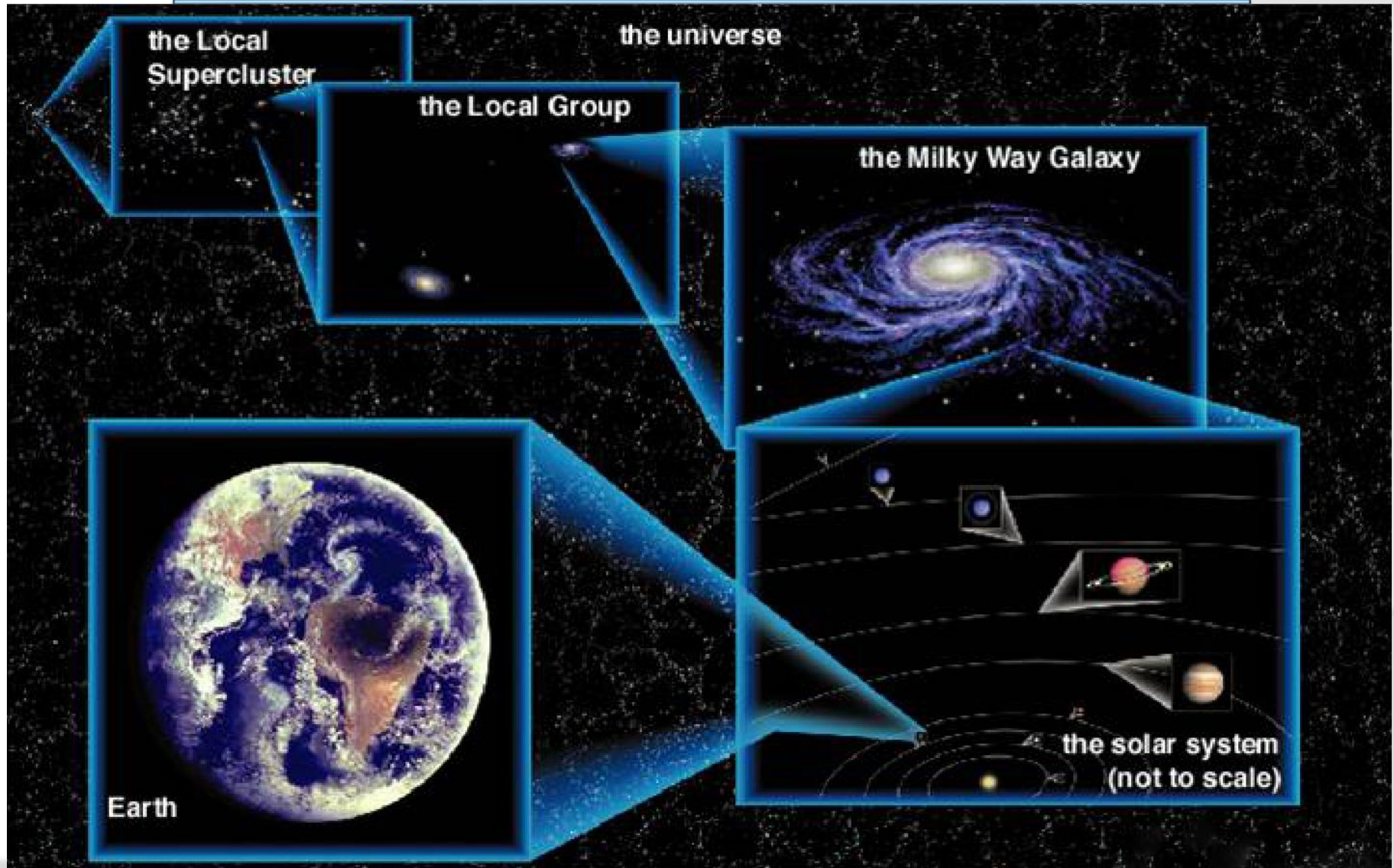




SIZE AND SCALE OF THE UNIVERSE



REALMS OF THE UNIVERSE

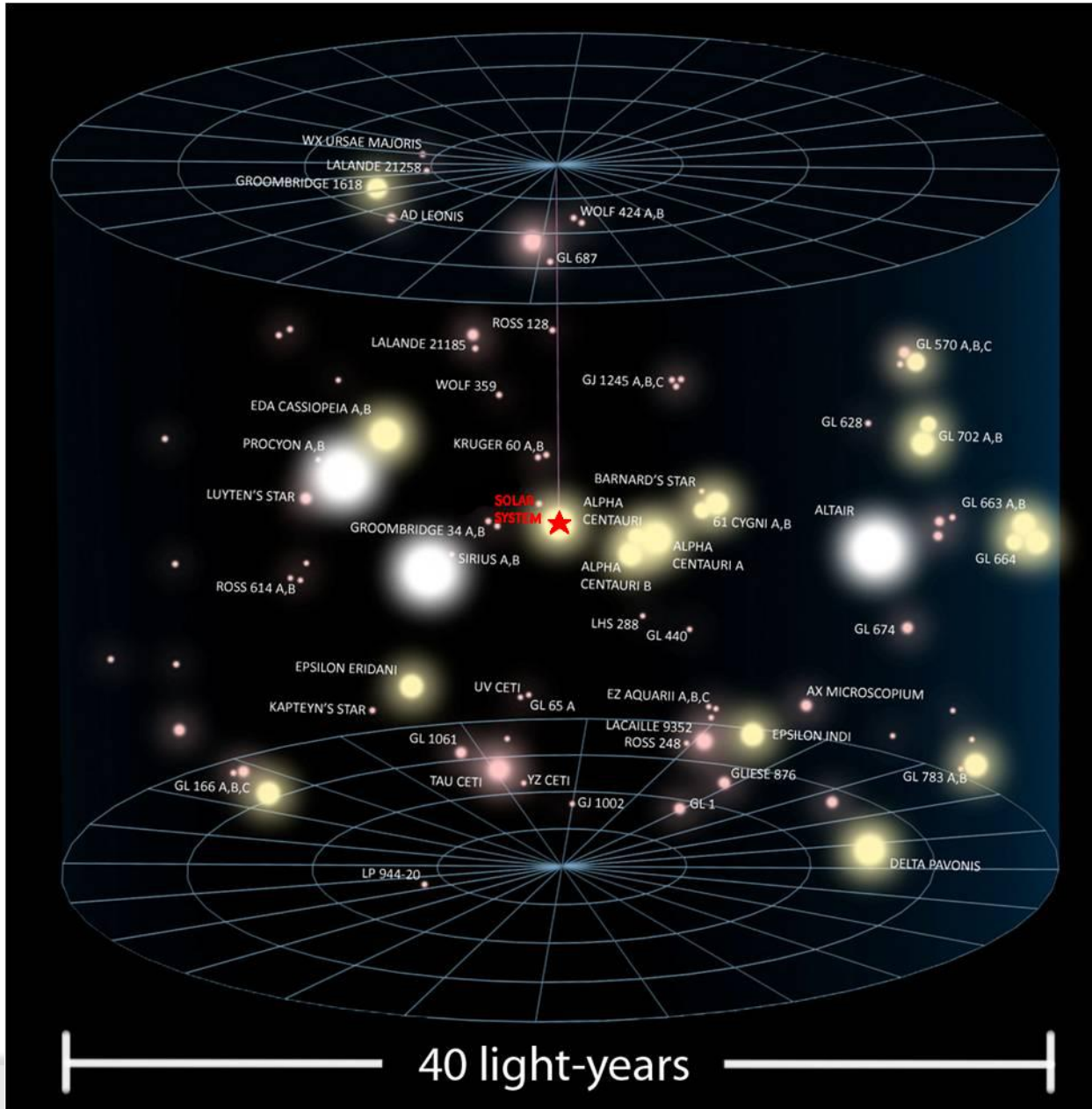




THE SOLAR NEIGHBORHOOD

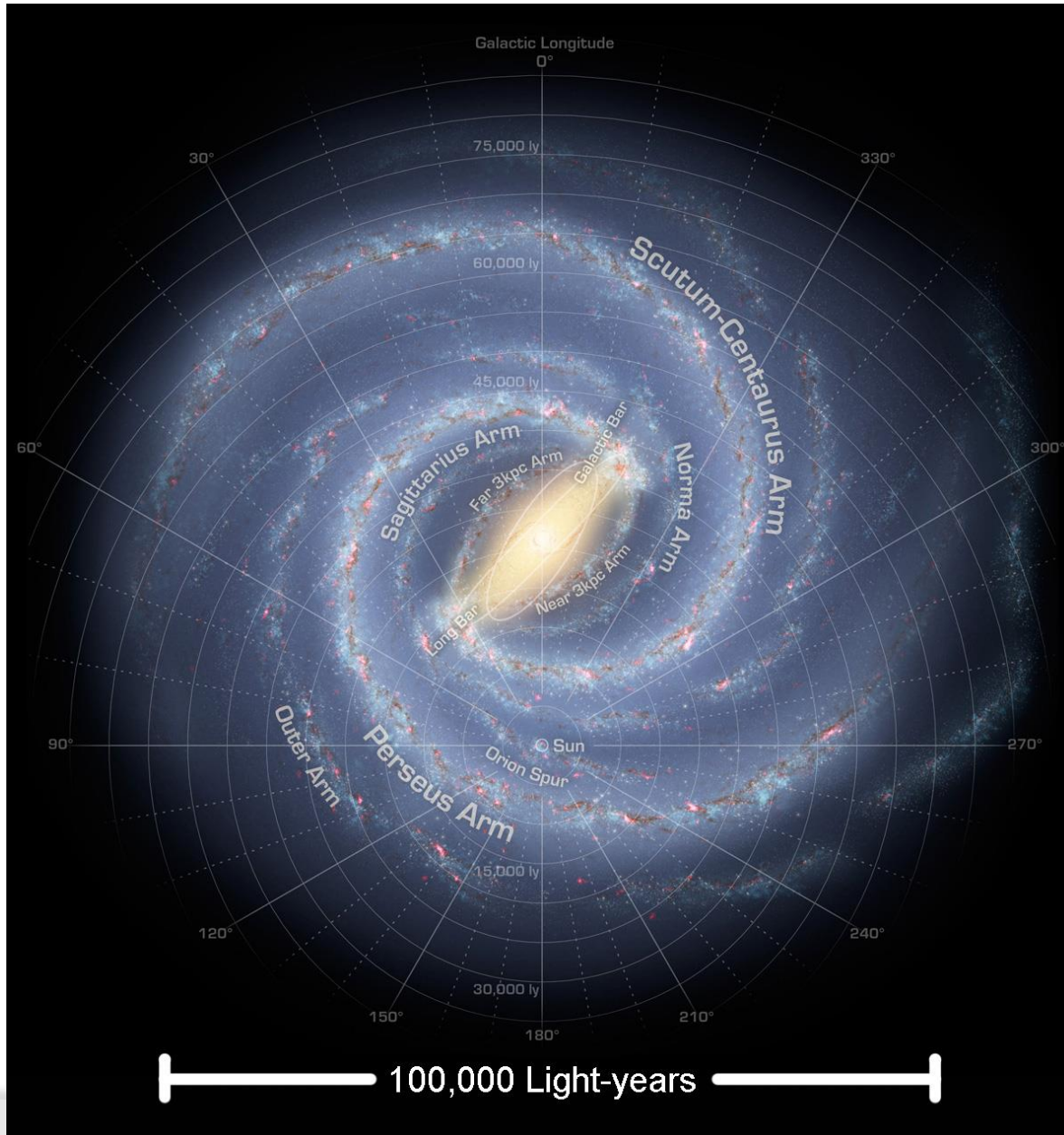
- The region of the Galaxy within about 20 light-years of the Sun (40 light-years diameter)
- A light-year is the **distance** that light travels in one year (~10 trillion kilometers or 63,000 AU)
- The neighborhood stars generally move with the Sun in its orbit around the center of the Galaxy
- The 'Solar Neighborhood' is a vague term not scientifically defined

