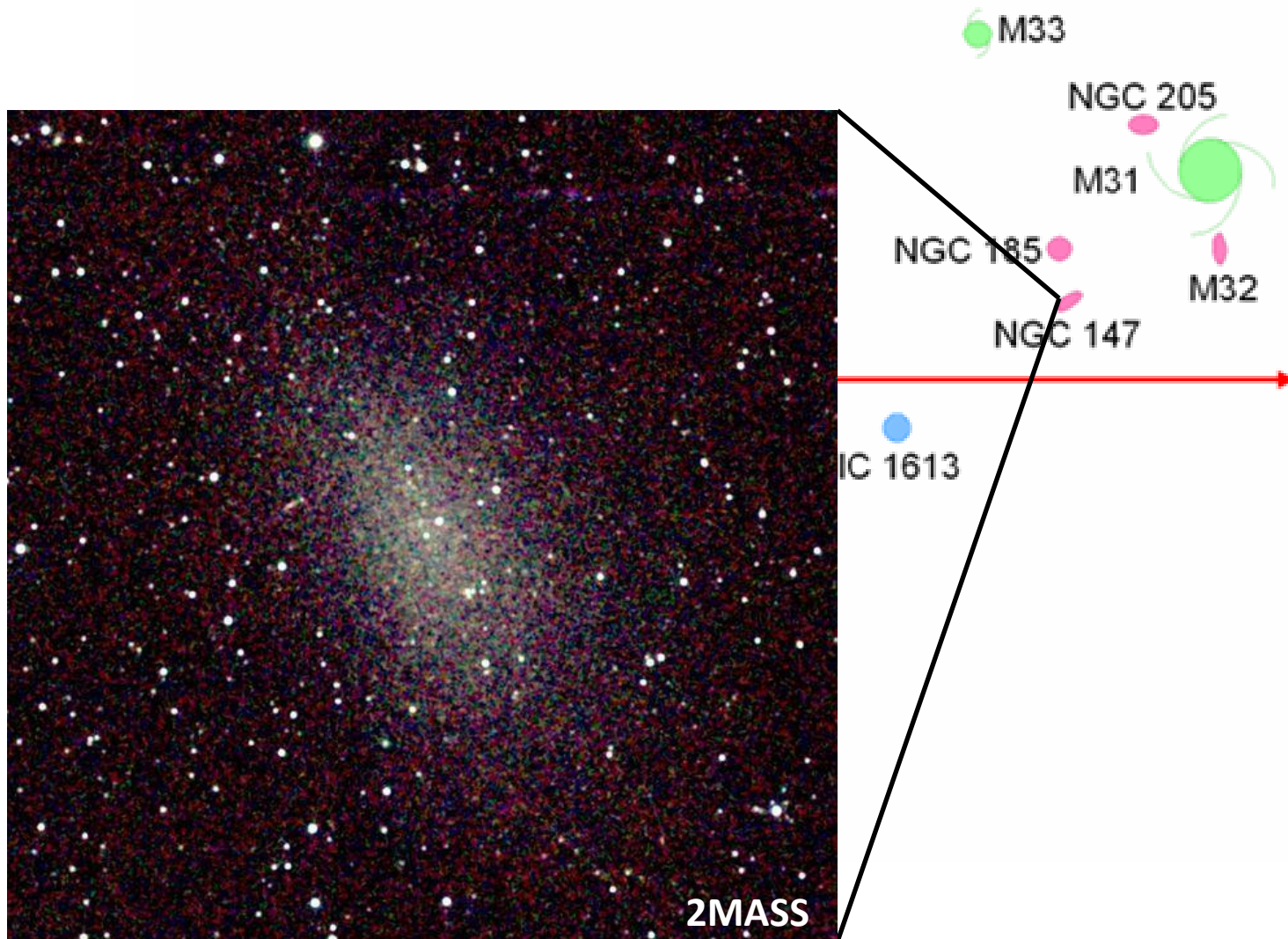
The Local Group



The Local Group



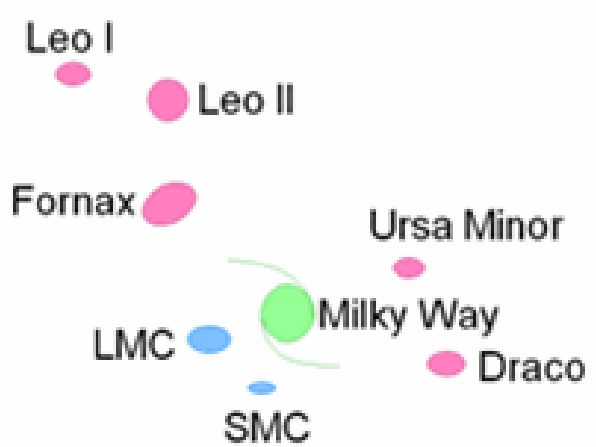
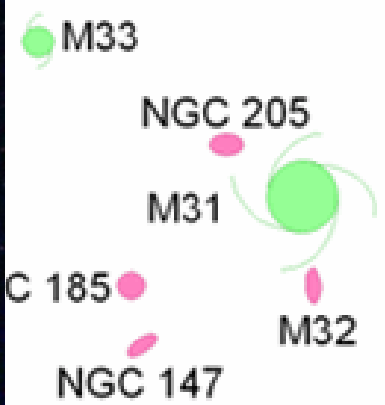
The Local Group



