

Astro 4: Stars, Galaxies, and the Universe

Rick Nolthenius

Office: 706a

email- see [My Salsa page](#)

All resources on all courses, and more,
are on my extremely [excellent website!](#)

- [About me](#)

Canvas?

- I have only a short link on Canvas, showing you where to go to find our syllabus and all other Astro 4 materials.
- I work hard on my teaching materials and want them to be valuable to more than just a small group of students, so I post them on the web.
- Just go to the Cabrillo Astronomy website [here](#)

Textbook - "The Cosmic Perspective - Stars, Galaxies, Cosmology" - Bennett, Donahue, Schneider, and Voit; 4th or later editions

- ~latest edition ~\$100 new, or better, our Bookstore says they promise to meet/beat Amazon's price (but not 3rd party sold through Amazon website). Buy used earlier editions and save!
- I will try to get one copy on reserve in the library.
- Equally helpful is my PowerPoints

They Call Me... Rick



Grading

- 6 mult. choice quizzes based on my lectures, with help from the textbook.
 - ~10 questions each
 - closed notes
- ~2 video quizzes; after seeing ~45 min video program. Take notes and use them for your mult. choice quiz, about 20 questions each
- Final Exam: 50 mult. choice questions. You may have a single 8x10 sheet of paper crammed with all the notes you can muster! No phones or laptops during exams
- Your two lowest scores will be dropped. That includes no-shows
- Because...No make-ups
- Extra Credit possibilities
- **Buy 10 green narrow scantron sheets from the book store. \$3. Cheap! Keep them in your notebook along with a pencil.**

Resources

- I've generated study guides for all your lecture/text based quizzes and the Final Exam (not for videos) and they're on our Astro 4 main page now.
- You can review my PowerPoints at any time. More and more, my material is drawn from my PowerPoints as I expand and improve them. More than mere take-off points to trigger a lecture, I use complete sentences to have them be more self-contained as learning units

Purple Slides...

- Are extra material for the very curious and unafraid of wading into the bizarre jargon and world of particle physics. You won't be tested on any details from purple slides.
- The only exception – THIS purple slide, which is here as an example!

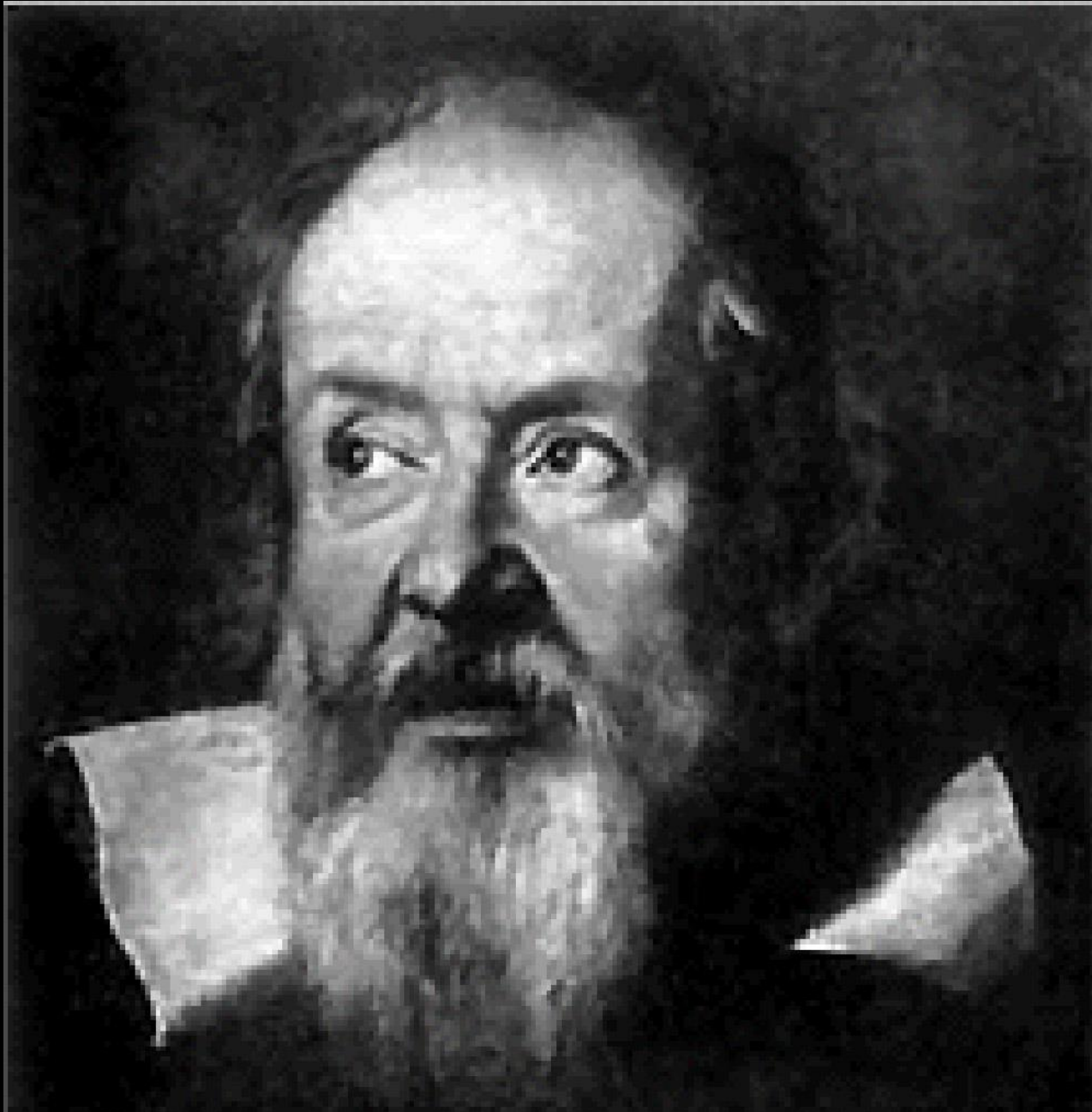
What will We Do in Astro 4?

