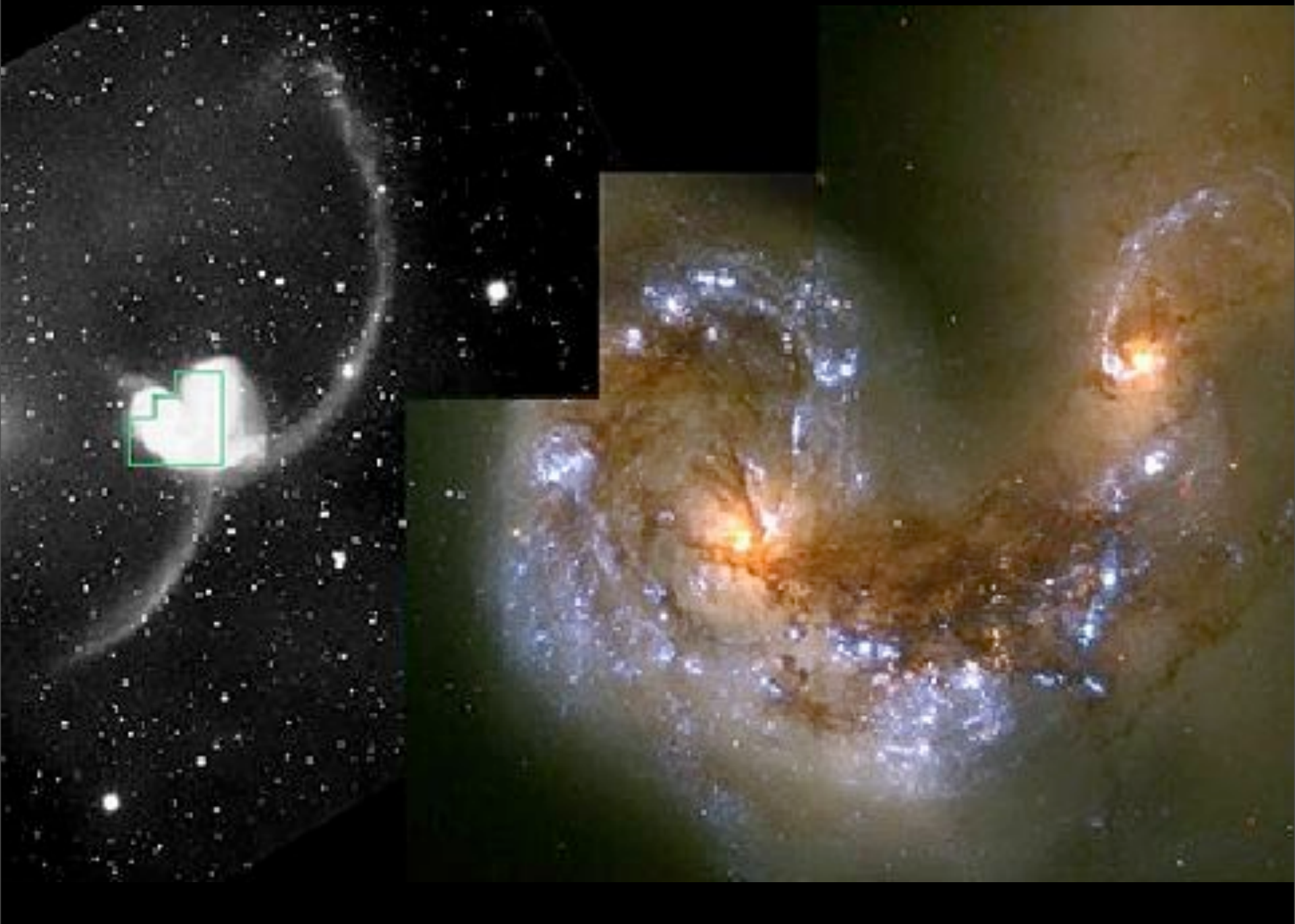


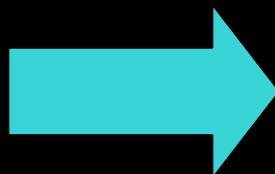
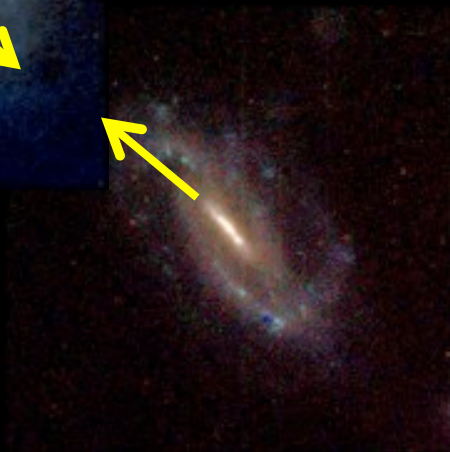
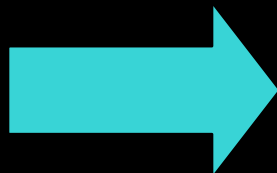
Centaurus A