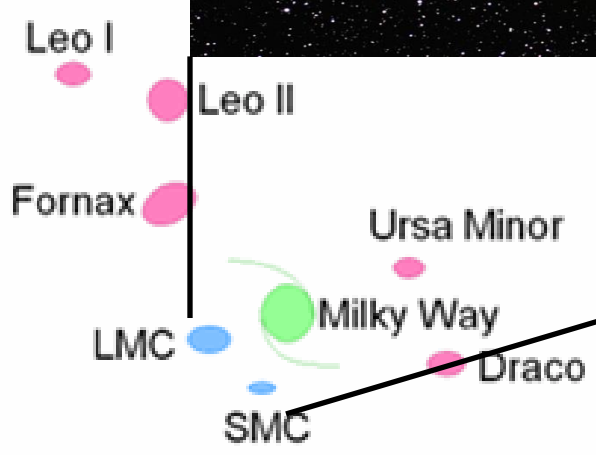
up



Brian Lusa

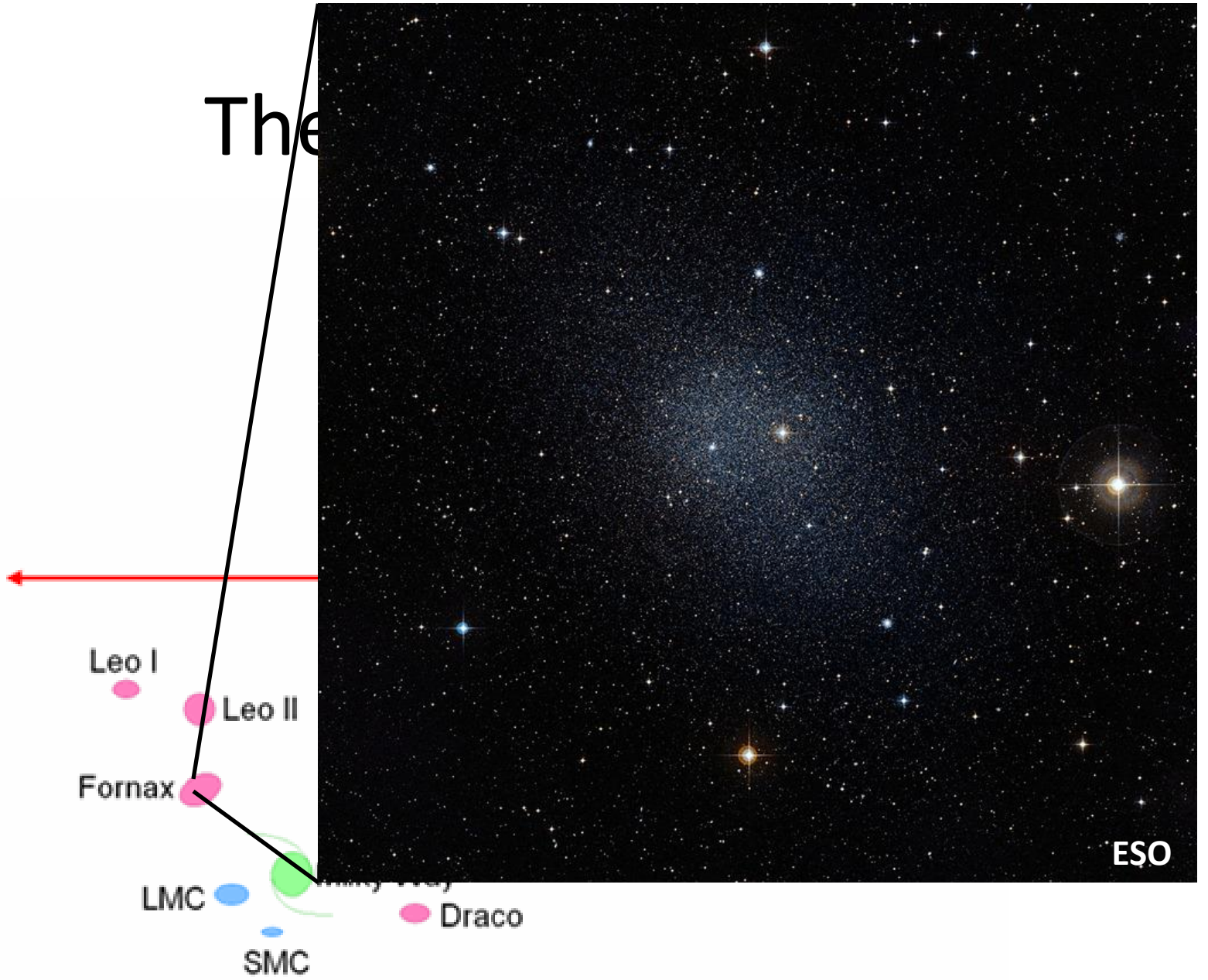


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The





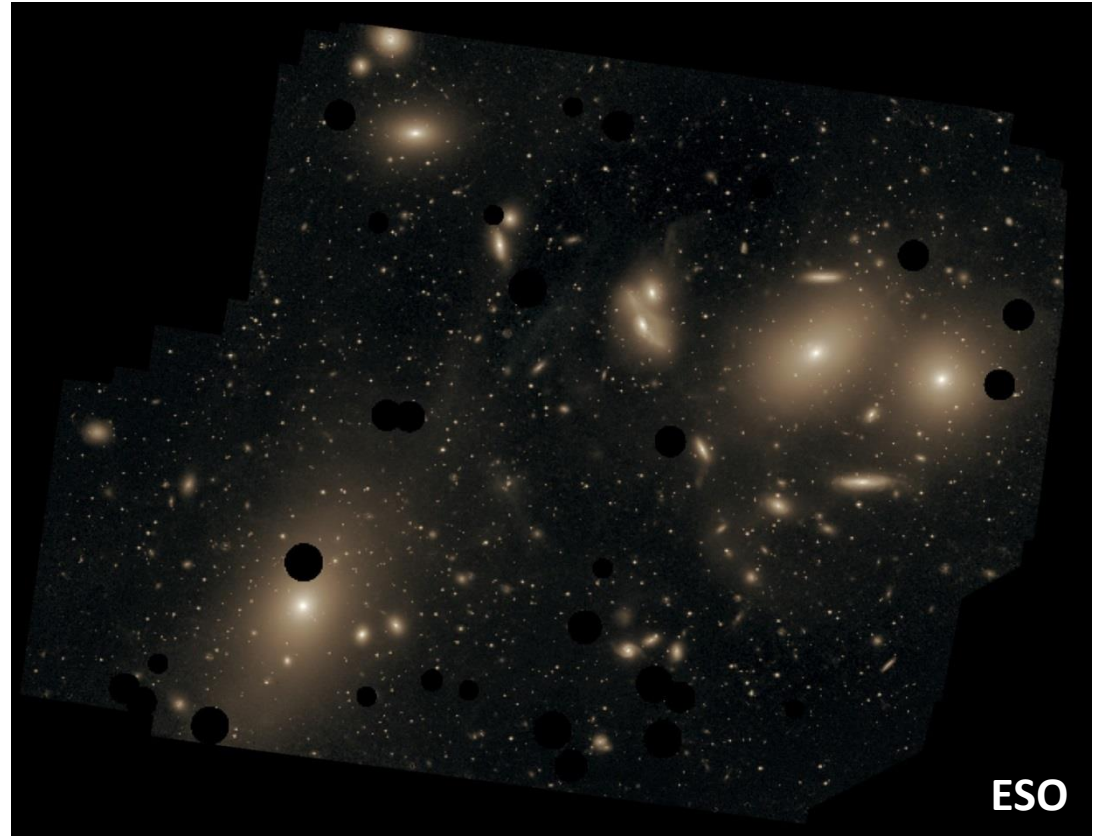