- My own "Chapter 0" on the principles of clear thinking and scientific method is our first topic - The nature of science and the principles of clear thinking.
- For many, or most - this may be the most important material in the entire course
- For most of human evolution, before didactic lectures were possible, we learn by seeing someone who knew what they were doing - doing it!
-
- Now, since evidence-based thinking and error-checking through "what if?" thought experiments is the most compelling way to convincingly reveal the truth of things, I'll be doing my level best to do exactly that.
- Much more effective than reading a recitation of factoids out of a book, and hopefully more entertaining too.
- I'll stress the observational facts and how we use scientific inference to arrive at ideas, and to test them to arrive at our current theories of the Universe. Exams will stress getting a picture of processes and the 'how' behind what we see, not so much on memorized factoids.

We'll learn clear thinking: My Chapter 0

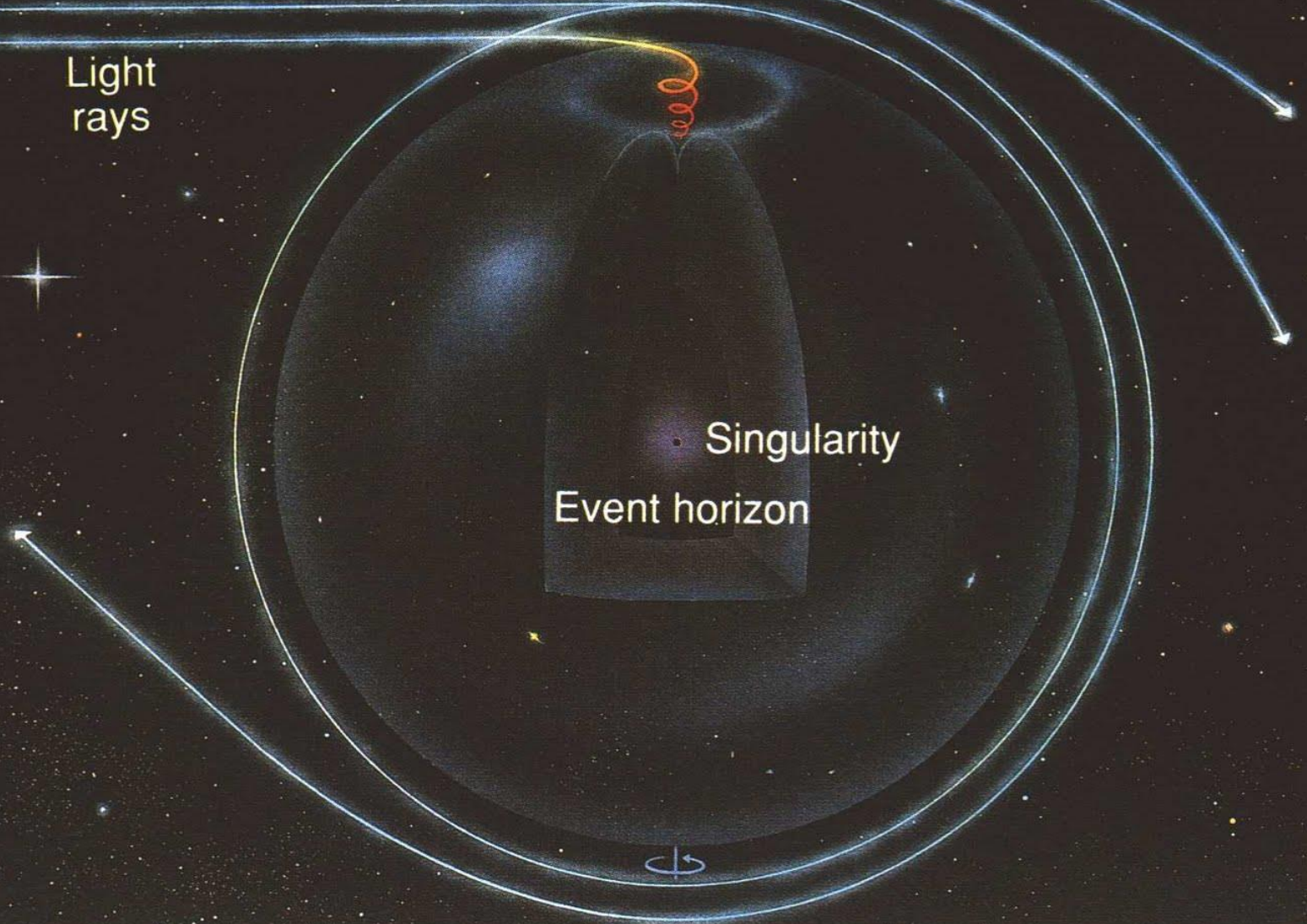


The discovery of forces, gravity, and light



An Intro to Relativity

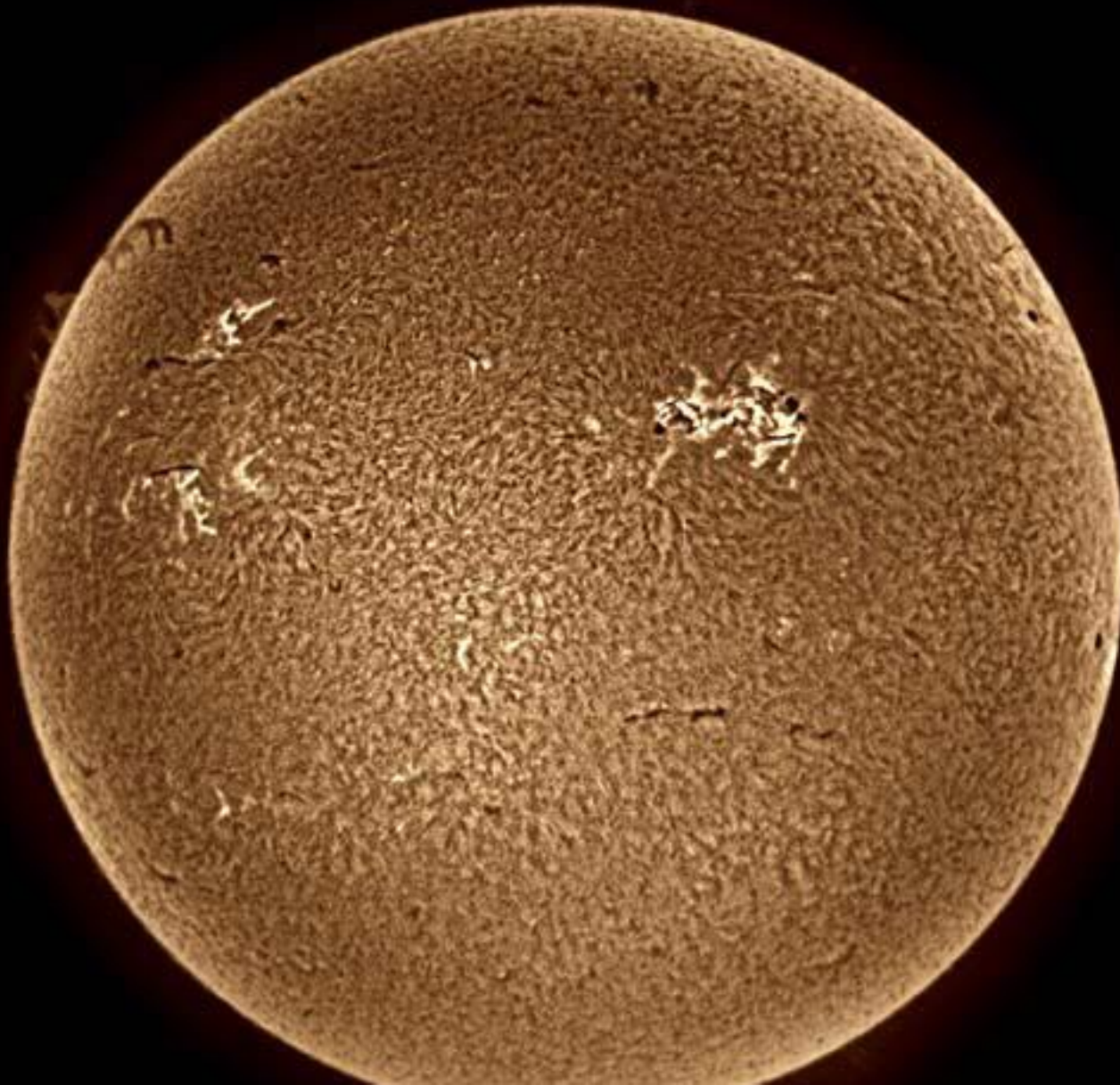