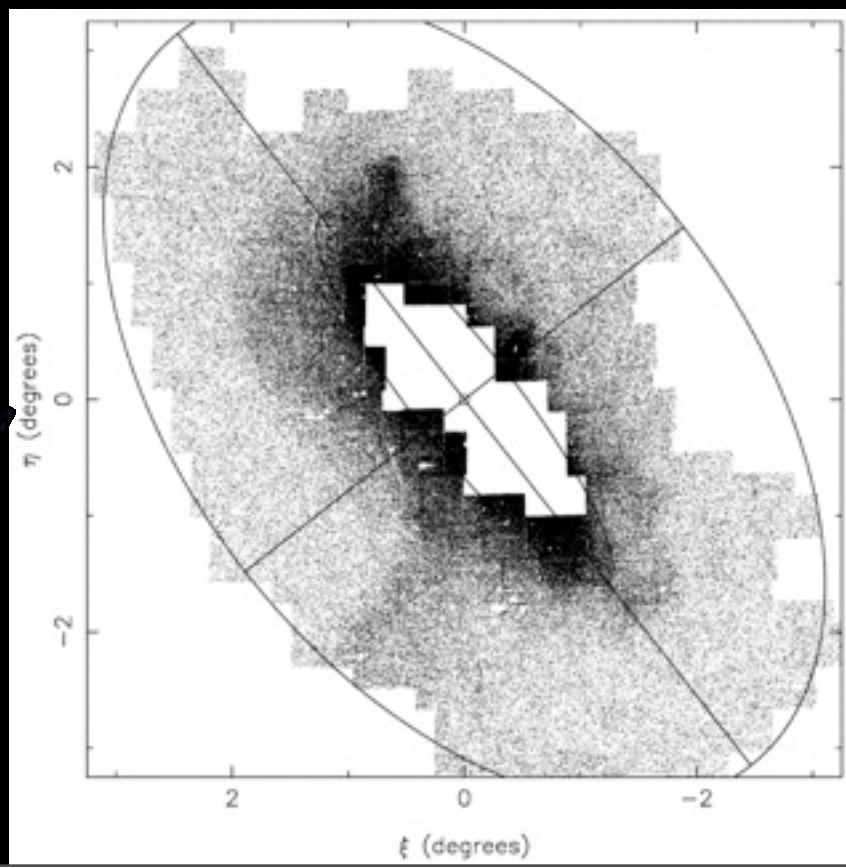
X-ray

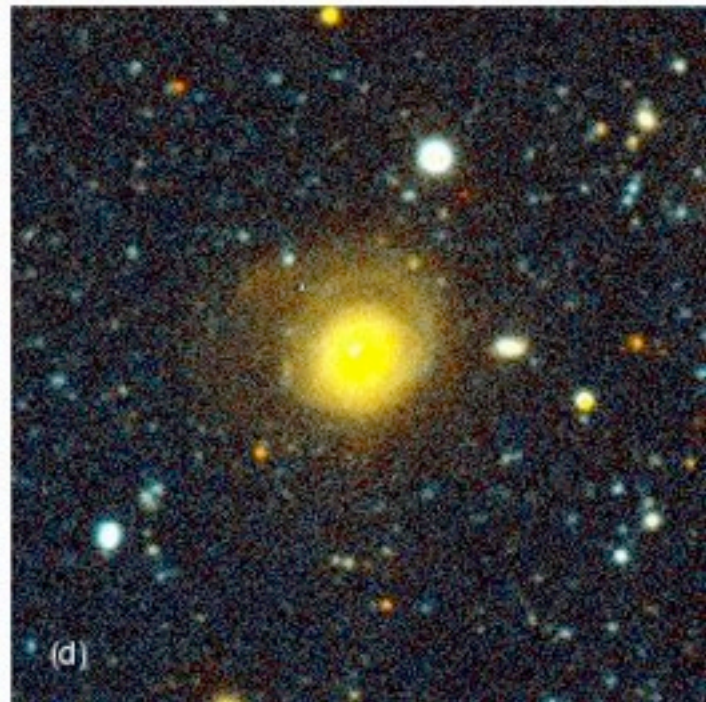
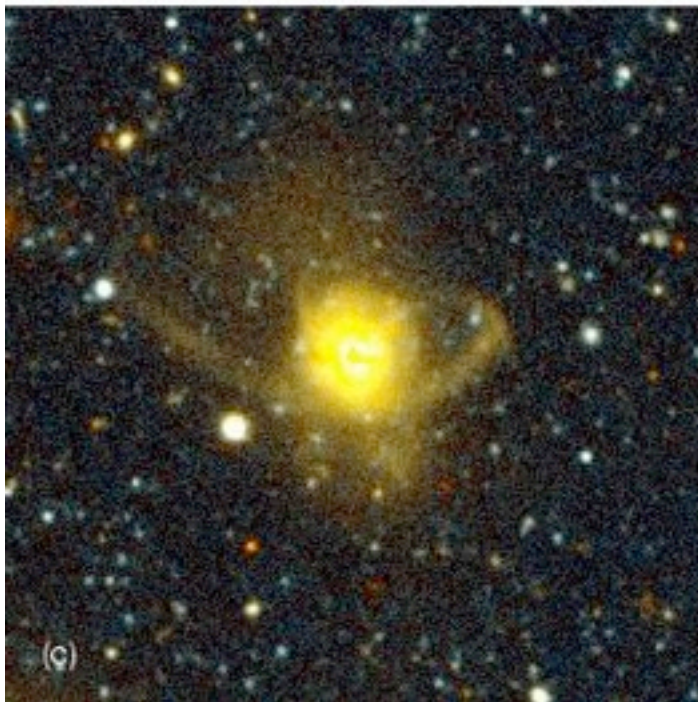
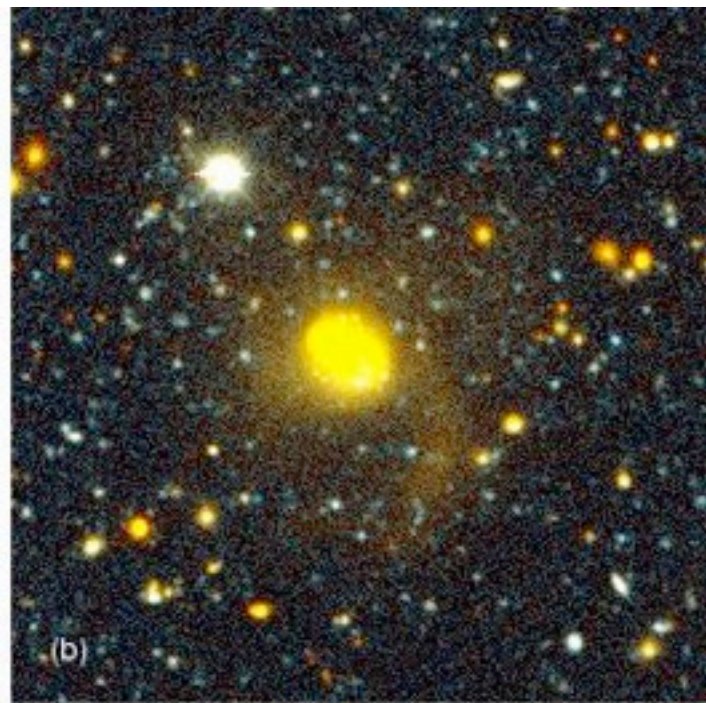
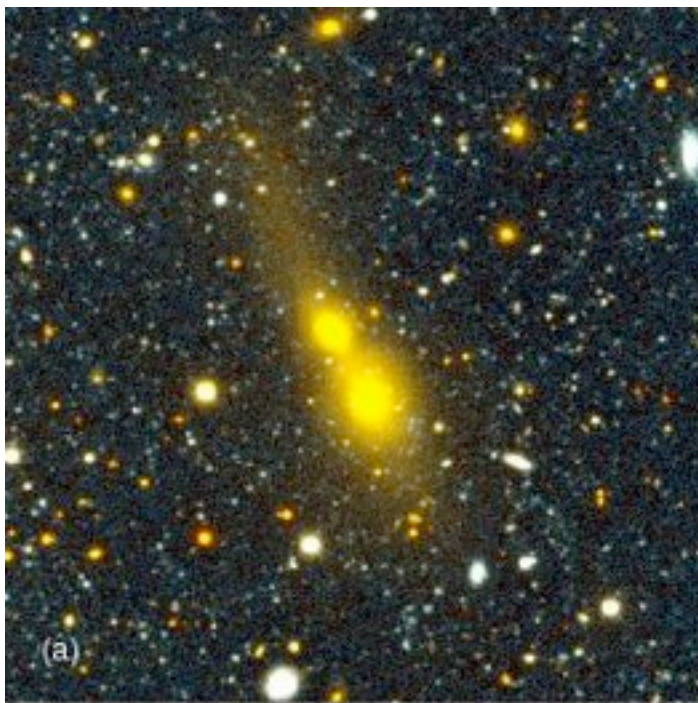
Astro 220:
Galaxies and Cosmology
Oct 18 2010



