

Astronomy 25

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- Stellar evolution
- Supernova explosions
- Black Holes in active galactic nuclei
- Gravitational waves events



Some logistics

- AST10S/AST10G/AST25, what is the difference?

AST10S

solar system, sun, planets,
exoplanets

AST10G

Milky Way, galaxy
evolution, cosmology

AST25

AST10G
(with more math)

Some logistics

- Communication will be electronic
 - Check your email regularly!
- Look at the course site on canvas regularly
 - [CANVAS.UCDAVIS.EDU](https://canvas.ucdavis.edu)
 - Choose AST 025
- Important features of the web site
 - Lectures, Homework, Quizzes, etc. will be posted there
 - Modules page shows week to week information and assignments – it is, in effect, an evolving version of the syllabus
 - The “General Course Information” module has important info

Introduction to canvas

Canvas (AST 25)

The screenshot shows a portion of the Canvas course interface. At the top, there's a navigation bar with icons for Home, Courses, Grades, Announcements, and Help. Below the navigation bar, the course structure is displayed in three main sections:

- General Course Information**: Contains links for "General Information" and "syllabus".
- Week 1**: Contains a Quiz (due Apr 6) and a Homework assignment (due Apr 8).
- Week 2**: Contains a Quiz (due Apr 6), a Homework assignment (due Apr 8), and a LAB assignment (due Apr 6).
- Week 3**: Contains a Quiz (due Apr 13), a Homework assignment (due Apr 15), and a LAB assignment (due Apr 13).

Each item in the course structure has a green checkmark icon, a plus sign for adding new items, and a three-dot menu icon.

Canvas (AST 25)

The screenshot shows the Canvas course interface for AST 25. It displays three main sections: General Course Information, Week 1, and Week 2.

General Course Information:

- General Information
- syllabus** (circled in red)

Week 1:

- Quiz 1 (due Apr 6 | 4 pts)
- Homework 1 (due Apr 8 | 100 pts)
- LAB1 (due Apr 6 | 100 pts)

Week 2:

- Quiz 2 (due Apr 13 | 4 pts)
- Homework 2 (due Apr 15 | 100 pts)
- LAB2 (due Apr 13 | 100 pts)

(Part of) Syllabus

Note: syllabus is subject to change.

Date	Topics	Lecture	Assignment Due	Associated Reading
Mon 31 Mar Wen 02 Apr Fri 04 Apr	Introduction to the Universe; astronomical distance scales and units Kepler's Laws	Lecture 1 Lecture 2 Lecture 3		Chapter 1.1-1.2 Chapter 2.1 (angular sizes) Chapter 3.3-3.5 Chapter 4.1-4.2, 4.4
Mon 7 Apr Wen 9 Apr Fri 11 Apr	Energy Gravity according to Einstein Kepler's Laws revisited Matter Properties of Light Thermal radiation	Lecture 4 Lecture 5 Lecture 6	Quiz#1 (due Mon) HW#1 (due Wed) LAB#1 (due Thu)	Chapter 4.3, 4.5 Chapter S3.1-S3.3 Chapter 5.3
Mon 14 Apr Wen 16 Apr Fri 18 Apr	Spectral Lines Telescopes Our Sun	Lecture 7 Lecture 8 Lecture 9	Quiz#2 (due Mon) HW#2 (due Wed) LAB#2 (due Thu)	Chapter 5 Chapter 6 Chapter 14
	Energy Transport	Lecture 10	Quiz#3 (due Mon)	

Canvas (AST 25)

The screenshot shows the Canvas course interface for AST 25. It displays four main sections: General Course Information, Week 1, Week 2, and Week 3. Each section contains various course items like quizzes, homework assignments, and labs, each with a due date and points.

- General Course Information:**
 - General Information** (circled in red)
 - syllabus**
- Week 1:**
 - Quiz 1** | Apr 6 | 4 pts
 - Homework 1** | Apr 8 | 100 pts
 - LAB1** | Apr 6 | 100 pts
- Week 2:**
 - Quiz 2** | Apr 13 | 4 pts
 - Homework 2** | Apr 15 | 100 pts
 - LAB2** | Apr 13 | 100 pts
- Week 3:**
 - Quiz 2** | Apr 13 | 4 pts
 - Homework 2** | Apr 15 | 100 pts
 - LAB2** | Apr 13 | 100 pts

Some logistics

- In the “general Information” link you can find info on the following:
 - Textbook
 - Exams
 - Homework
 - LABS
 - Office hours
 - On-line quizzes

(Part of) General Info Page

General Information

Astronomy AST25 - General Information

Lectures: MWF 2:10-3:00PM

Course website: on UC Davis Canvas

Instructor: Prof. Stefano Valenti

TA: Kelsey Glazer,

Email: valenti@ucdavis.edu

Email: ksglazer@ucdavis.edu

Office Hours: TBD

Office Hours: TBD

<https://ucdavis.zoom.us/j/6018765982>

Final exam: June 12. 3:30 p.m.

Course Description

This class is an introduction to astronomy, with a focus on stars and galaxies. Through this course we will also learn about the history, contents, and ultimate fate of the Universe. Unfortunately 10 weeks is a very short time and we will cover only a small fraction of the amazing phenomena in the universe -- things like black holes, exploding stars, and the birth of the universe. The course is split into three parts. In the first part we will develop a scientific toolbox for understanding the forces of nature, matter, energy, and light. The second part of the course will focus on the life cycle of stars including the Sun, culminating in the deaths and remnants of stars. In the third part we will learn about the Milky Way and other galaxies, the contents of the universe, and the history of the universe including the big bang.

In order to get the most out of class, you should read the chapters beforehand so that you are familiar with the material that I will be covering. To encourage this, there will be on-line quizzes (worth 5%).

Textbook:

The textbook for this class is "**The Cosmic Perspective: Stars, Galaxies, and Cosmology**" by Bennett, Donahue, Schneider, and Voit. You can also use the full textbook "**The Cosmic Perspective**" which contains material for both this course and Astronomy 10G/10S. "Stars, Galaxies, and Cosmology" contains those chapters from the full book that we will be reading in this course. You should get the **6th edition or later (6th, 7th, 8th, or 9th)**. The

AST25 Textbook

Wrong Option	GOOD OPTION
The Cosmic Perspective The Solar System	The Cosmic Perspective Stars, Galaxies and Cosmology
The Cosmic Perspective (full book)	

DO NOT BUY “The Solar System”!!

6th, 7th, 8th, 9th edition are ok
(5th is also almost ok)

Course grading

- Exams (2 midterms, 1 final): 60% (20%, 20%, 20%)
- Homework: 20%
- Quizzes: 5%
- Lab homework: 15%
 - Quizzes due on Monday
 - HW due on Wednesday
 - Labs: due on Thursdays

Online Office Hours

- Course grader and I will have office hours
- A chance for you to ask questions: about the homework or anything else about astronomy
- When and where? Check the Important Information link in Canvas

Let's start !!!

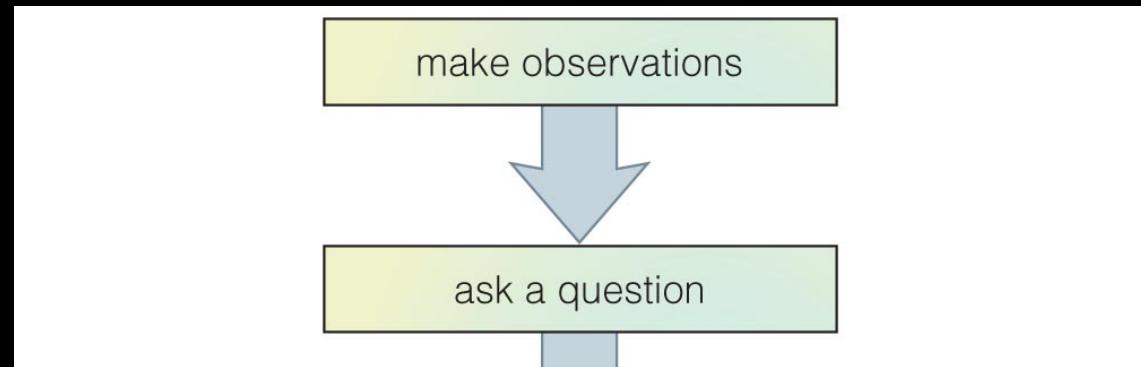
Chapter 1.1-1.2

What is astronomy ?

- Astronomy is a science (astrophysics)

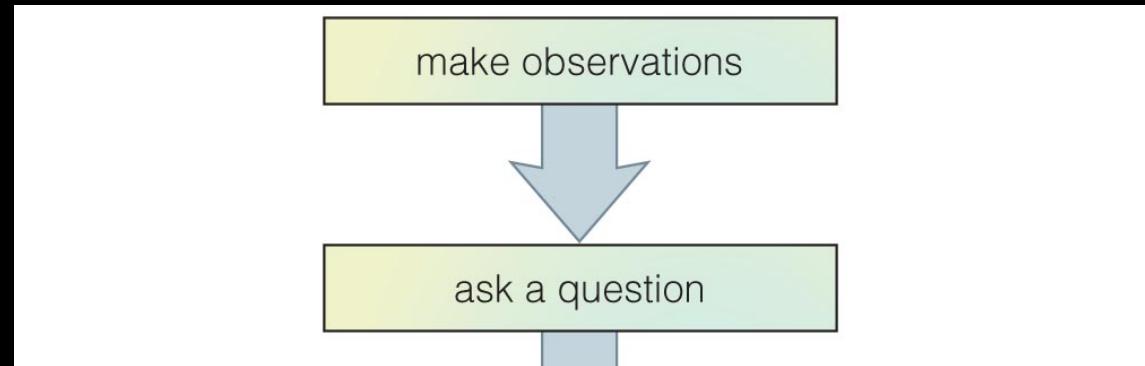
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What is our address in the Universe?

Why are there planets around stars?

Why planets move around stars?

Is/was there life on other planets?