Light rays



Singularity

Event horizon

The Sun - our close up look at a star



The Birth of Stars in Interstellar Clouds



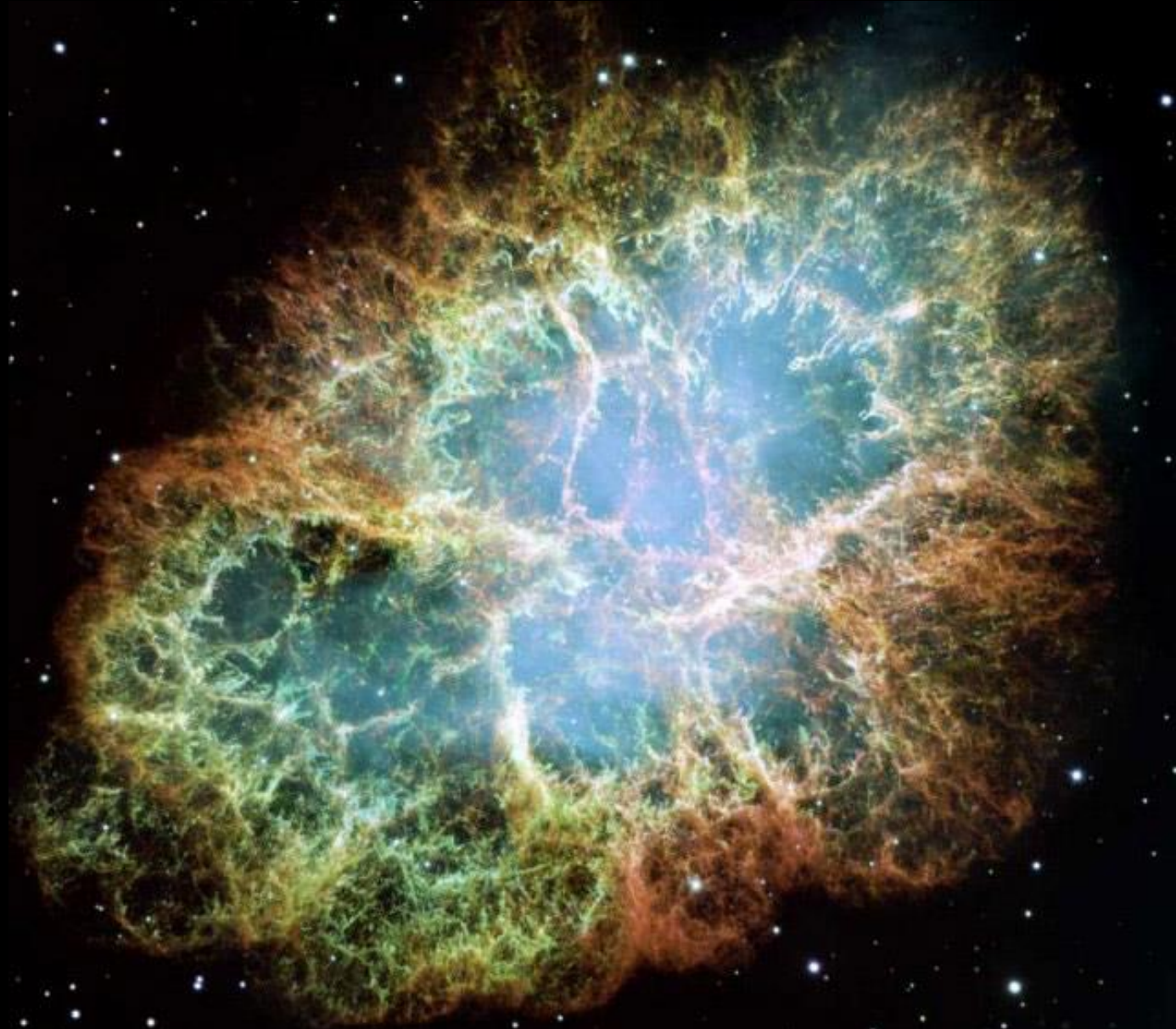
Star clusters and stellar evolution



The death of stars



Supernovae and Stellar death and birth



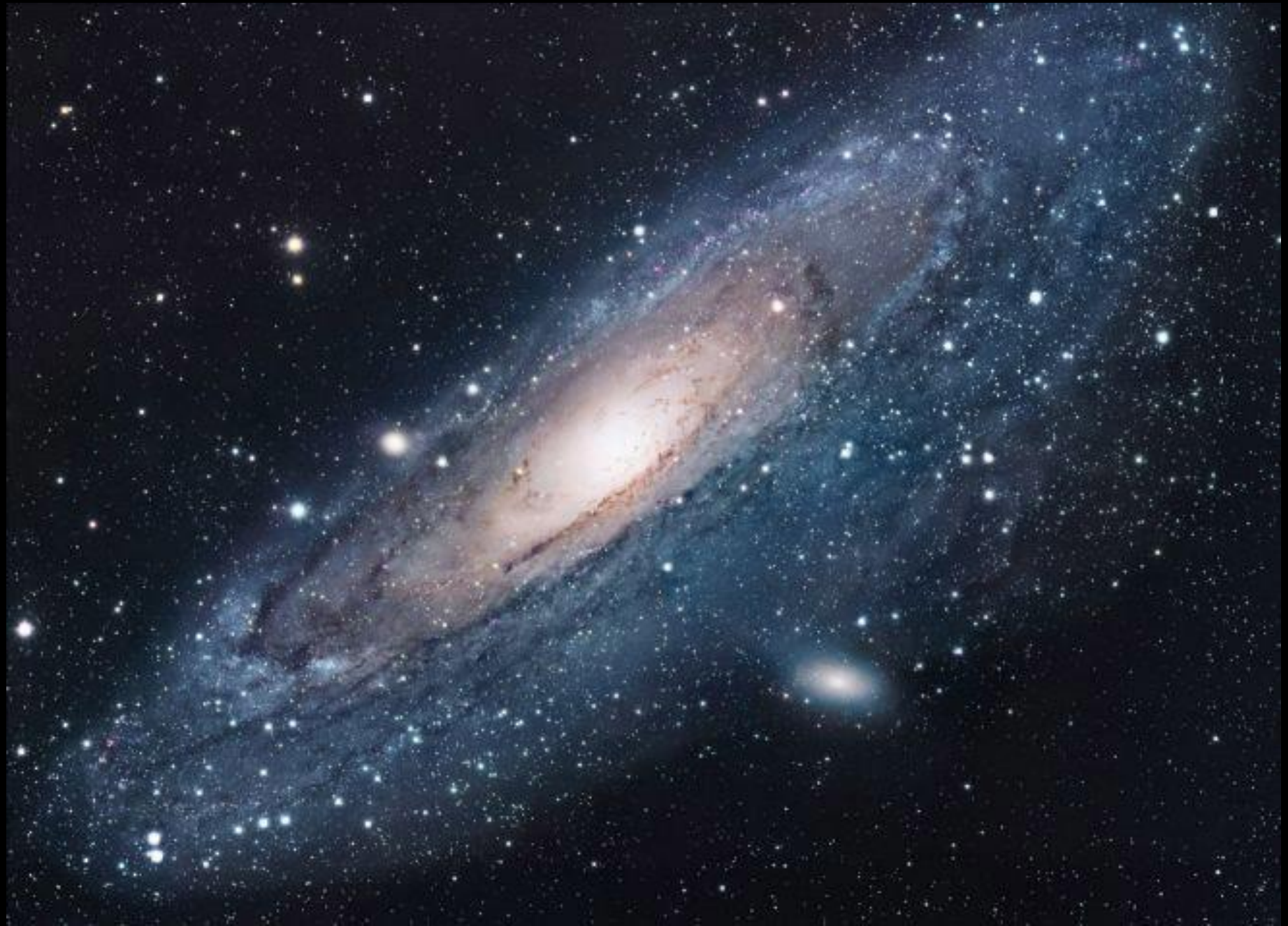


ew billion years from now, with atmosphere and ocean boiled away