Monday, November 1, 2010

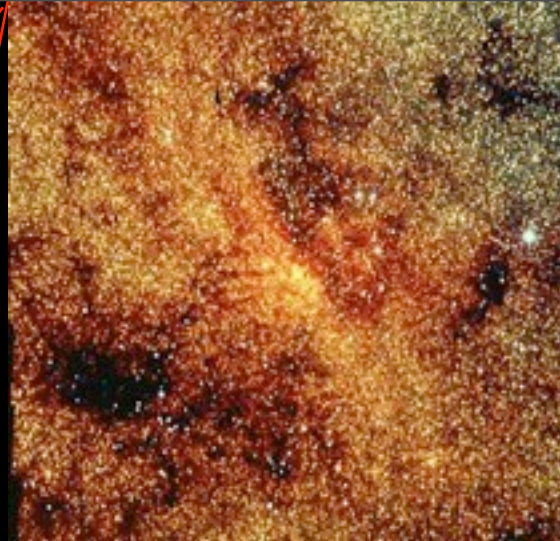
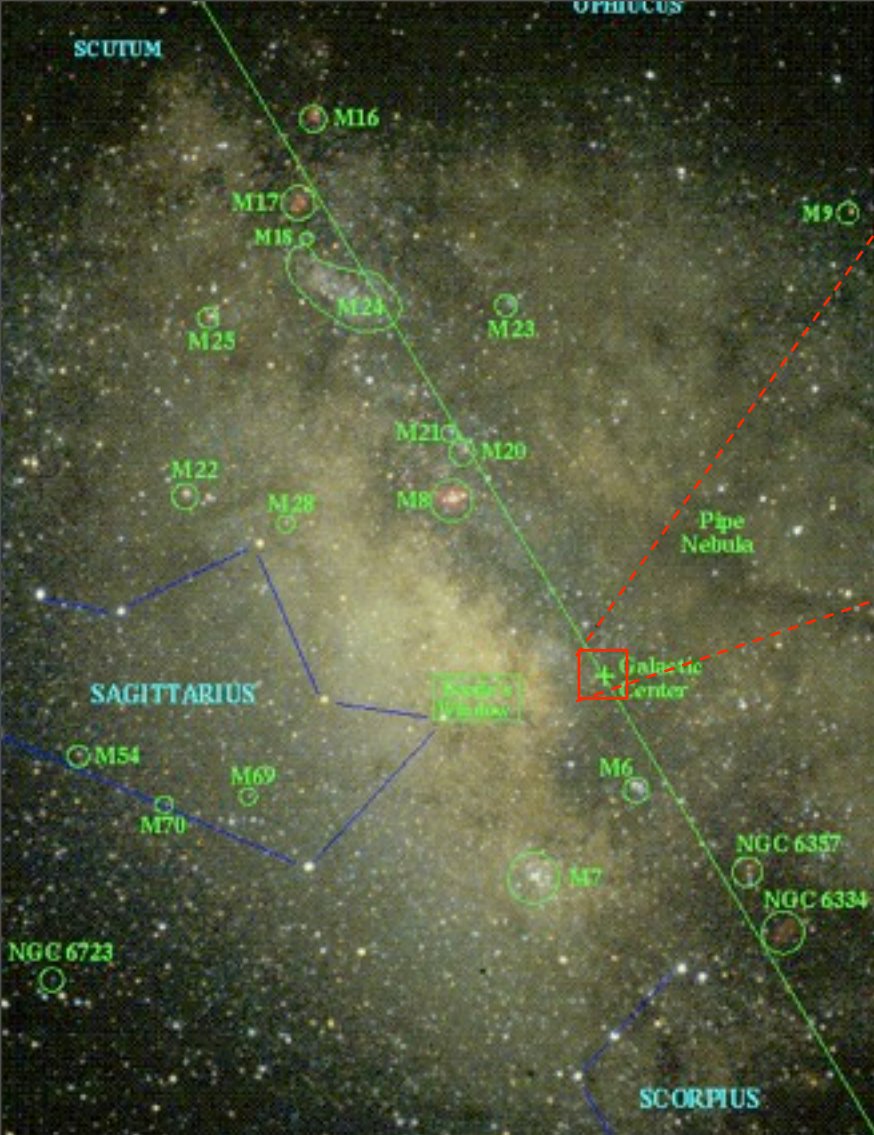