Note: the size of the stars in this image represents their brightness, they would actually all be specks at this distance





THE MILKY WAY GALAXY

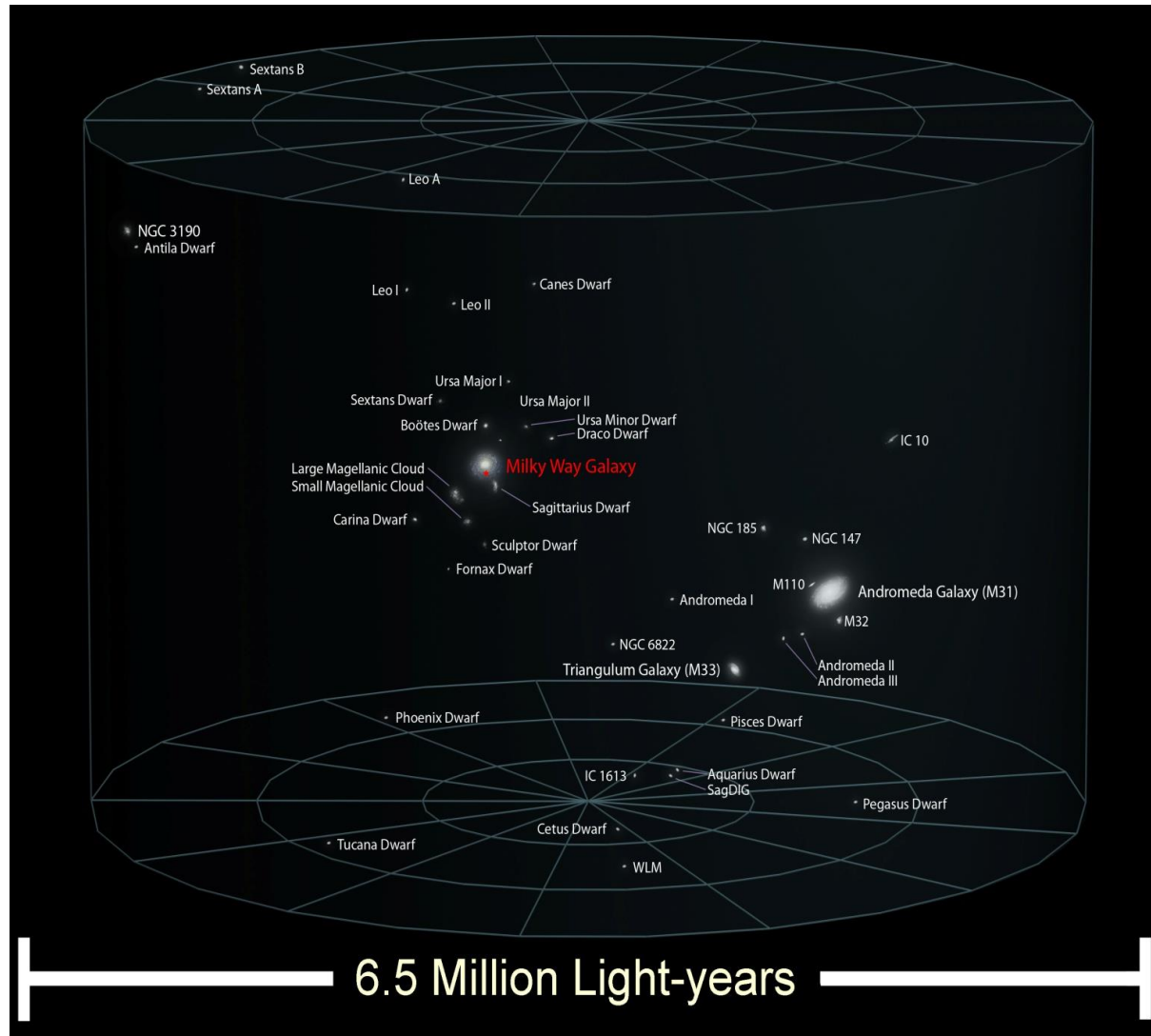


- **The Milky Way Galaxy** is a giant disk of stars 100,000 light-years across and 1,000 light-years thick
- Our solar system is located in the Milky Way Galaxy. Specifically, the Sun is located at the edge of a spiral arm, called **Orion's Arm** (30,000 light-years from the center)
- It takes about 250 million years for the Sun to complete one orbit
- There are over 200 billion stars in the Milky Way



THE LOCAL GROUP

(OF GALAXIES)



- The milky way (our galaxy) is located in a group of galaxies called **The Local Group**.
- About 6.5 million light-years in diameter
- Contains 3 large spiral galaxies -- Milky Way, Andromeda(M31), and Triangulum(M33) -- plus a few dozen dwarf galaxies with elliptical or irregular shapes
- Gravitationally bound together—orbiting about a common center of mass
- Roughly shaped like a football