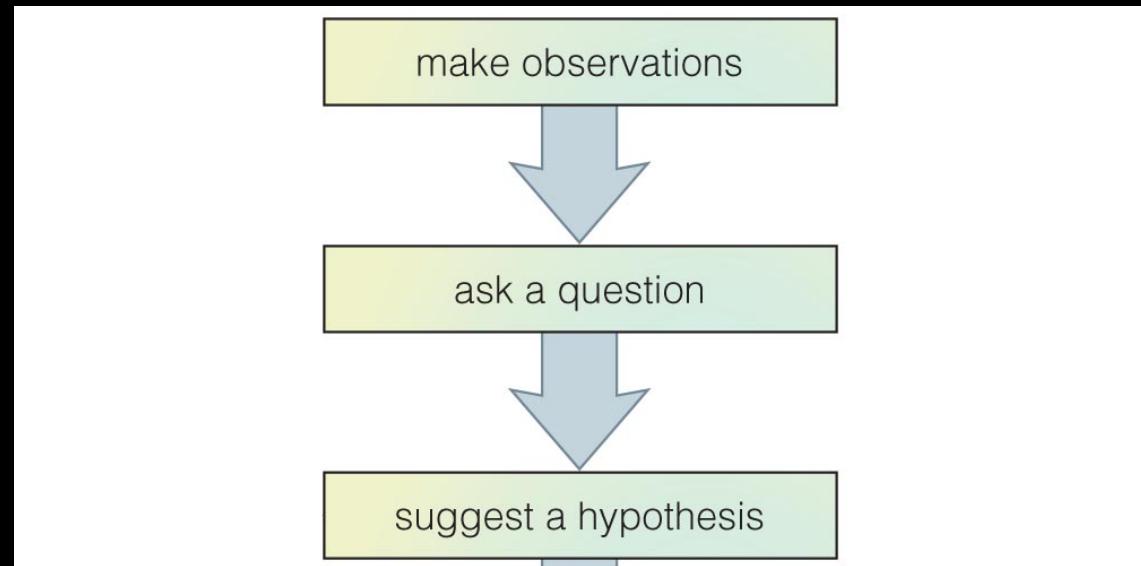
How long the Sun will be there?

Why the moon has phases?

How we can use telescopes to learn all of these?

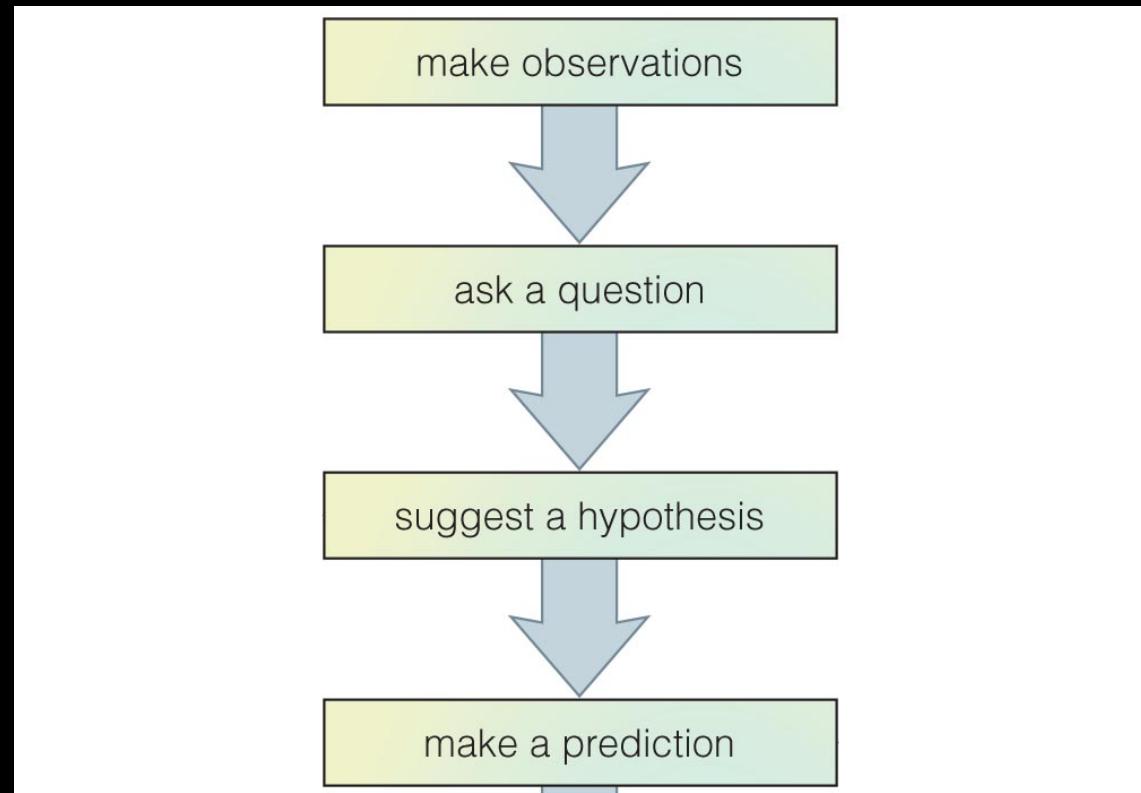
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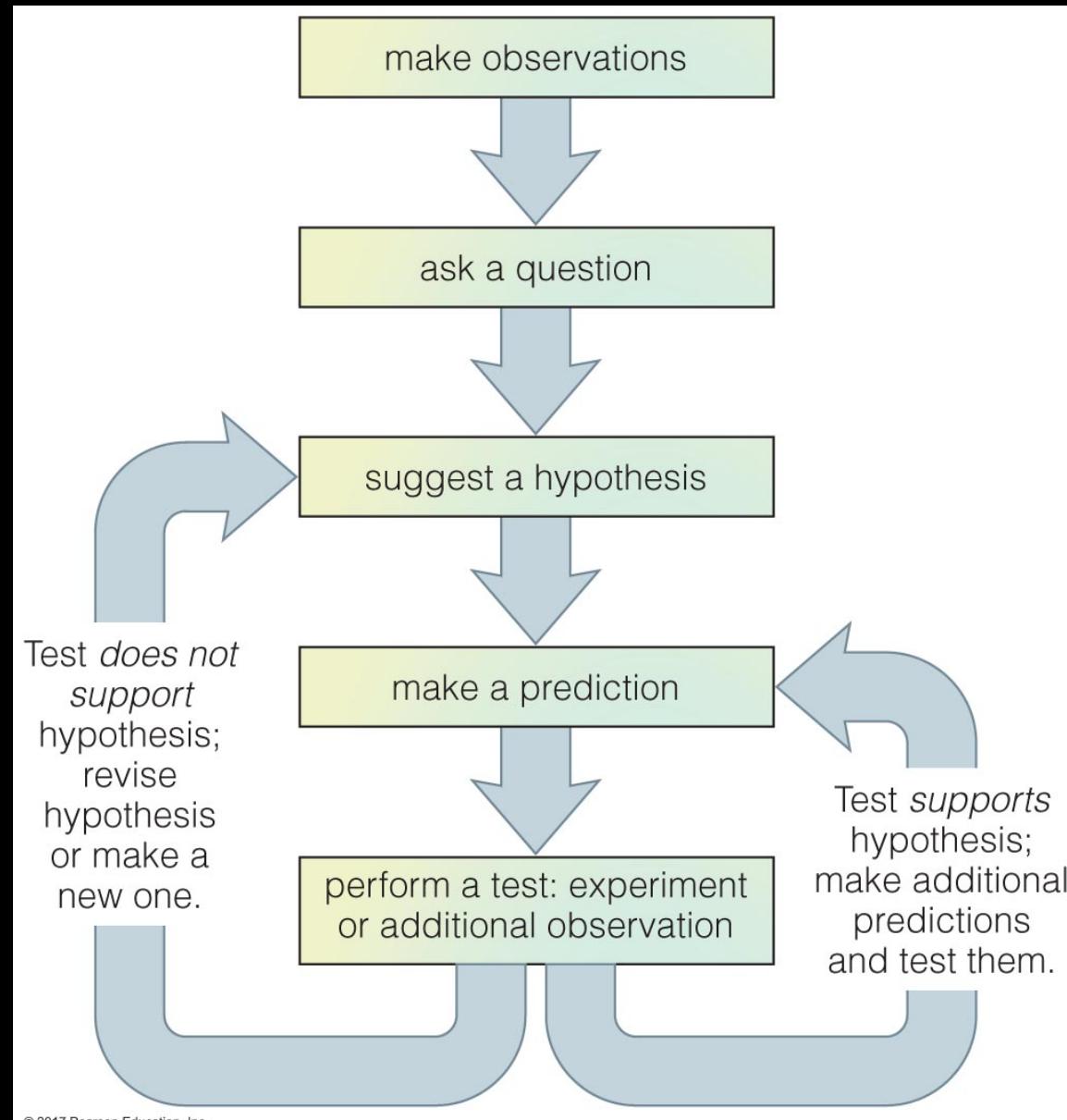
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- We make observations of the Universe and try to figure out what is going on
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 - Make more observations to test the predictions made by the hypothesis
 - Revise the hypothesis
 - etc., etc.