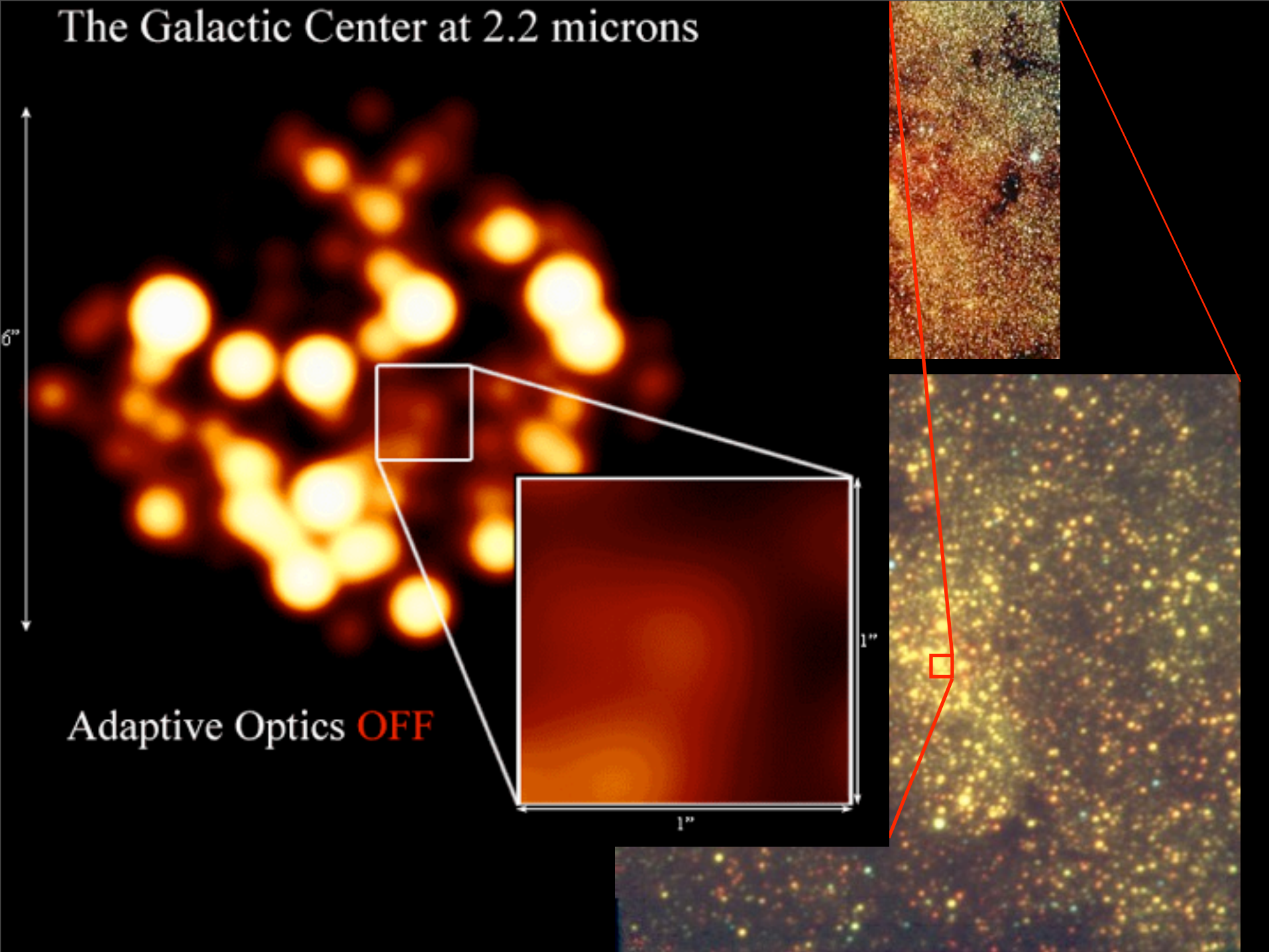


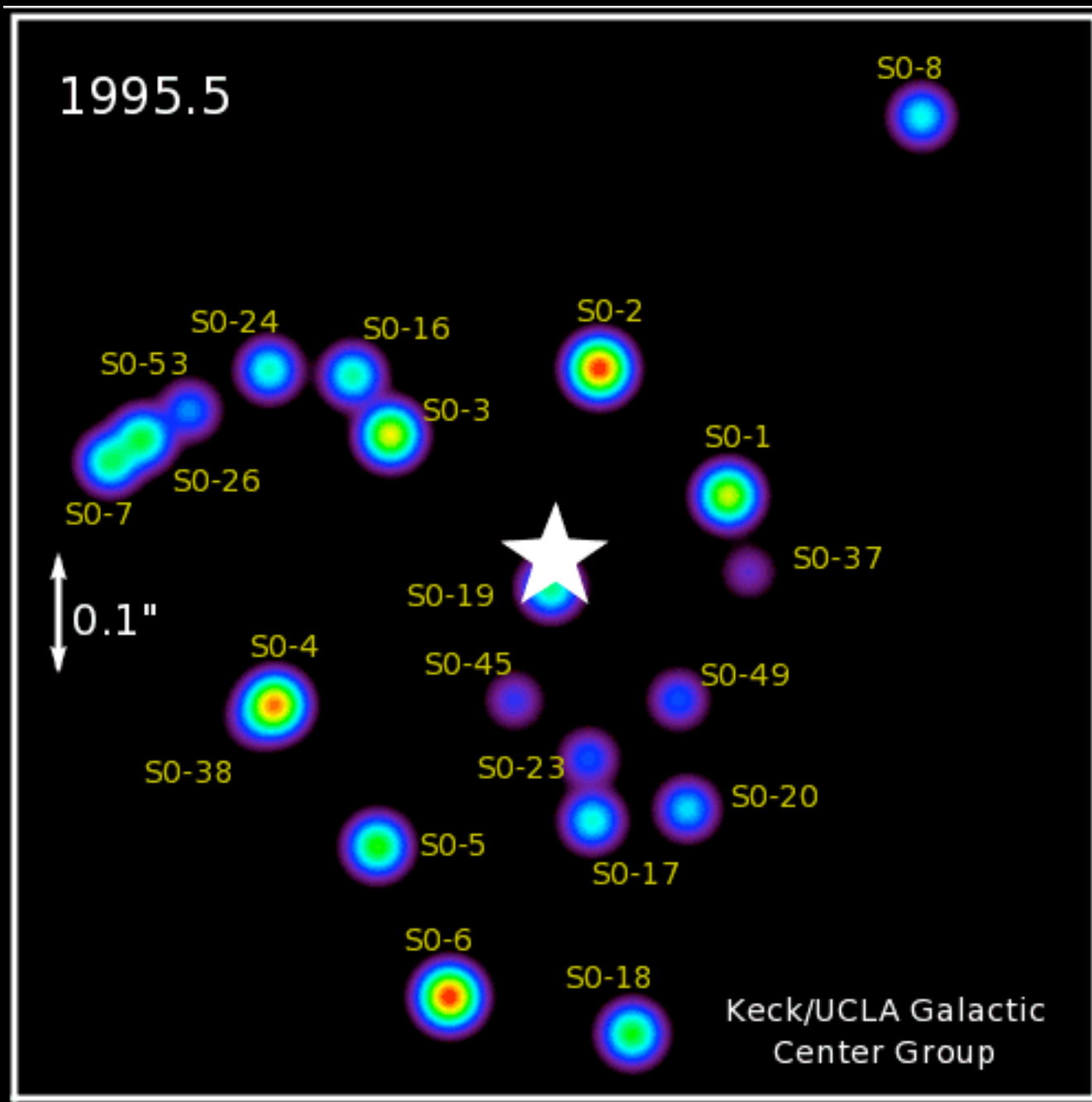


z: 49.5



The Galactic Center at 2.2 microns







Hubble Space Telescope
strengthened the evidence