by a growing post-main-sequence Sun, life will come to an end. Humankind — or whatever it has evolved into — may flourish elsewhere in the galaxy. But as in *The Last Three Minutes*, we can't run forever. Painting © 1991 David A. Hardy/Astro Art.

We're All Doomed!

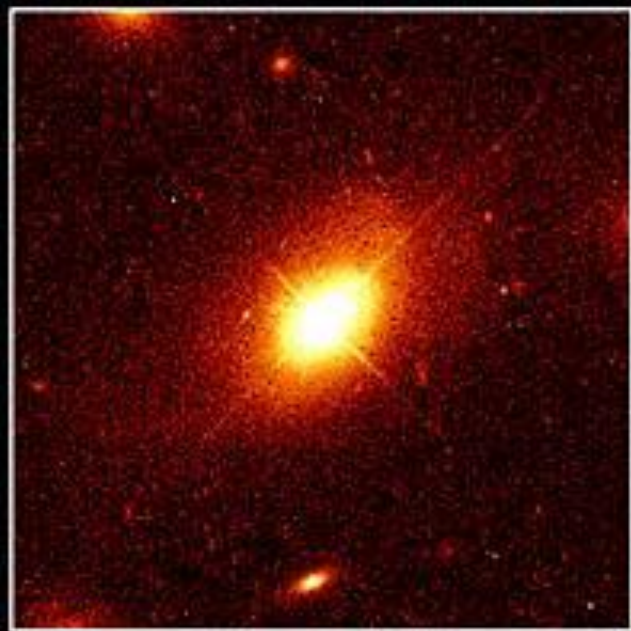
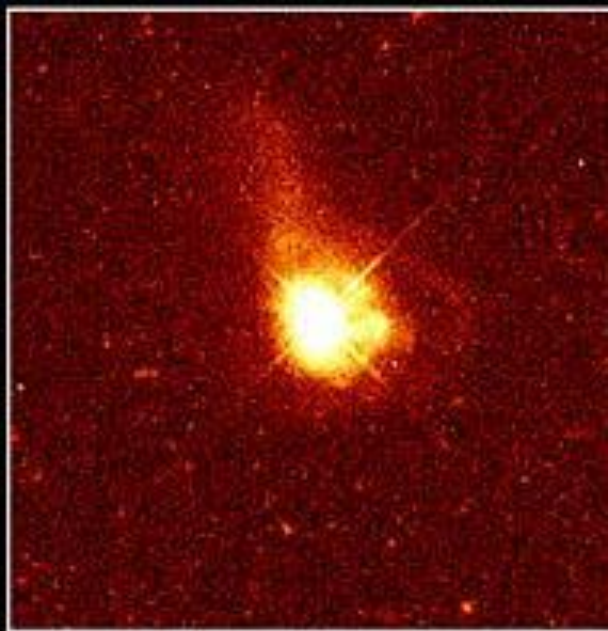
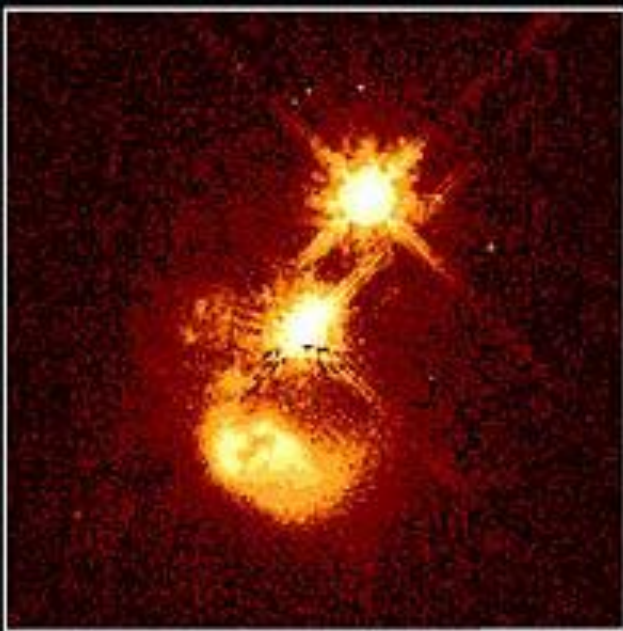