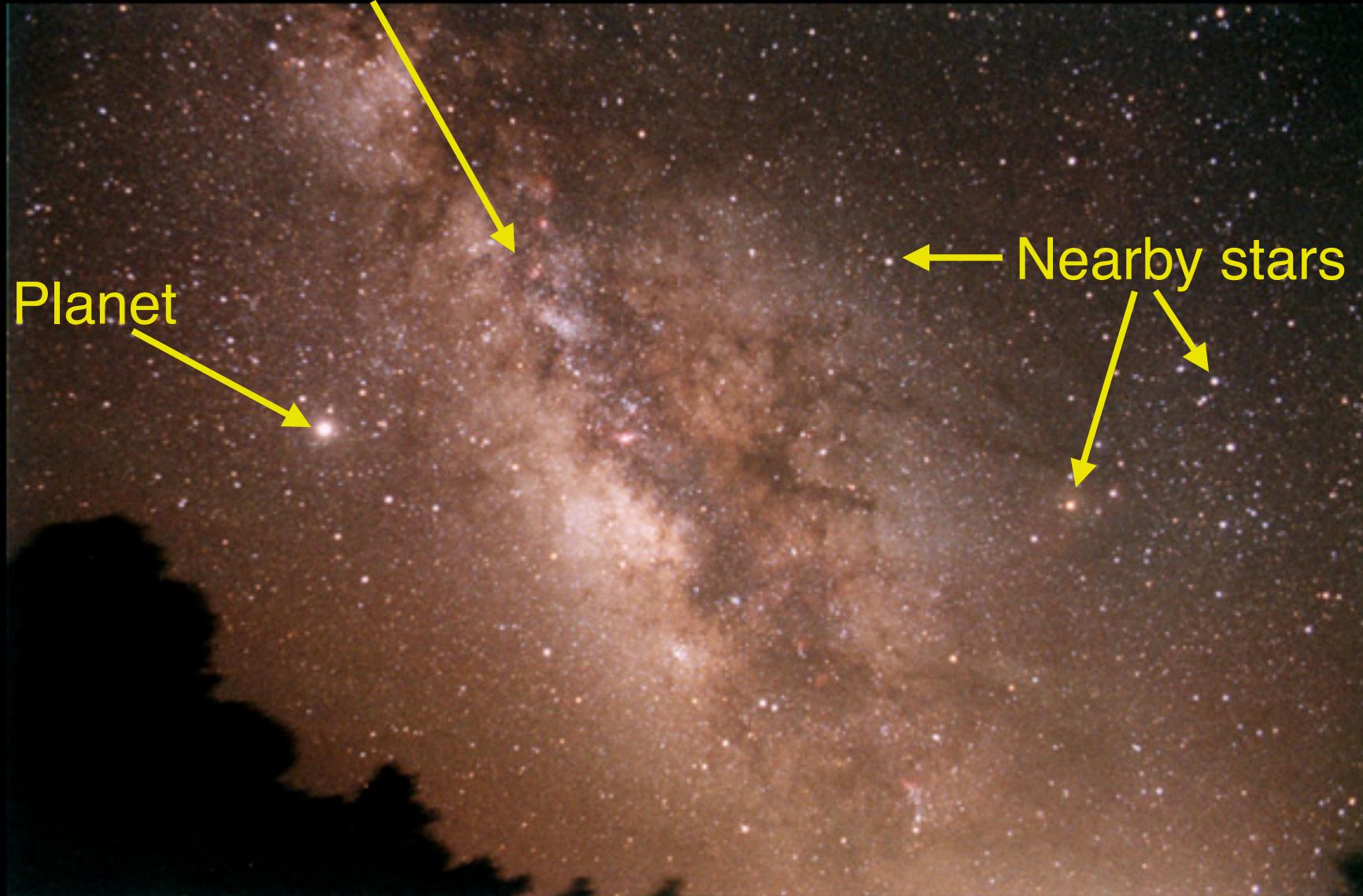
How astronomy began...



The Milky Way, made of billion stars (10^{11}), one of which is the sun. The center is about 2 billion times further away from us than we are from the sun.



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Our cosmic address

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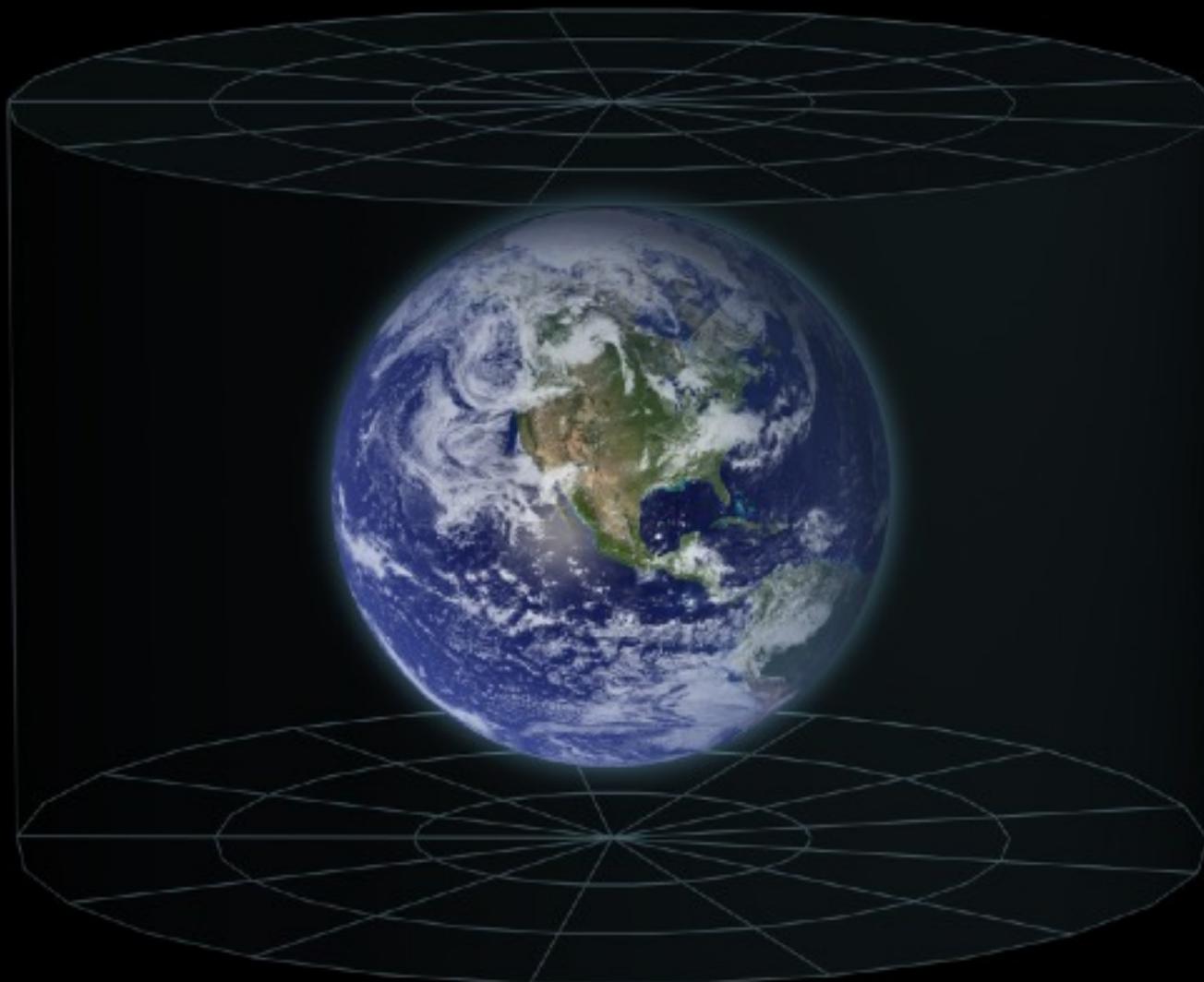
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- Don't confuse galaxies with solar systems!
- With these structures, we can give our “cosmic address”

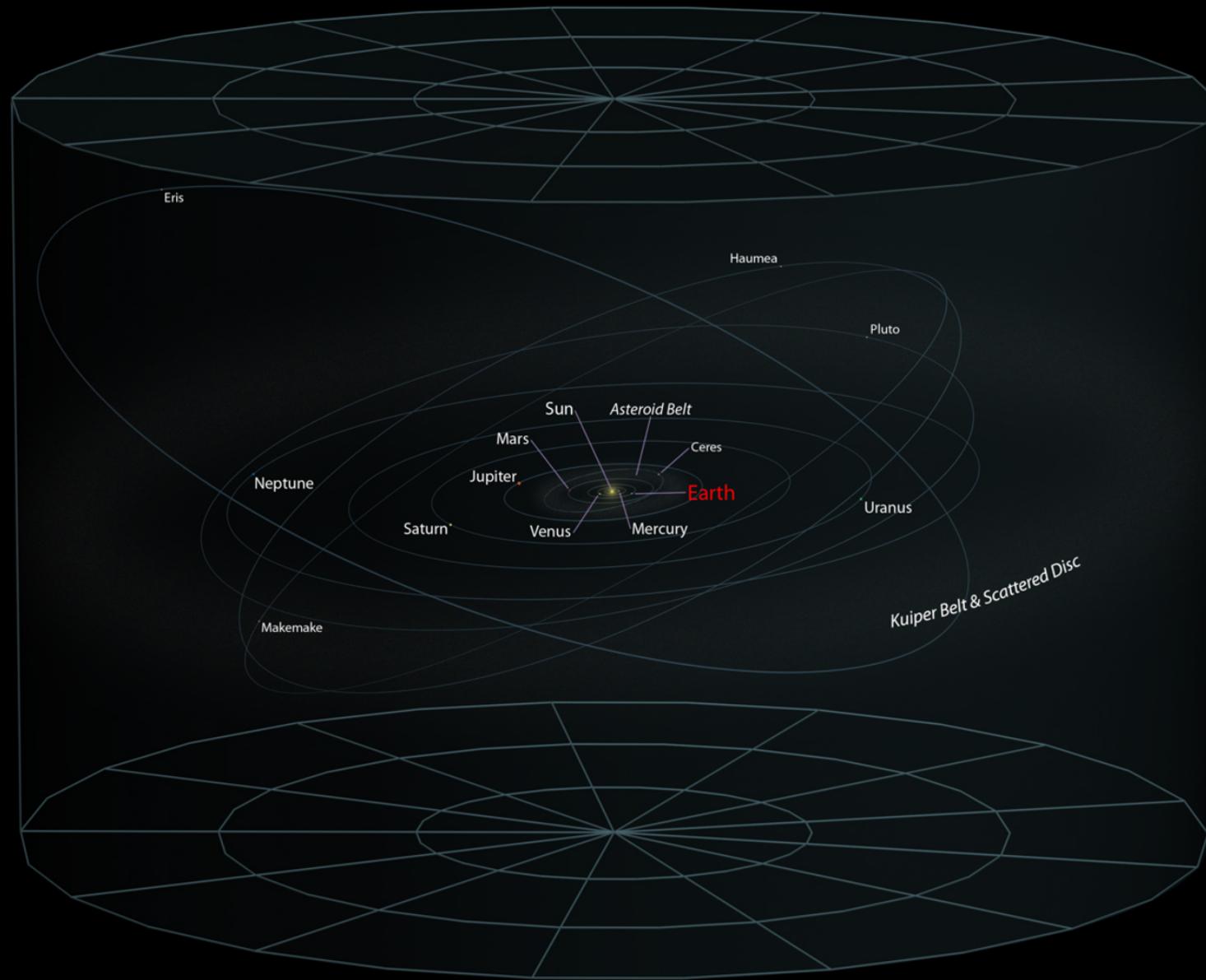
Where are we in the Universe?