for a massive black hole
in the nearby galaxy
M32

Andromeda

M32

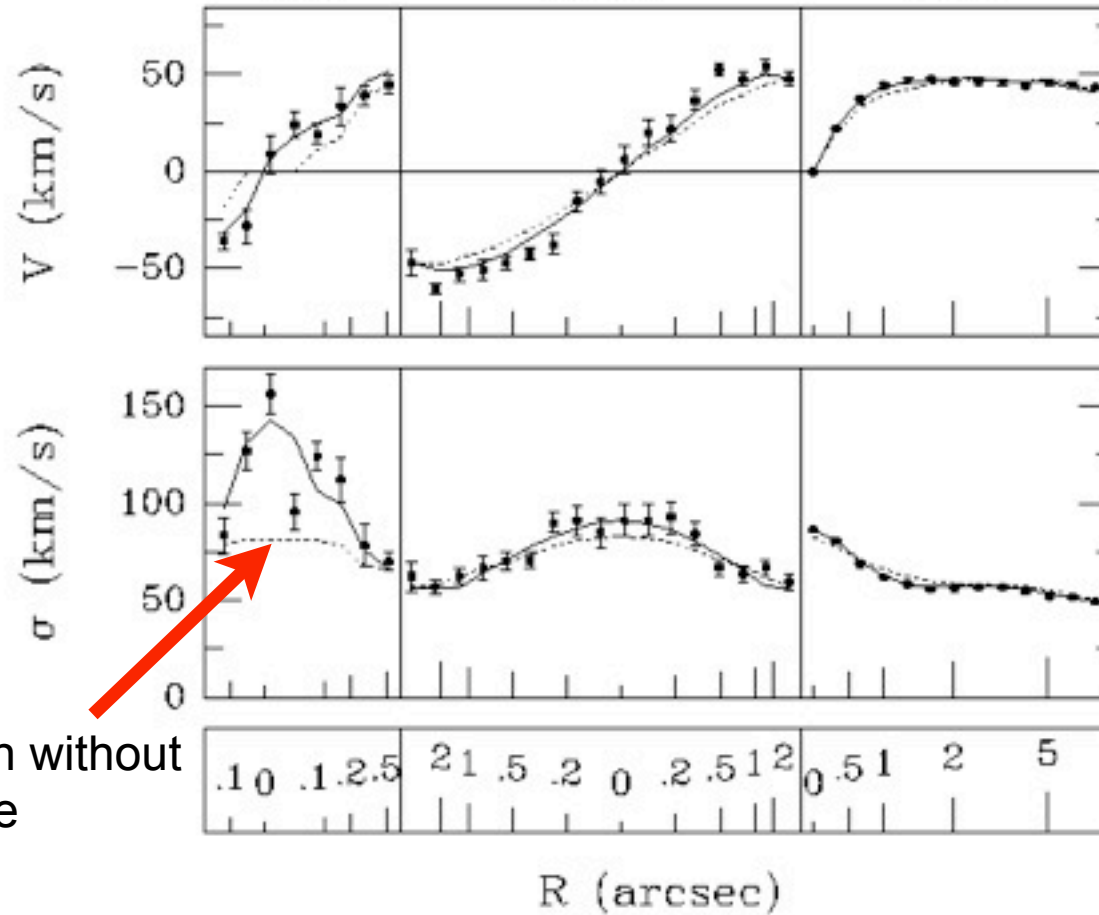
principal investigator, animation: Roeland P. van der Marel [marel@sns.ias.edu]