THE LOCAL SUPERCLUSTER

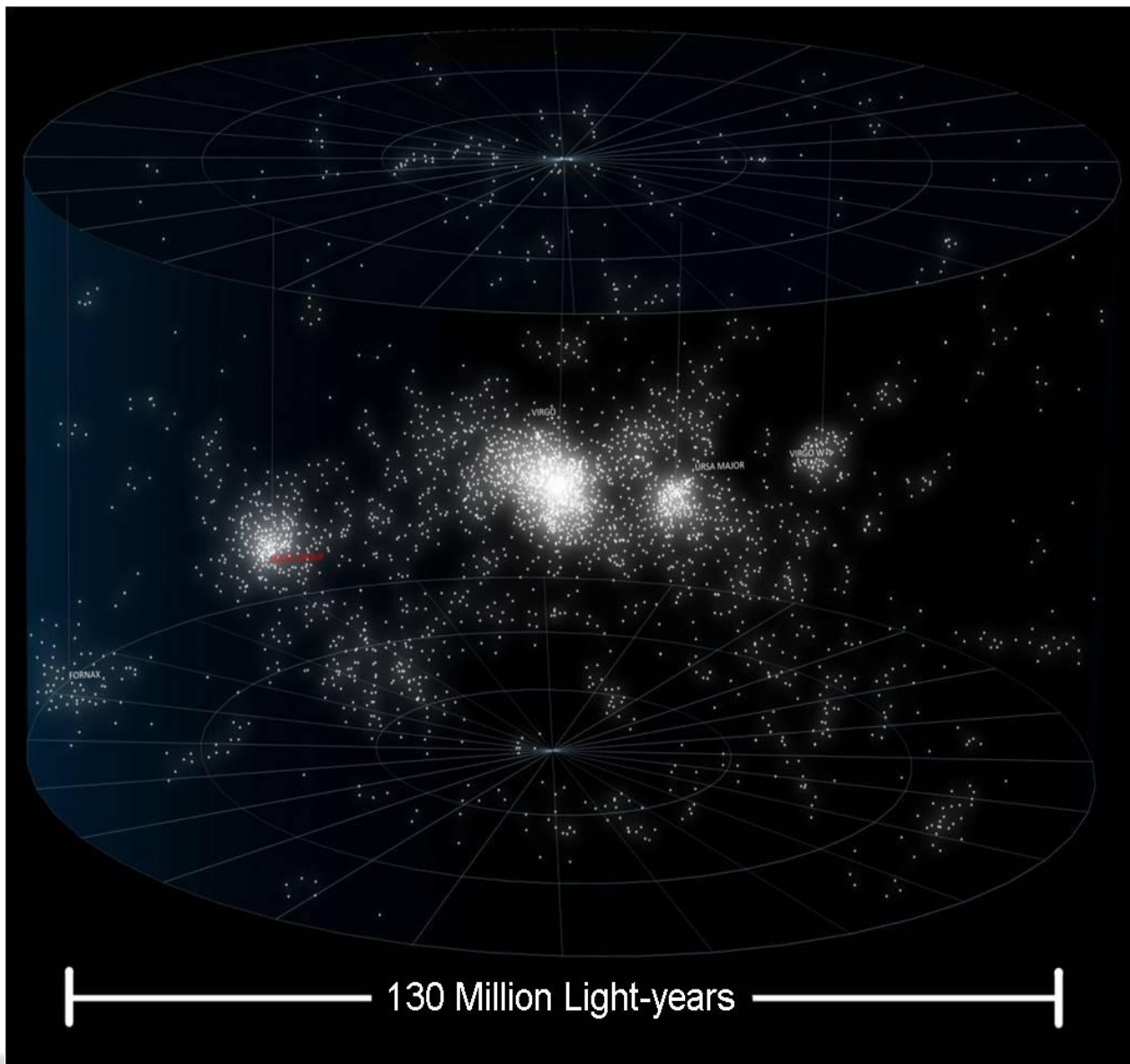


Image credit: Andrew Colvin

- The Local Supercluster is about 130 million light-years across
- It's a huge cluster of thousands upon thousands of galaxies
- Largest cluster is the **Virgo super cluster** (where our galaxy is) containing well over a thousand galaxies
- Clusters and groups of galaxies are gravitationally bound together, however the clusters and groups spread away from each other as the Universe expands
- Roughly pancake shaped