EARTH



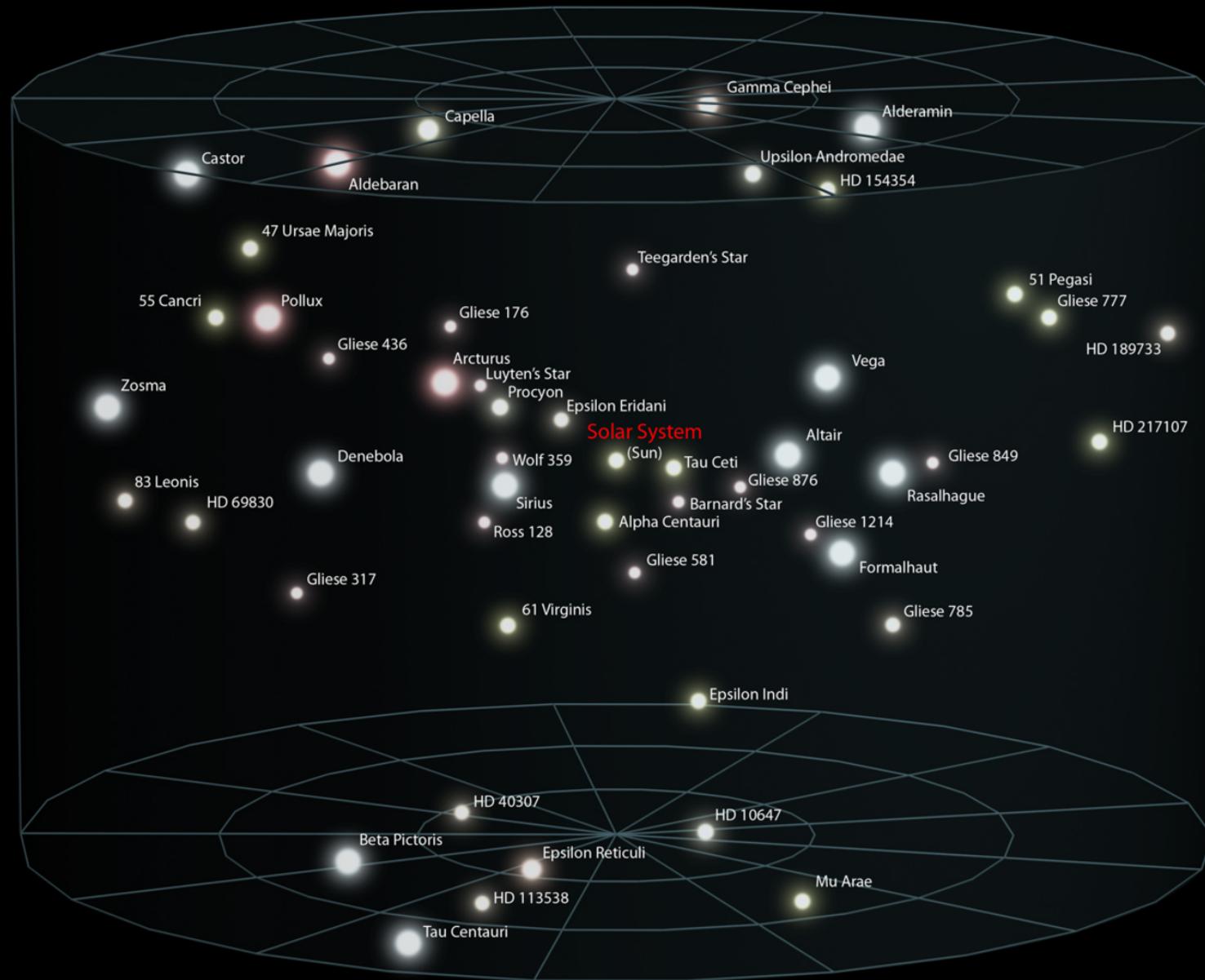
Where are we in the Universe?

SOLAR SYSTEM



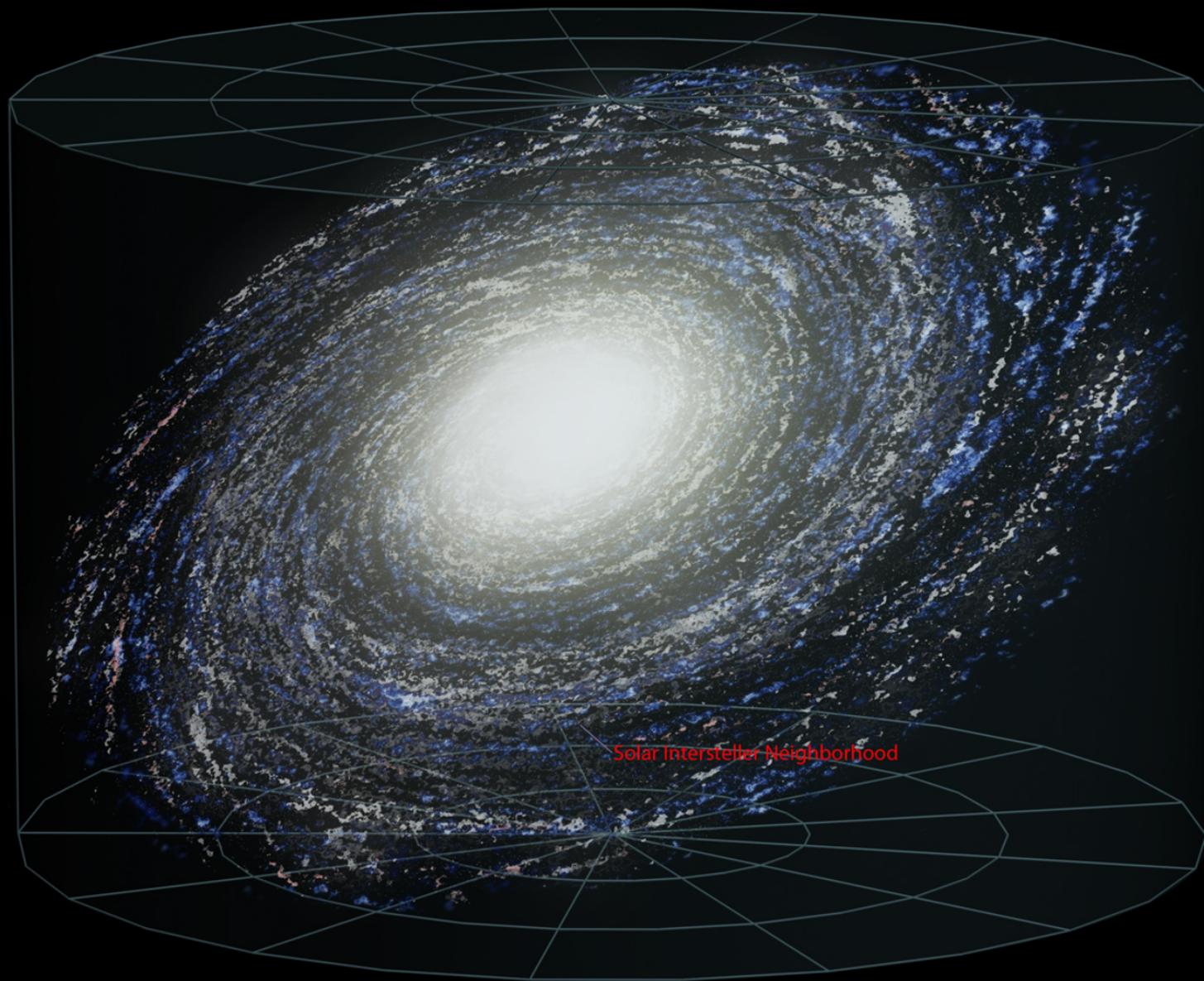
Where are we in the Universe?

INTERSTELLAR NEIGHBORHOOD



Where are we in the Universe?