M32 major axis stellar kinematics

HST

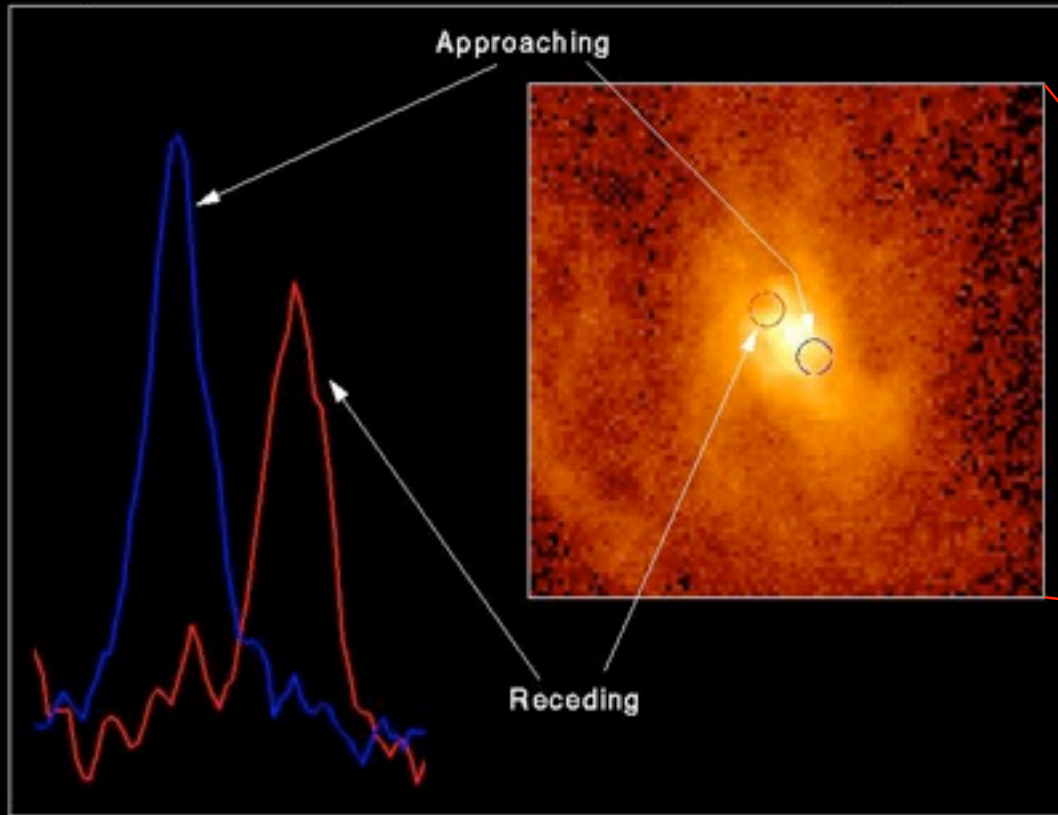
CFHT

WHT

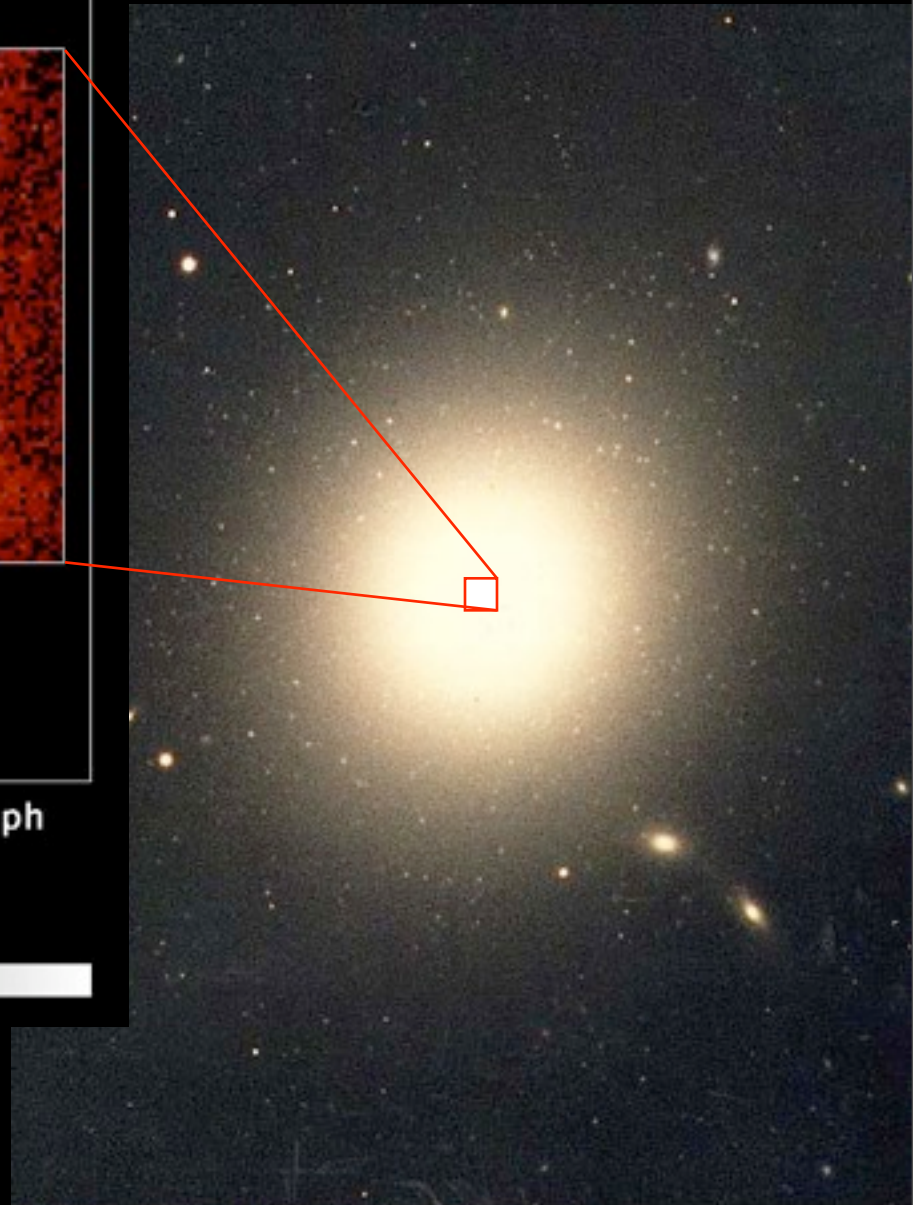


Prediction without
black hole