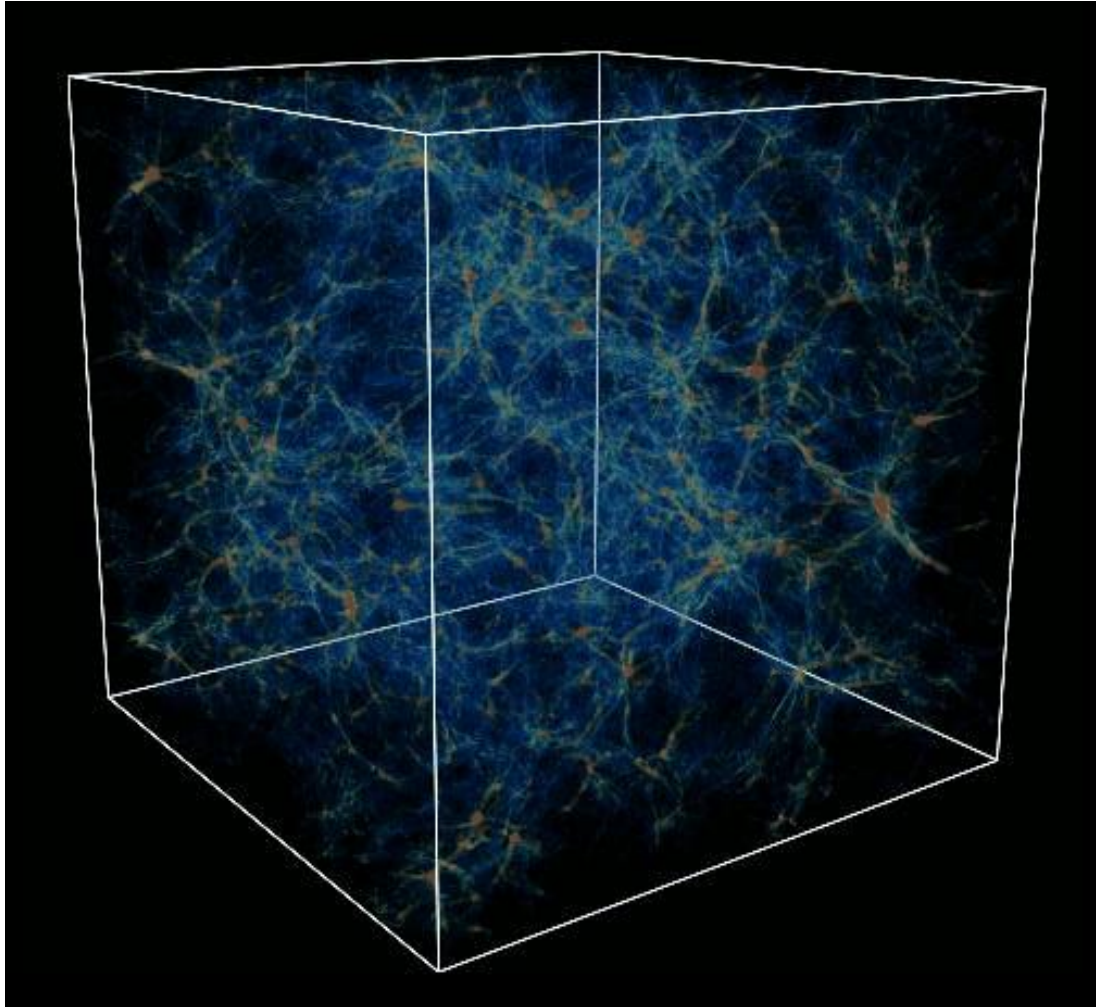


Image Credit: G.L. Bryan, M. L. Norman, UIUC, NCSA, GC3

- Computer simulations also show a similar structure, often called the “Cosmic Web”

THE UNIVERSE

(THE OBSERVABLE PORTION)

- Great walls and filaments of galaxy clusters surrounding voids containing no galaxies
- Probably at least 100 billion galaxies in the Universe
- Surveys of galaxies reveal a web-like or honeycomb structure to the Universe

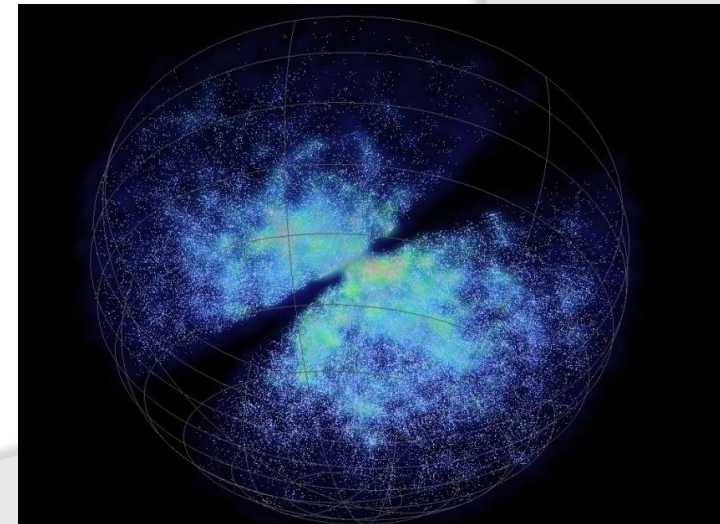


Image Credit: Dr Chris Fluke, Centre for Astrophysics and Supercomputing, Swinburne University of Technology



THE UNIVERSE

(THE OBSERVABLE PORTION)

- The Observable Universe is currently about **91 billion light-years** across
- There could be (and likely is) much more beyond that, but we cannot see it from this point in spacetime
- *Note: The matter that we can see glowing shortly after the Big Bang (detected by the light it emitted 13.7 billion years ago) is now about 46 billion light-years away due to the ongoing expansion of the fabric of the Universe*