MILKY WAY GALAXY

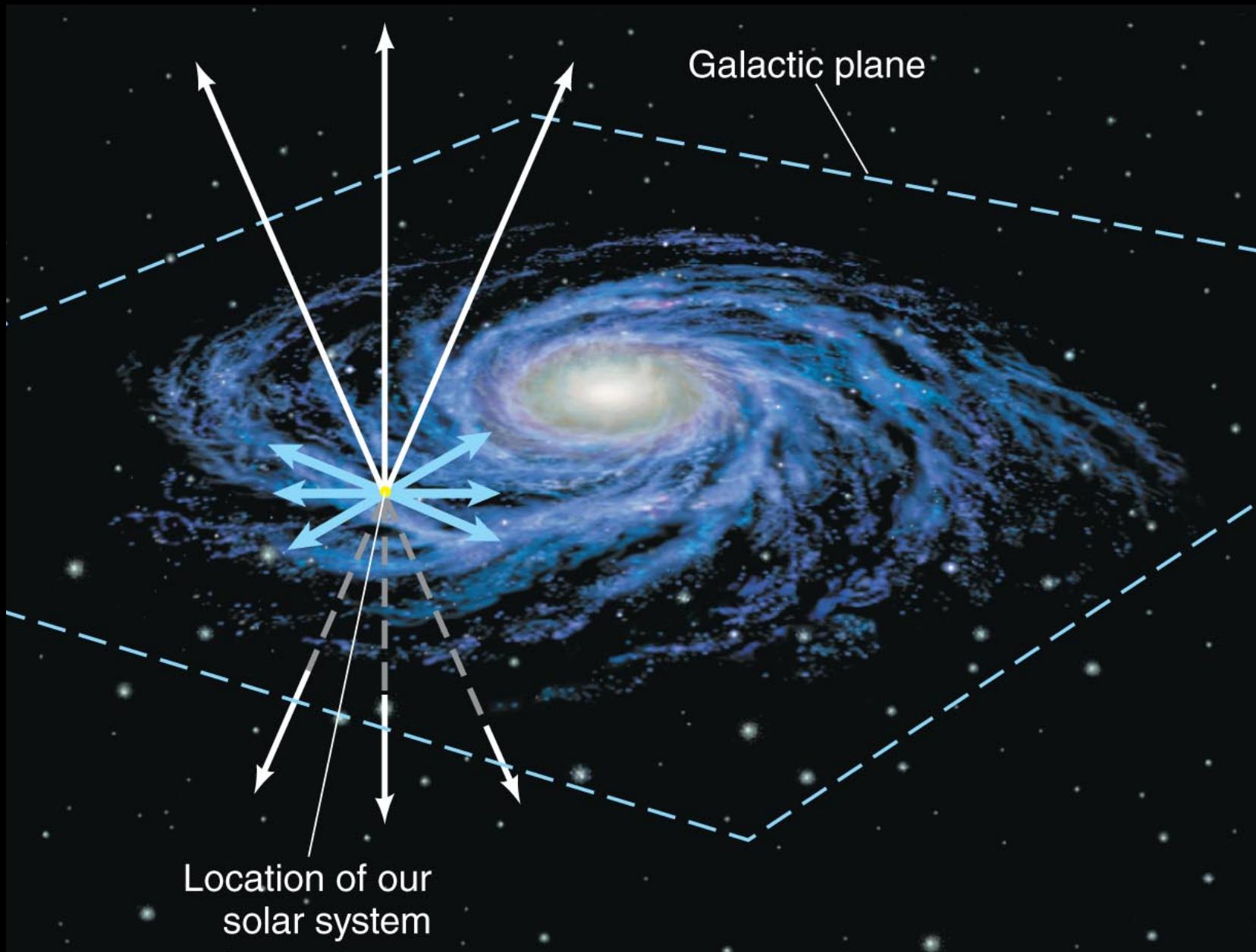


All-sky View of the Milky Way

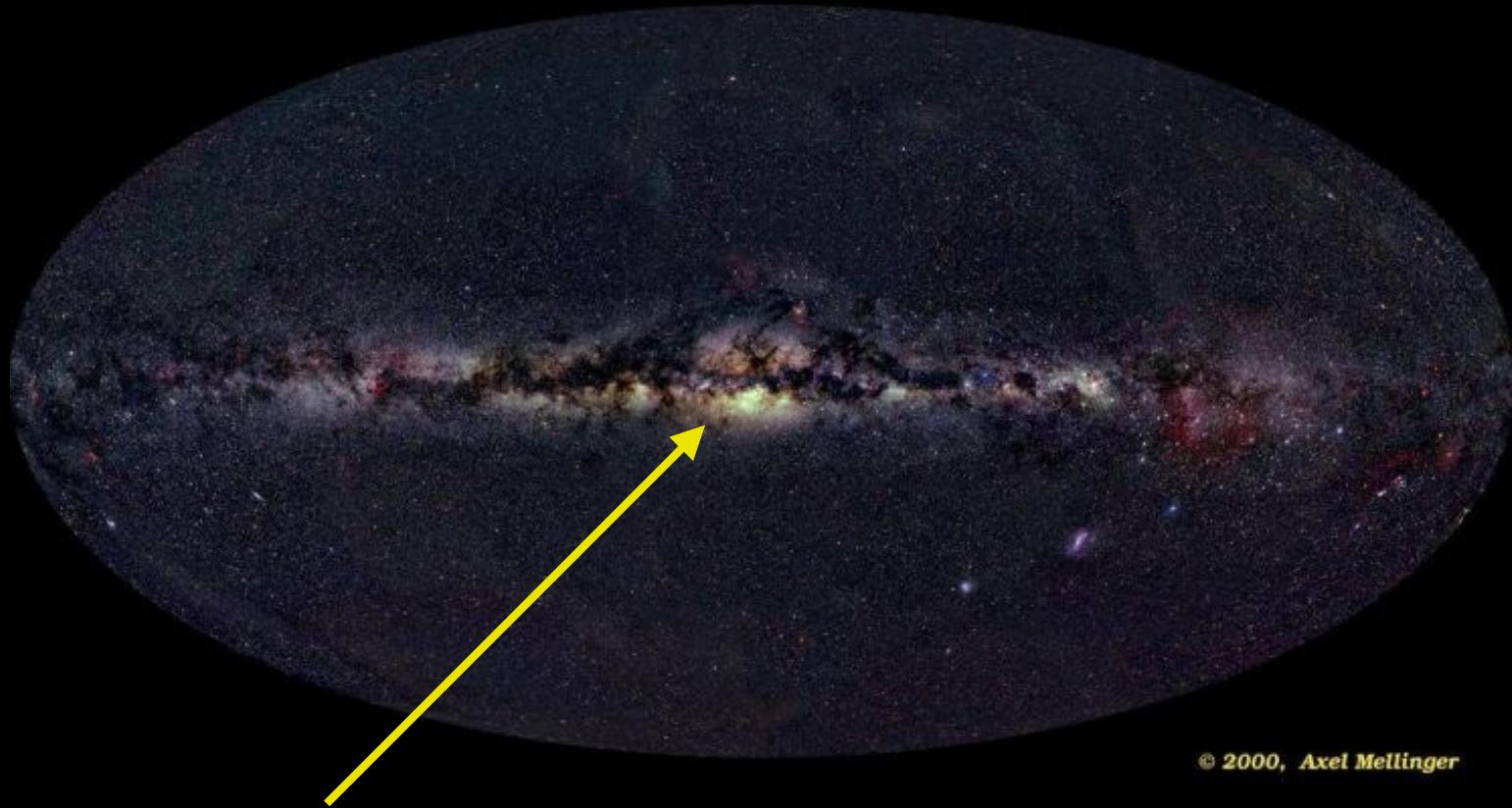


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Milky Way (from inside)



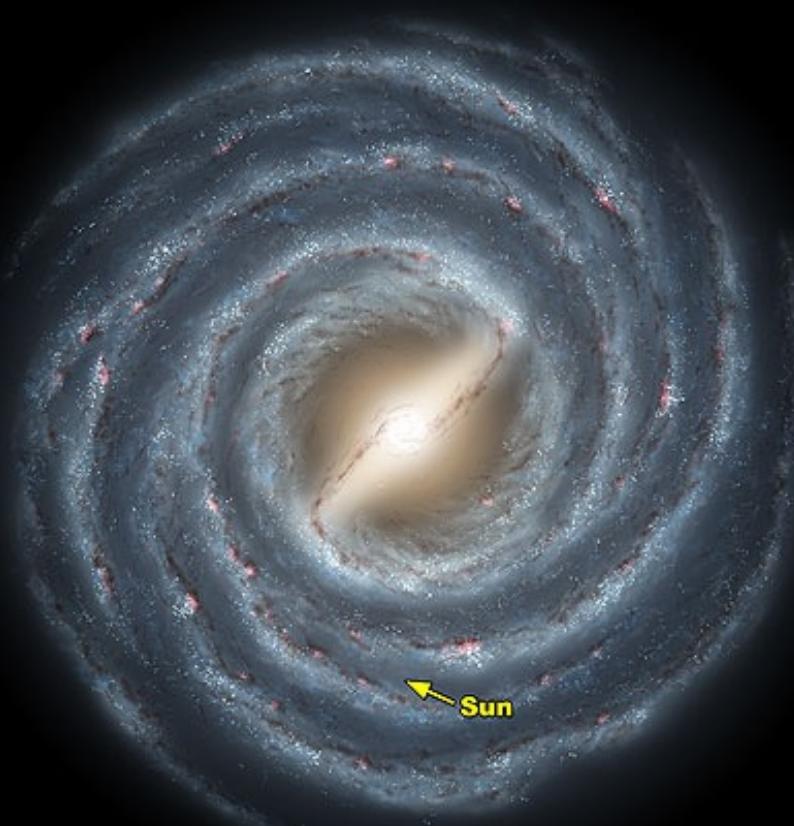
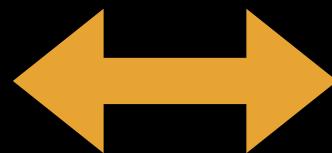
All-sky View of the Milky Way



© 2000, Axel Mellinger

Stars are so far away and so close together that their light overlaps and looks smooth

What does the MW look like from the outside?