K McQuinn - HST

Galaxy Clusters

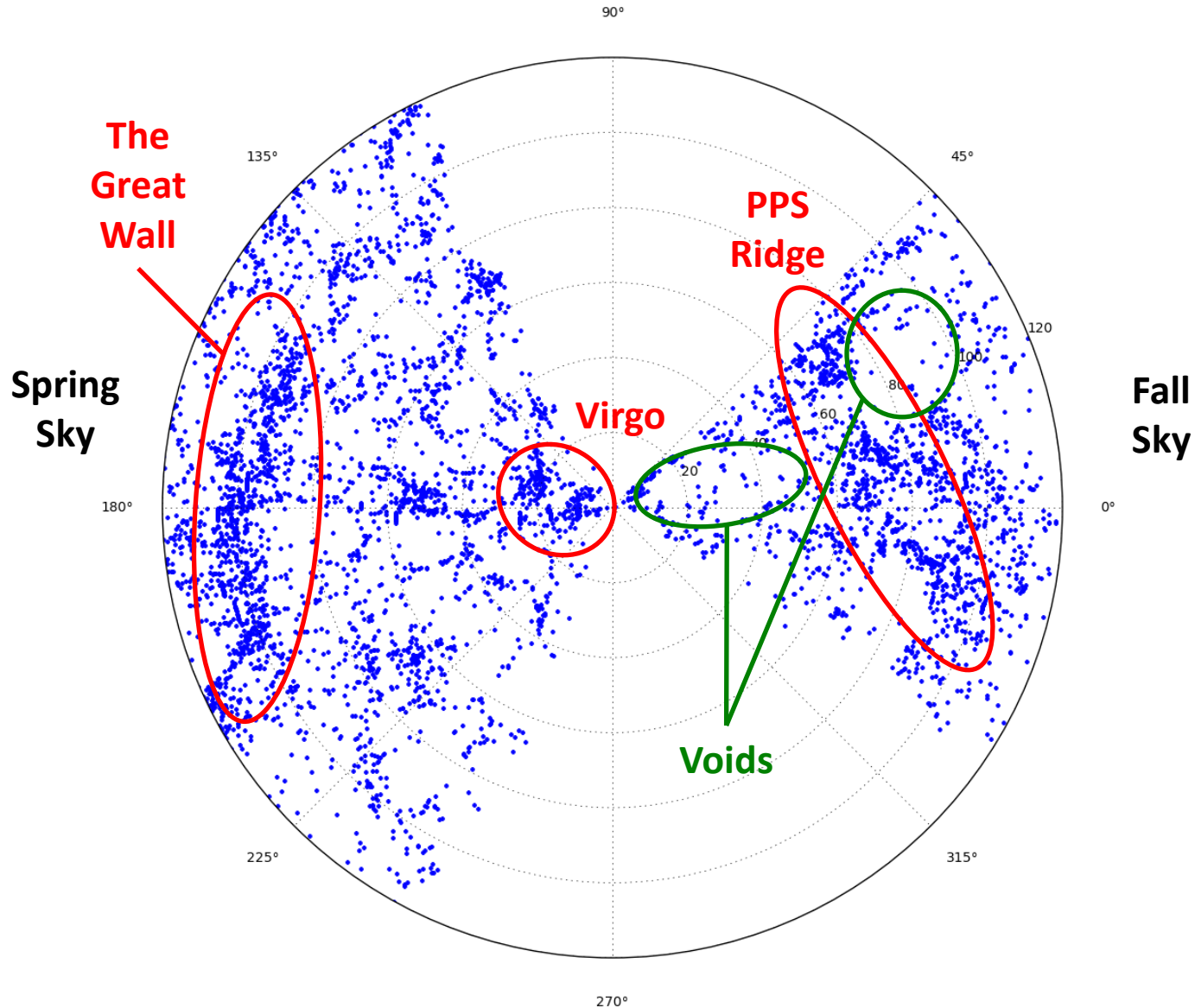
- Clusters are dense groups of 100s or 1000s or galaxies.
- They are gravitationally bound.
- Space between galaxies is filled with ionised gas at millions of Kelvin.
- Their mass is about 1% galaxies, 10% ionised gas, and the rest is dark matter.
- About half of galaxies today reside in clusters.