Our Milky Way Galaxy



Galaxy Evolution





Quasar Host Galaxies

HST • WFPC2

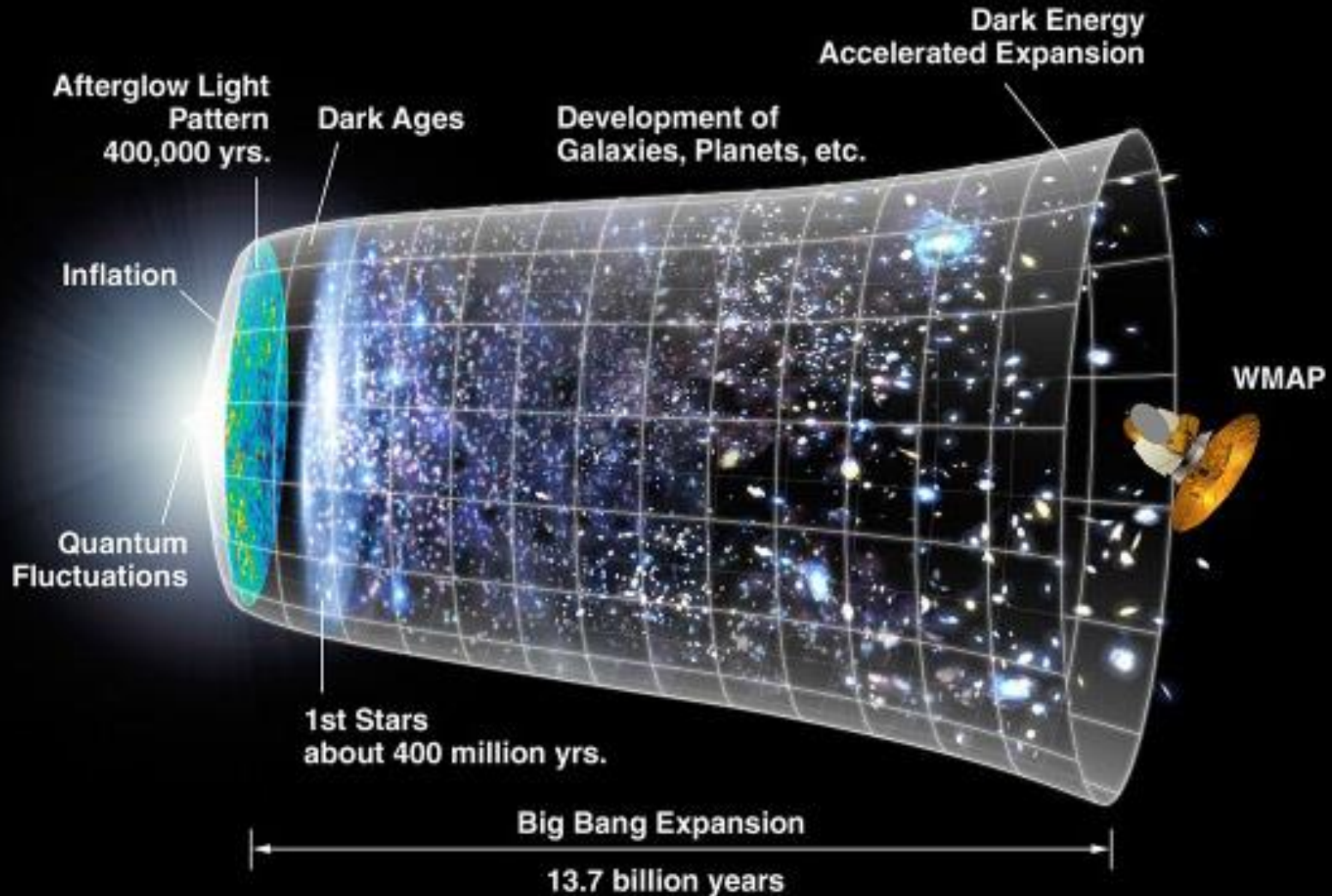
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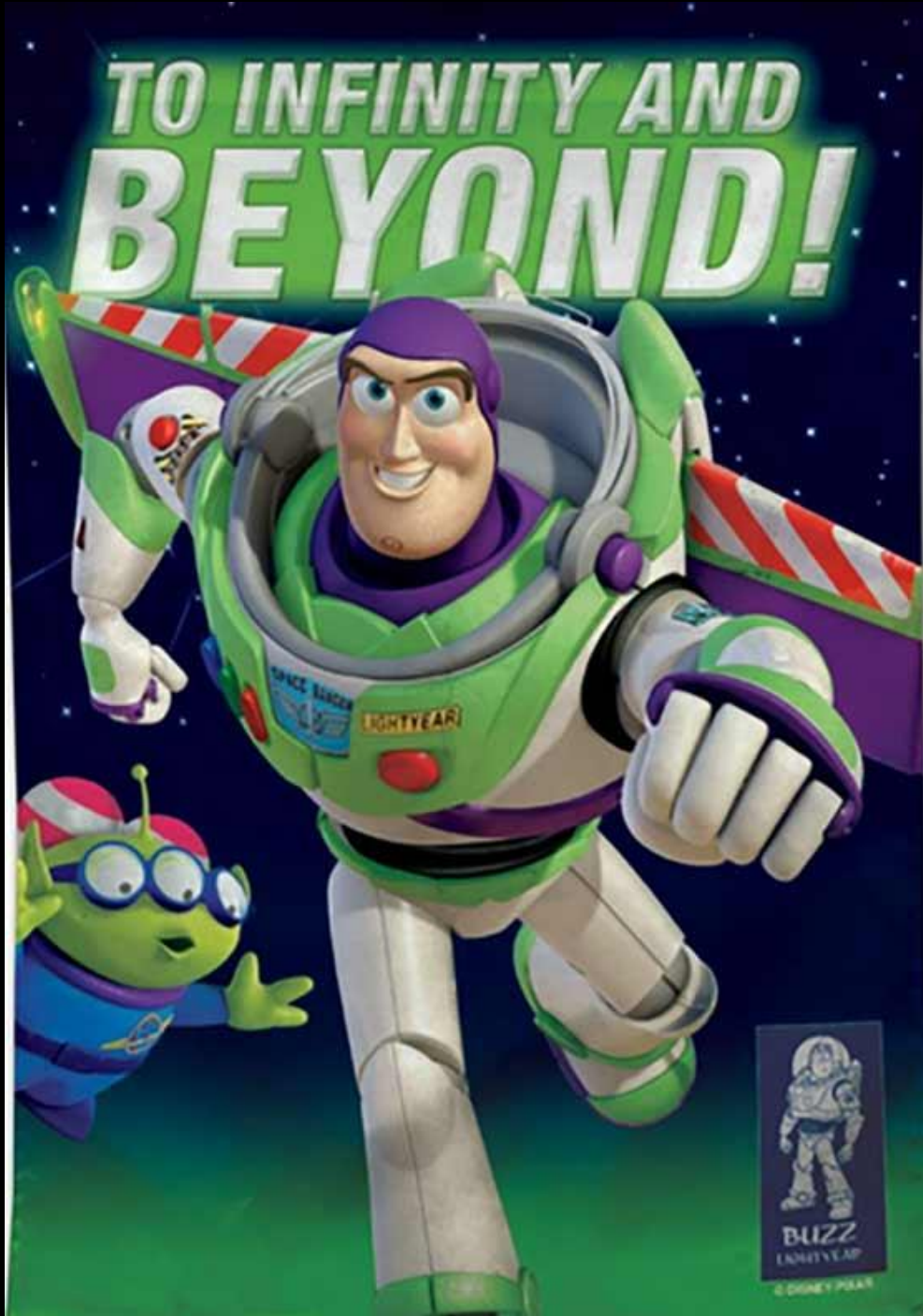
L. Bahcall (Institute for Advanced Study), M. Disney (University of Wales), and NASA

Dark Matter - What it is not, and might be



Dark Energy and the Origin of the Universe





And Finally -
Inflation,
Bubble
Universes
within the
Multi-verse,
and how the
quantum nature
of it all
explains...

...the Existence of Life - no miracles or
psychological biases needed!



**I WANT TO
BELIEVE**