Side View
(Another galaxy)

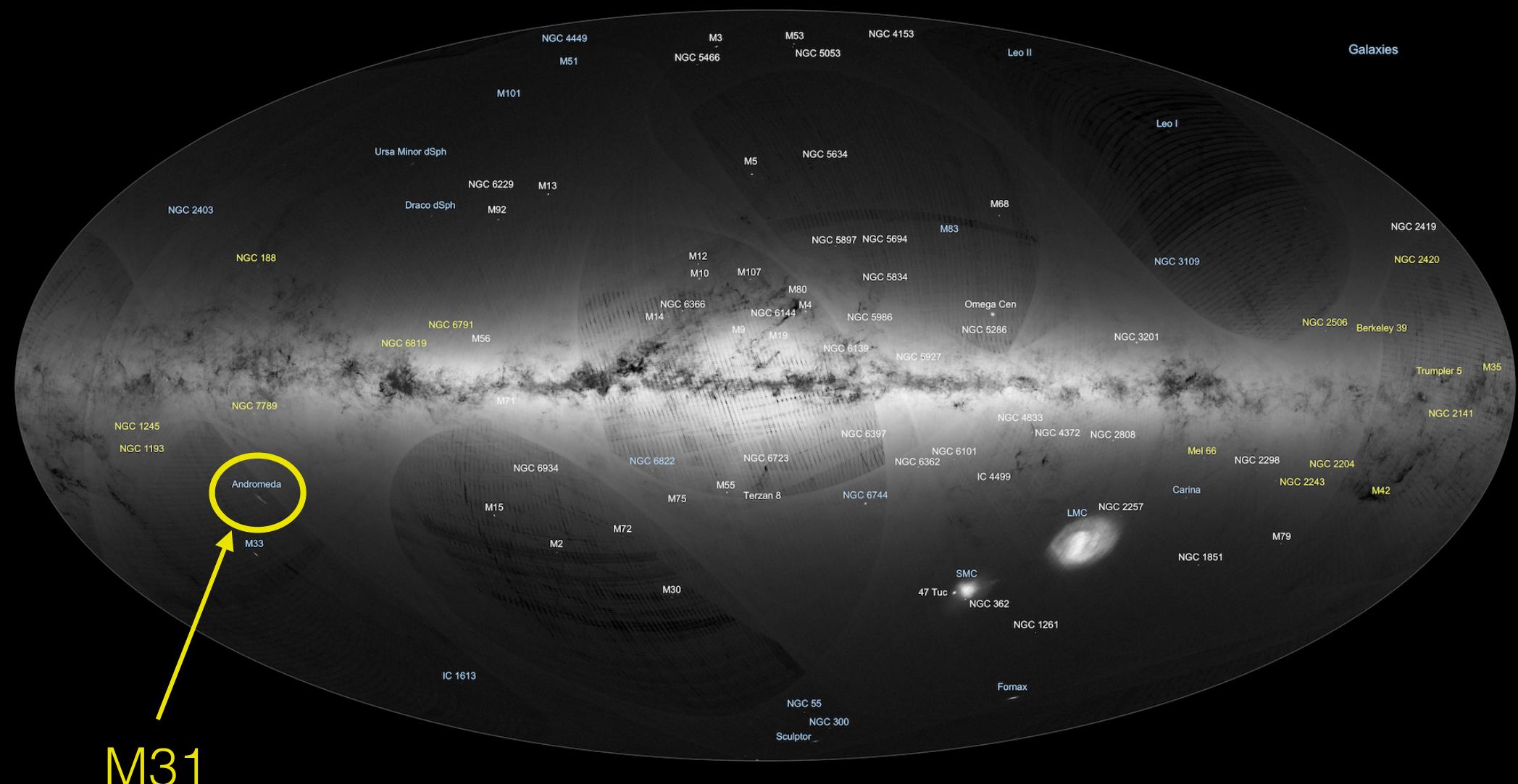
Top View
(Artist's conception)

What does the MW look like from the outside?

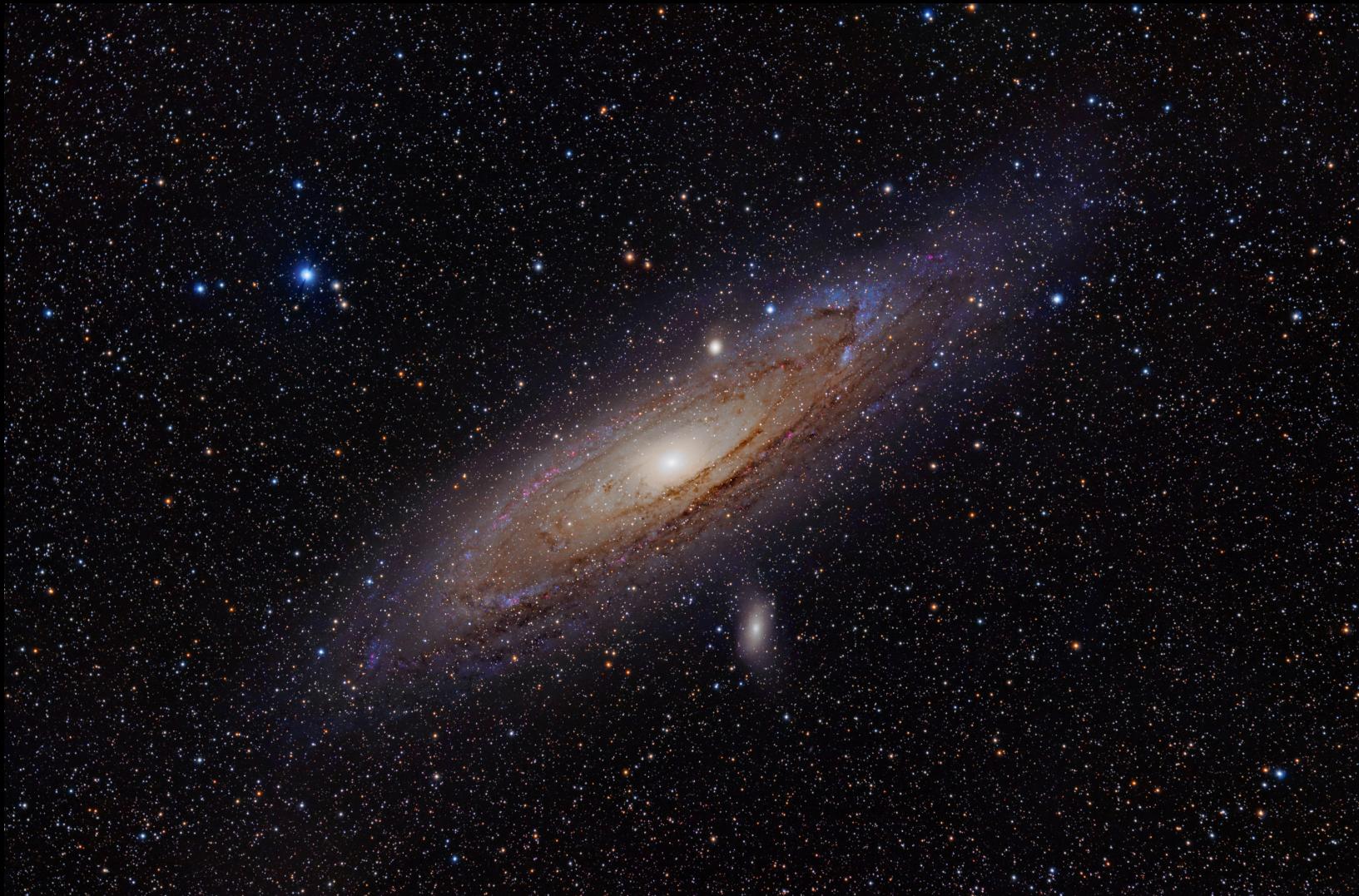


Another galaxy (M31 or Andromeda): about 100 times as far from us, as we are from the center of our own galaxy, the Milky Way.

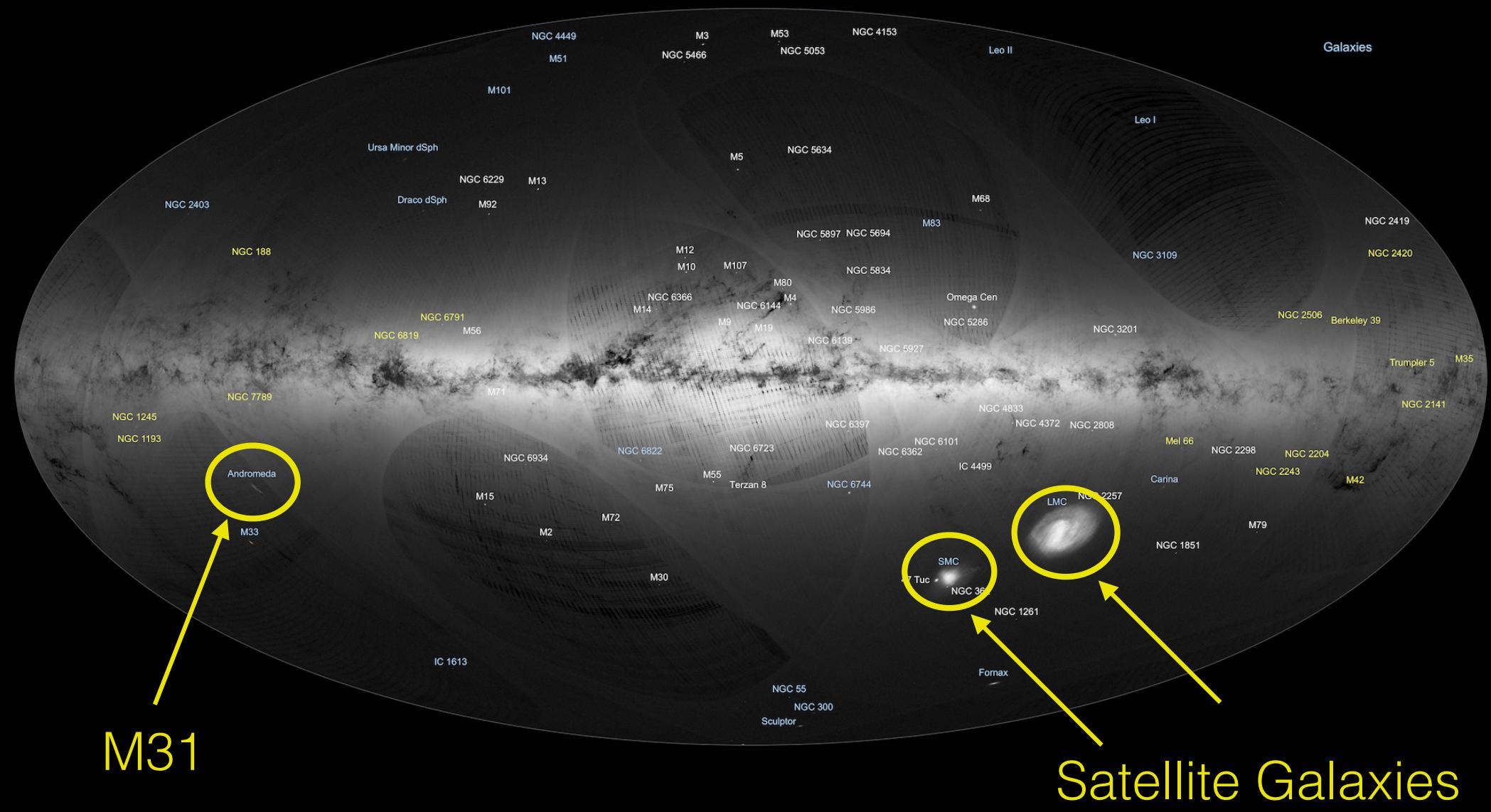
Milky Way (from inside)