Virgo Cluster

- 1300 catalogued members
- Distance = 16.5 Mpc
- Velocity dispersion = 1000 km/s
- Mass = $10^{15} M_{\text{sol}}$
- Disrupts the local Hubble flow.

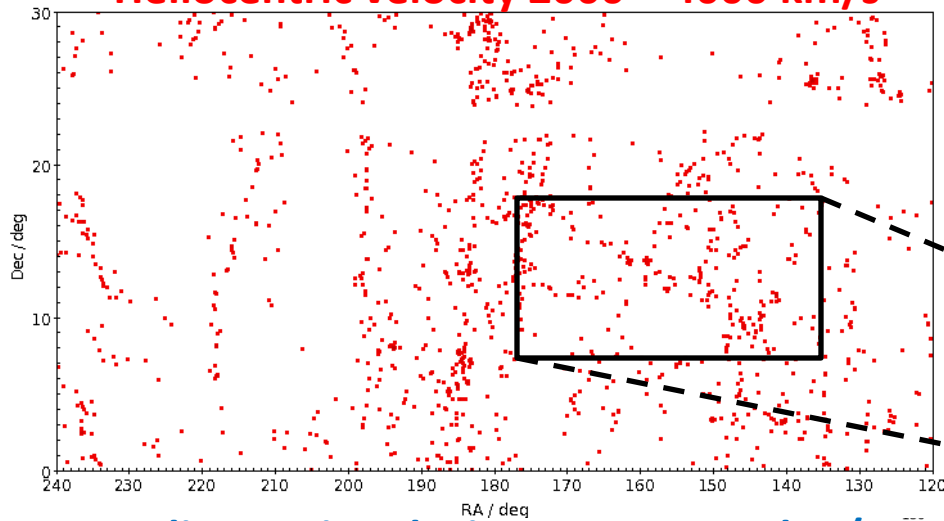


ALFALFA's view of the Local Universe

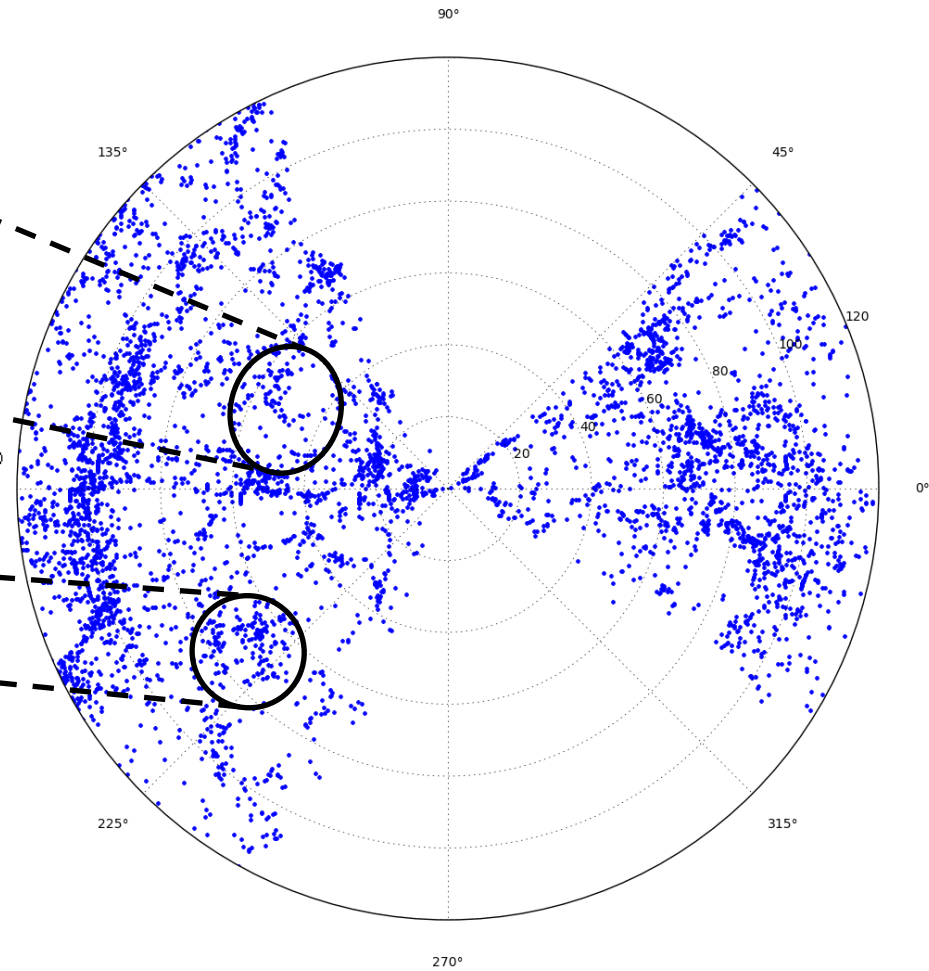
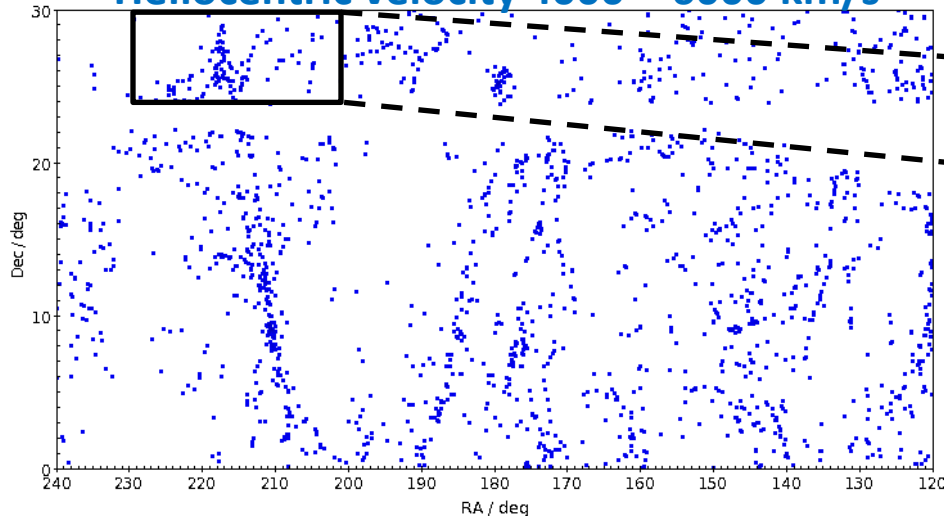


Where are the galaxies we are observing?

