Sterrenstels en Kosmos
Galaxies & Cosmology

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Course outline

- Stars and star clusters (ST)
- The Milky Way (RvdW)
- Galaxies (ST)
- The cosmic distance ladder (ST/RvdW)
- Large-scale structure in the Universe (RvdW)
- Cosmology (RvdW)
- The Big Bang and the early Universe (RvdW)

Course requirements

- Written exam: 27-01-2010 14.00
  - Re-exam: 22-04-2010 09.00
- Three completed assignments

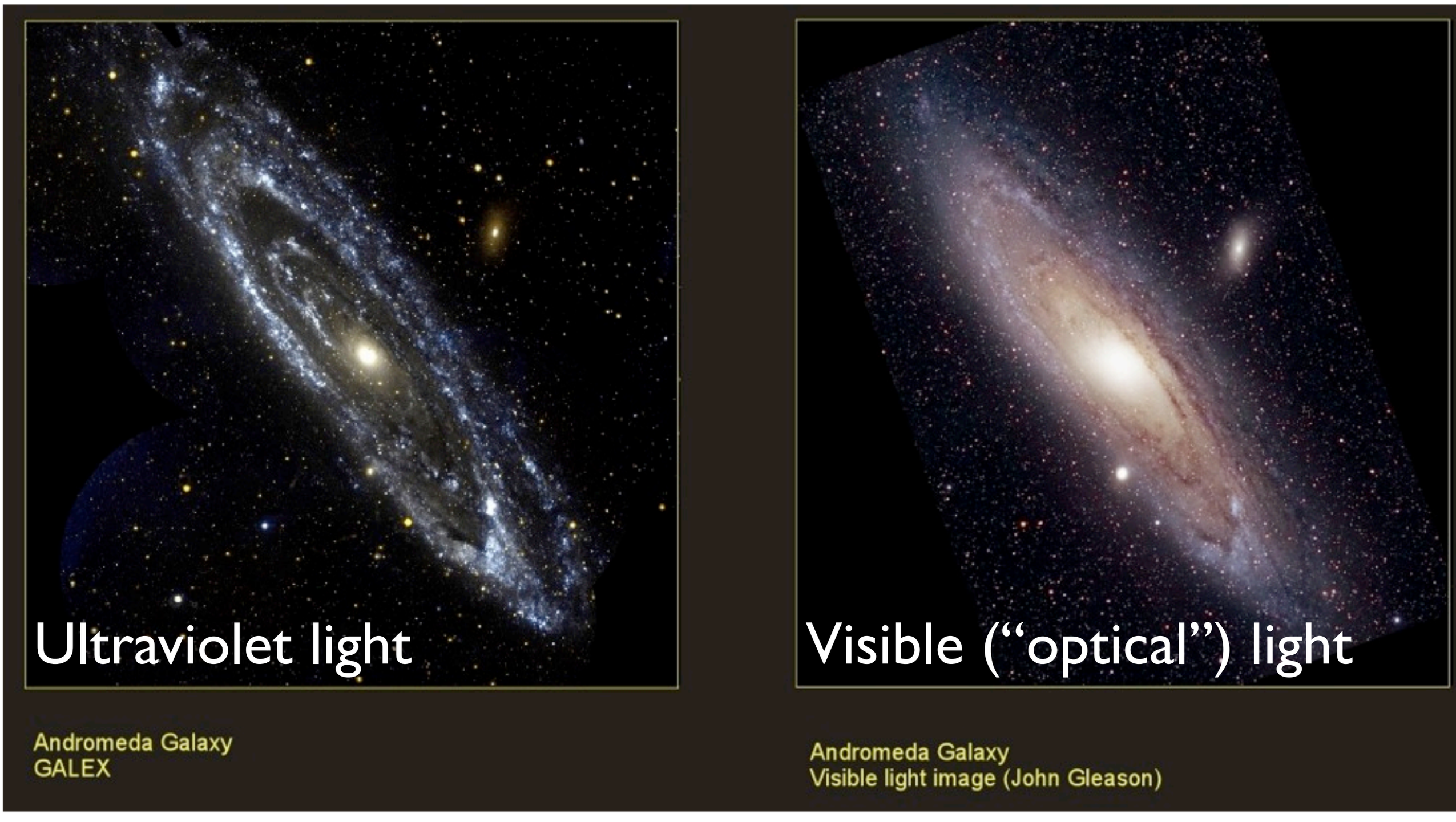
Introduction: the Universe of galaxies

Galaxies lie at the crossroads of astronomy