Spectrum of Gas Disk in Active Galaxy M87

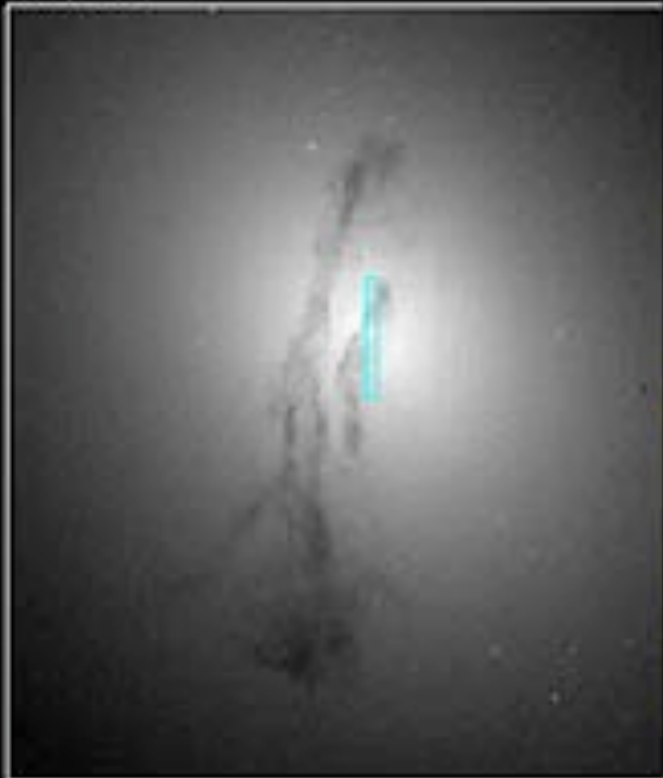


Hubble Space Telescope • Faint Object Spectrograph

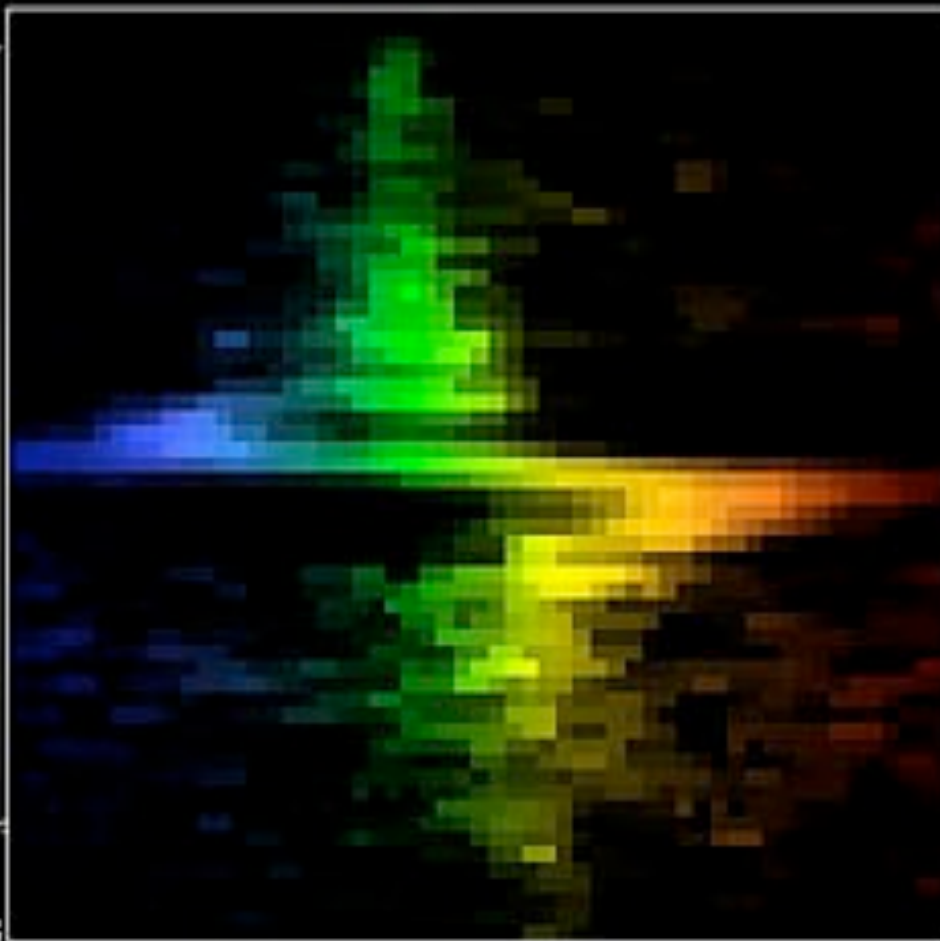