Andromeda galaxy is the big brother of the MW

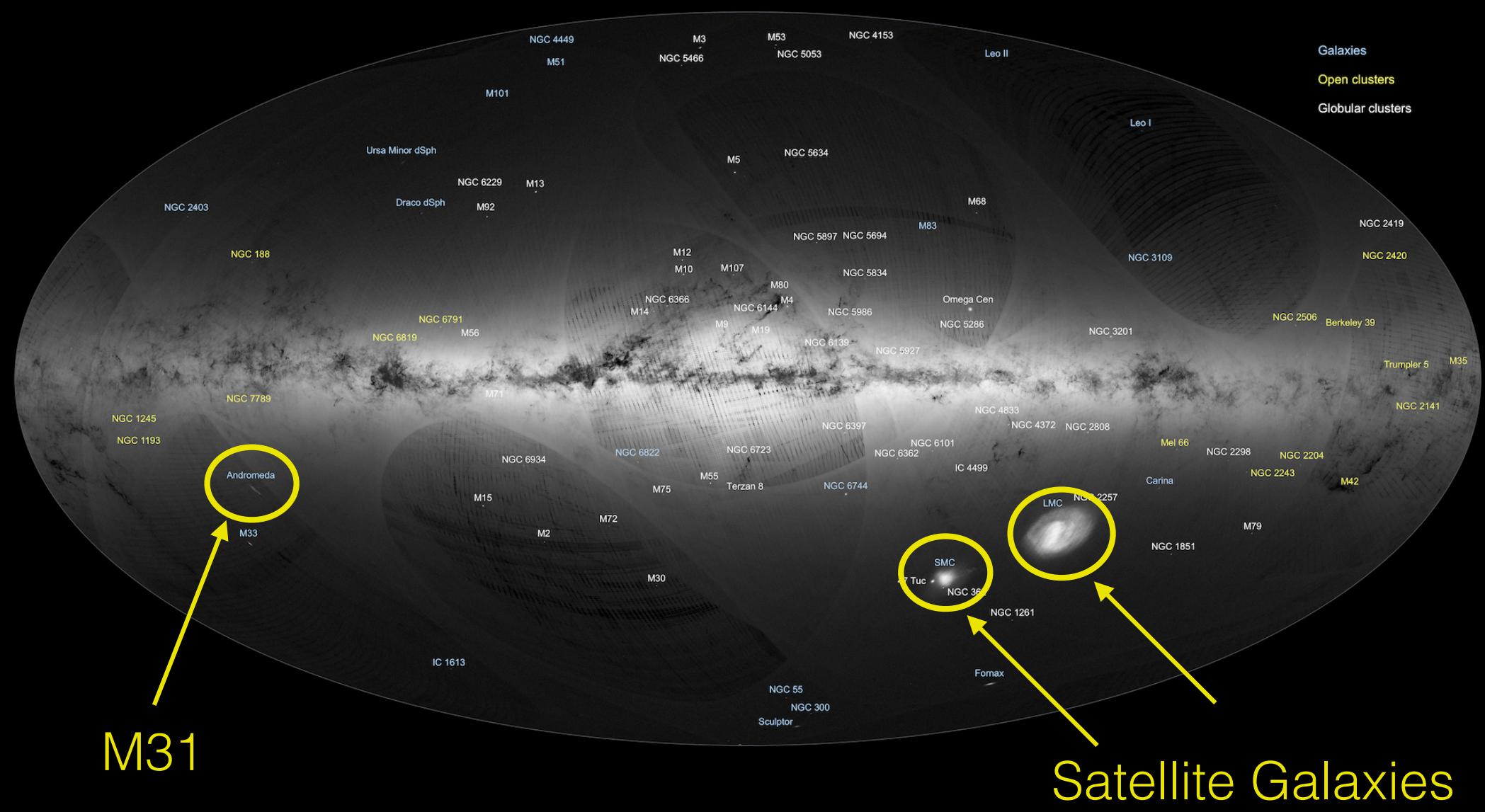


Milky Way (from inside)



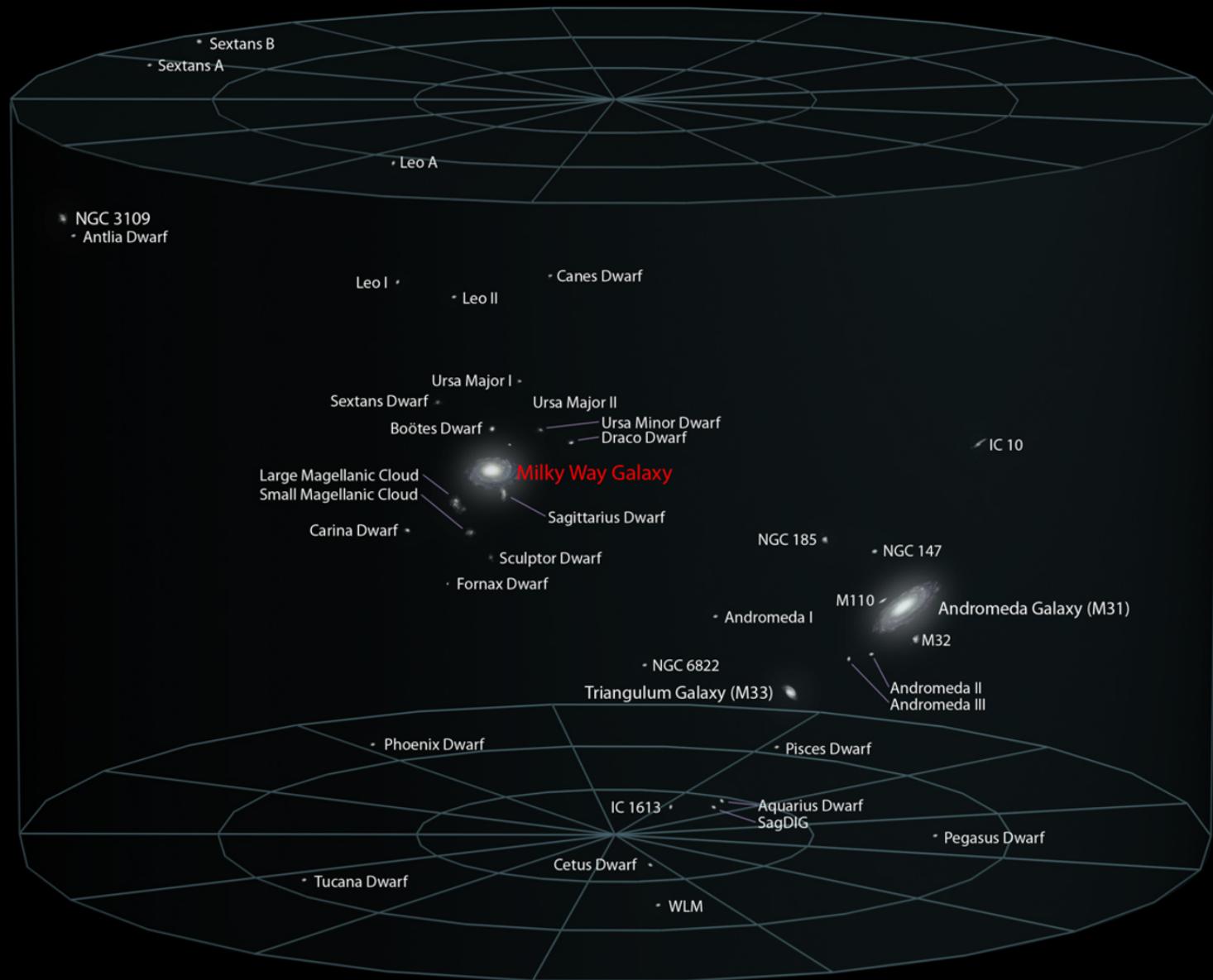
Milky Way (from inside)