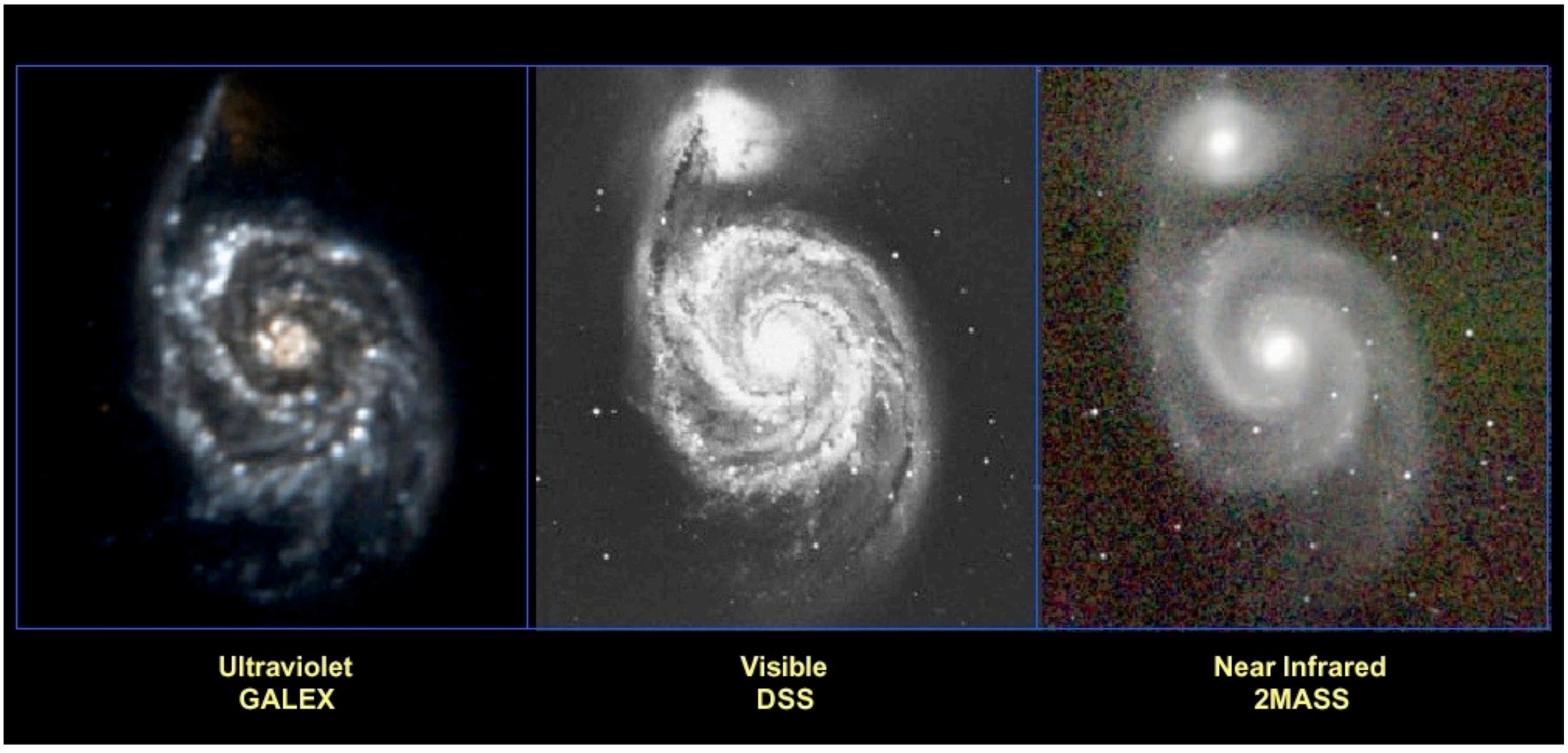
- The study of galaxies brings together nearly all astronomical disciplines:
  - stellar astronomy --- the formation and evolution of stars in galaxies
  - "gastrophysics" --- the behavior of and the interaction between gas in and between galaxies
  - high and low energy processes --- from dust to AGN
  - cosmology --- the formation and evolution of galaxies

- And uses nearly all observational techniques...
  - from low-frequency radio observations (LOFAR)
  - through the radio, mm, sub-mm, infrared, optical, and UV bands
  - to the X-ray and γ-ray bands