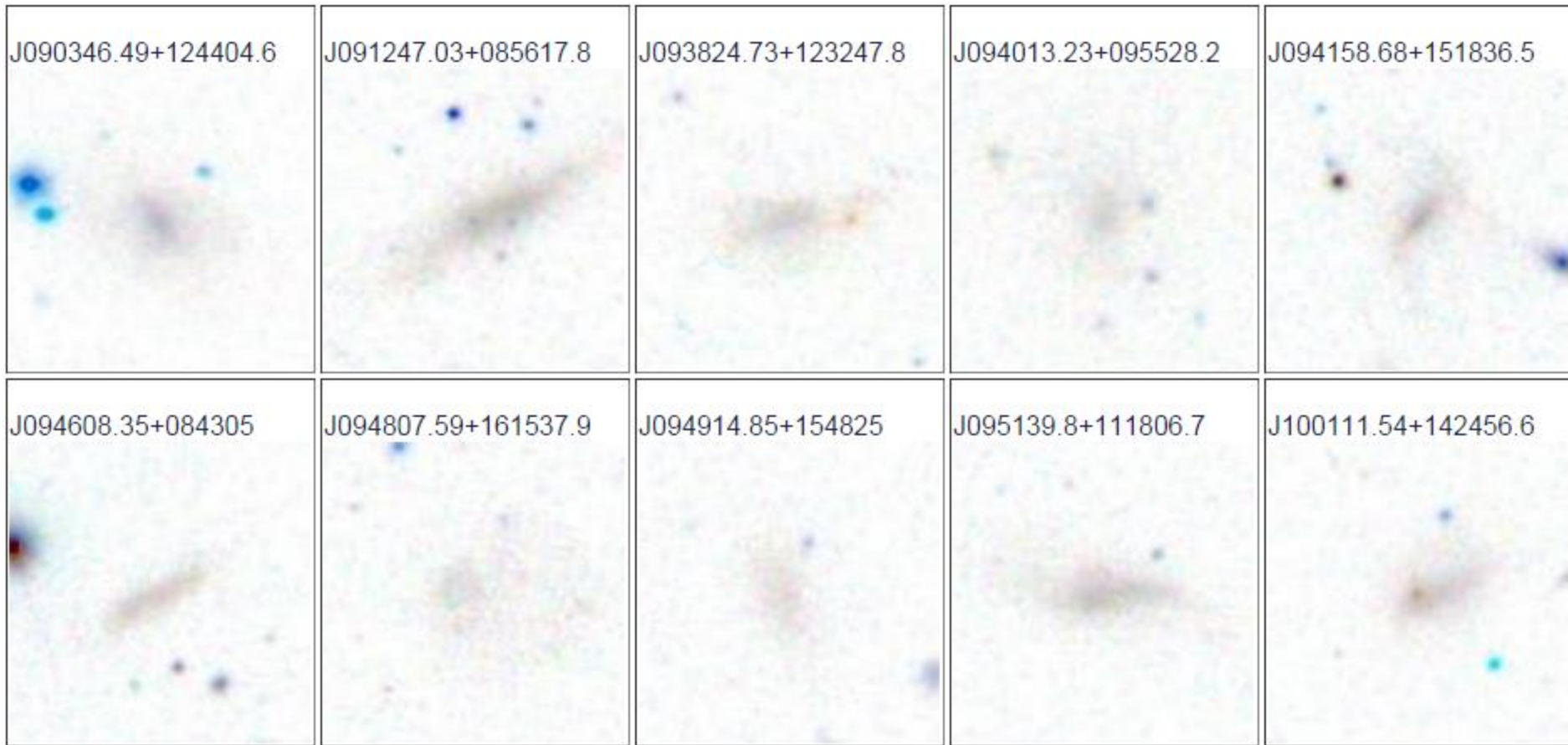
Heliocentric velocity 2000 – 4000 km/s



Heliocentric velocity 4000 – 6000 km/s



What type of galaxies are these?



SDSS

Some Concluding Remarks

- The Milky Way resides in a small group called “The Local Group”.
- The local group sits next to the Virgo Cluster on one side and a void on the other.
- The local group is filled with dwarf galaxies that are difficult to see.
- We are looking for dwarf galaxies (though a little larger) in the Local Universe.

Acknowledgements

- Brian Kent - Probably the original creator of this talk.
- Ann Martin, Greg Hallenbeck and Luke Leisman for their iterations of the talk.

Any Questions?