distance is very important in astronomy



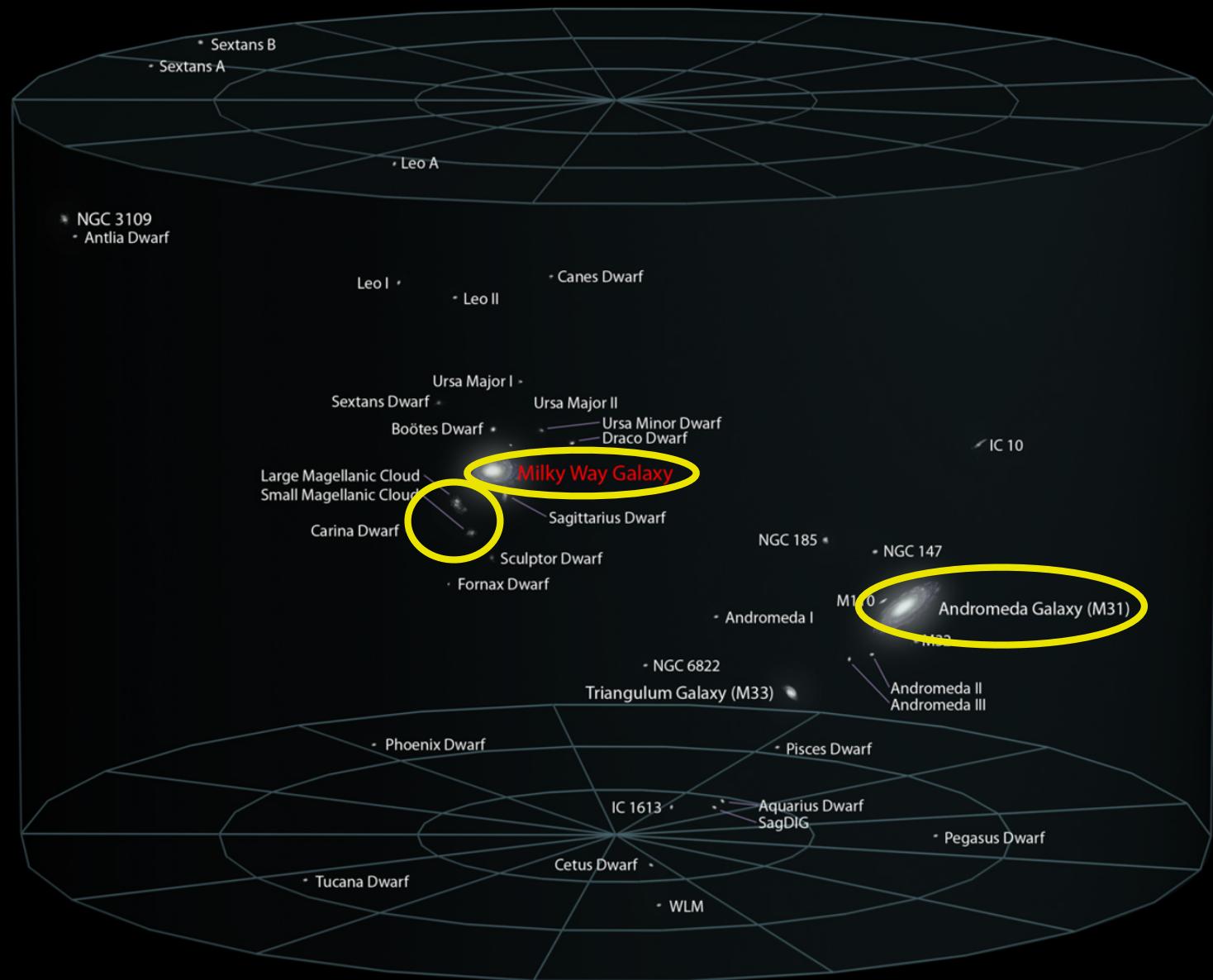
Where are we in the Universe?

LOCAL GALACTIC GROUP



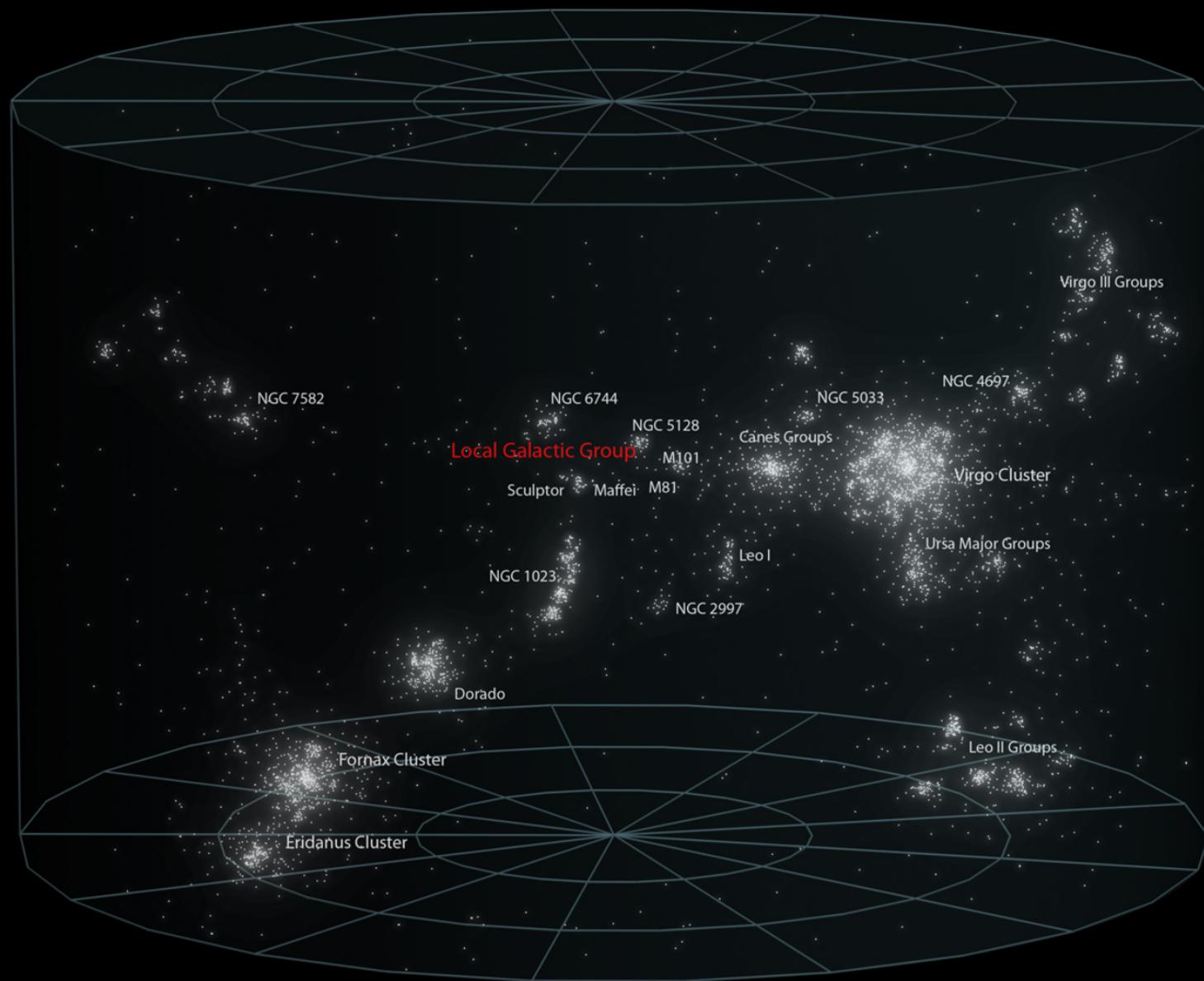
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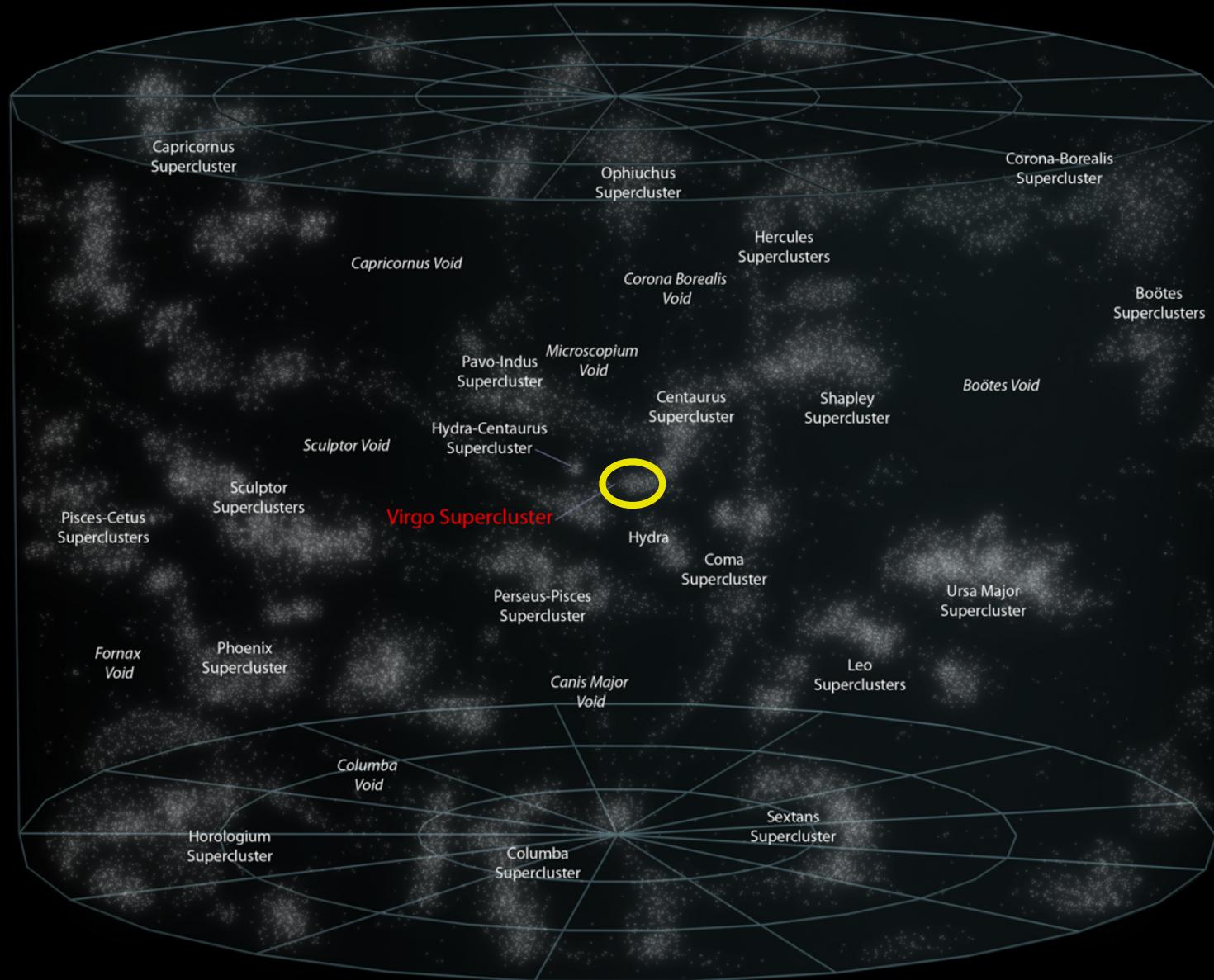
Where are we in the Universe?

VIRGO SUPERCLUSTER



Where are we in the Universe?

LOCAL SUPERCLUSTERS



Where are we in the Universe?

OBSERVABLE UNIVERSE