M31: The Andromeda galaxy



Messier 51, the Whirlpool galaxy: UV, optical, and NIR light

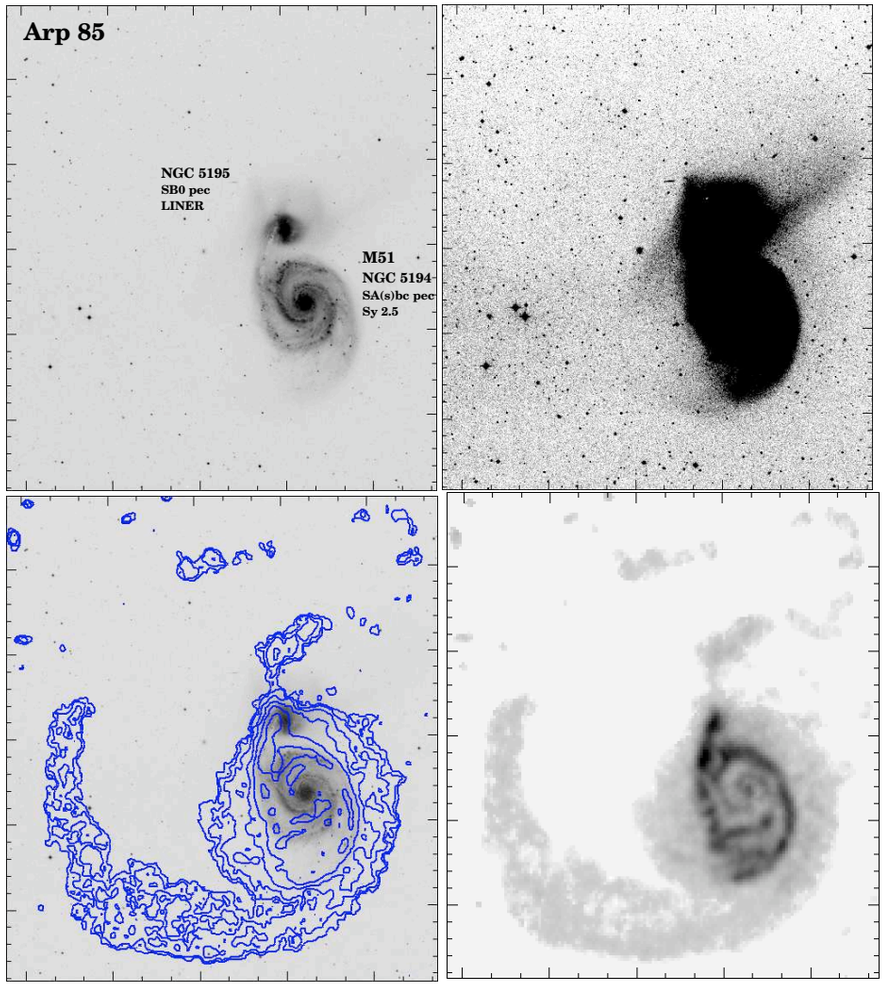


Young stars

Middle-aged stars and gas

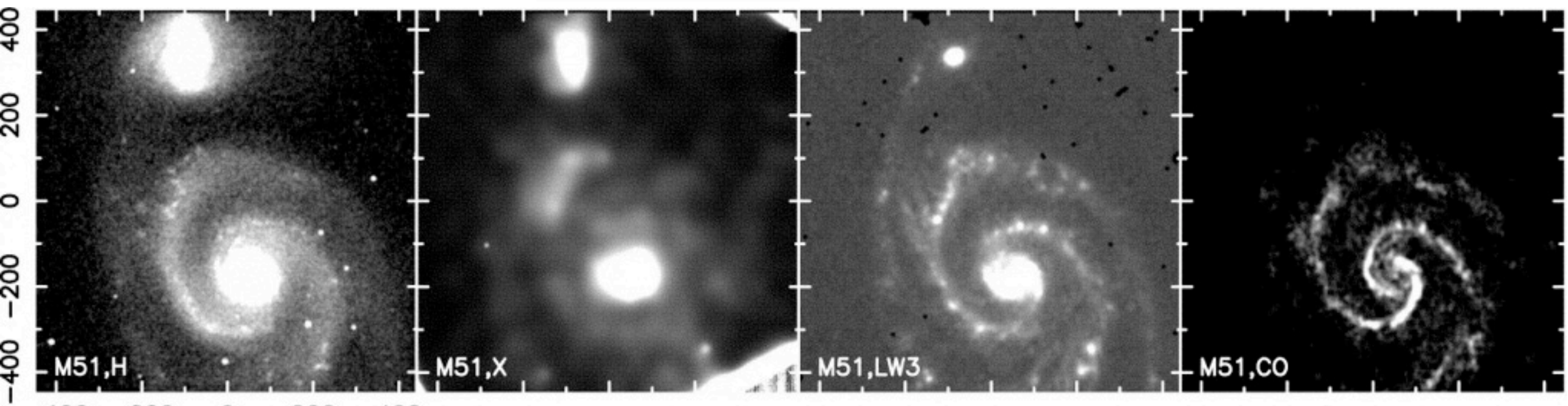
Old stars

Messier 51: Radio (HI and CO), NIR, mid-IR, and X-ray



Stars

Neutral hydrogen gas



Old stars

Hot gas, high energy processes

Warm dust

Cold molecular gas

Plan of attack: galaxies

- First we'll study stars and star clusters, the basic "light bulbs" in galaxies
- Next we'll study the stars and gas in the Milky Way to get a feeling of how galaxies work
- We'll then expand our study to look at galaxy shapes, star formation, dynamics, scaling relations, and "activity"