M87 © Anglo-Australian Observatory
Photo by David Malin

WFPC2

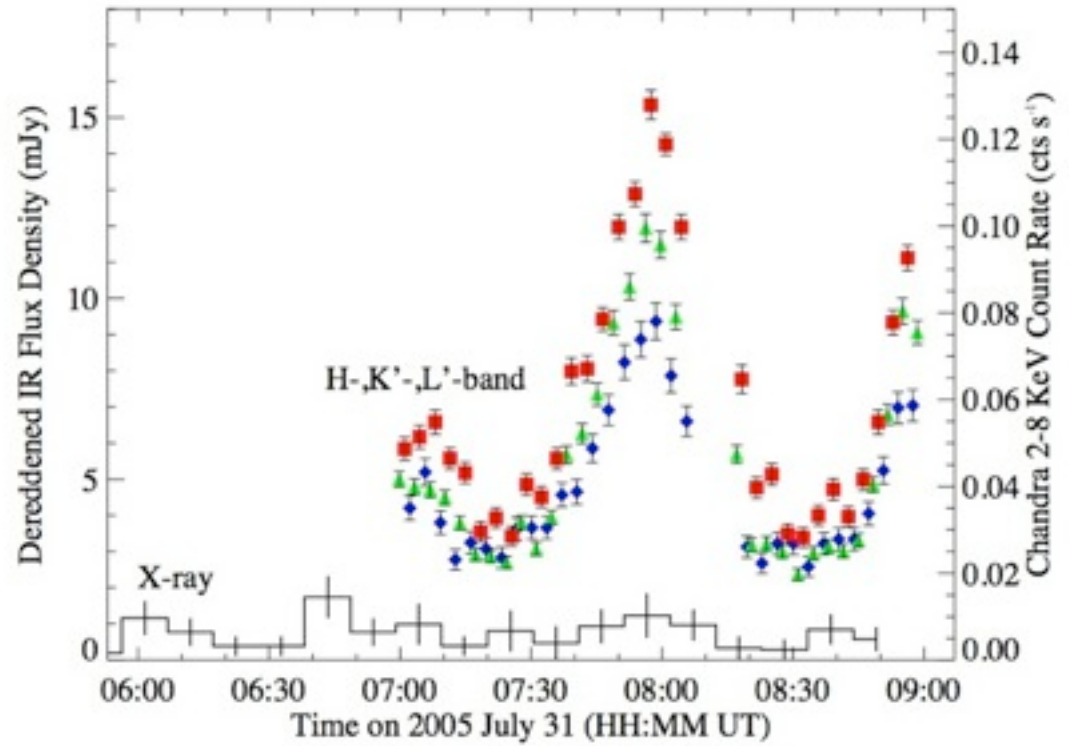
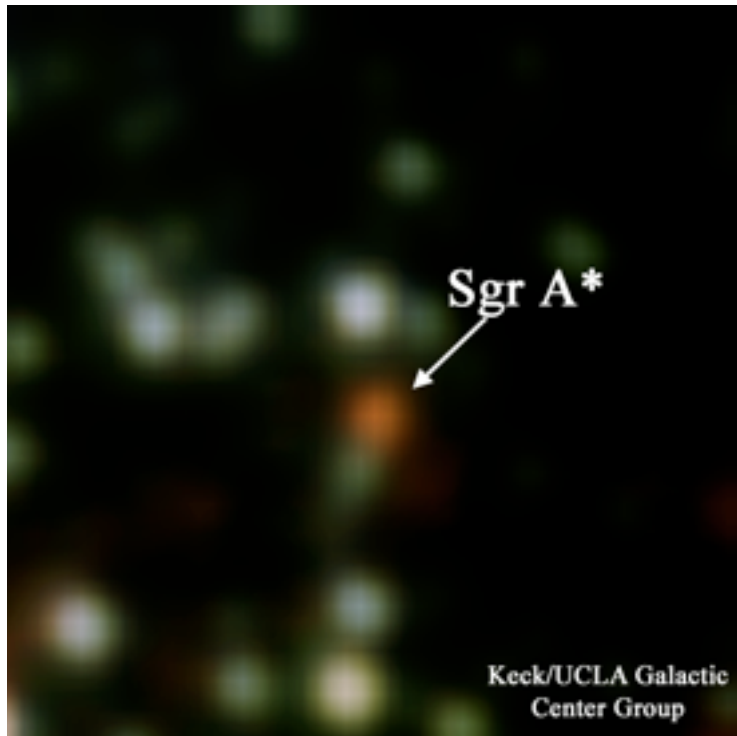


STIS

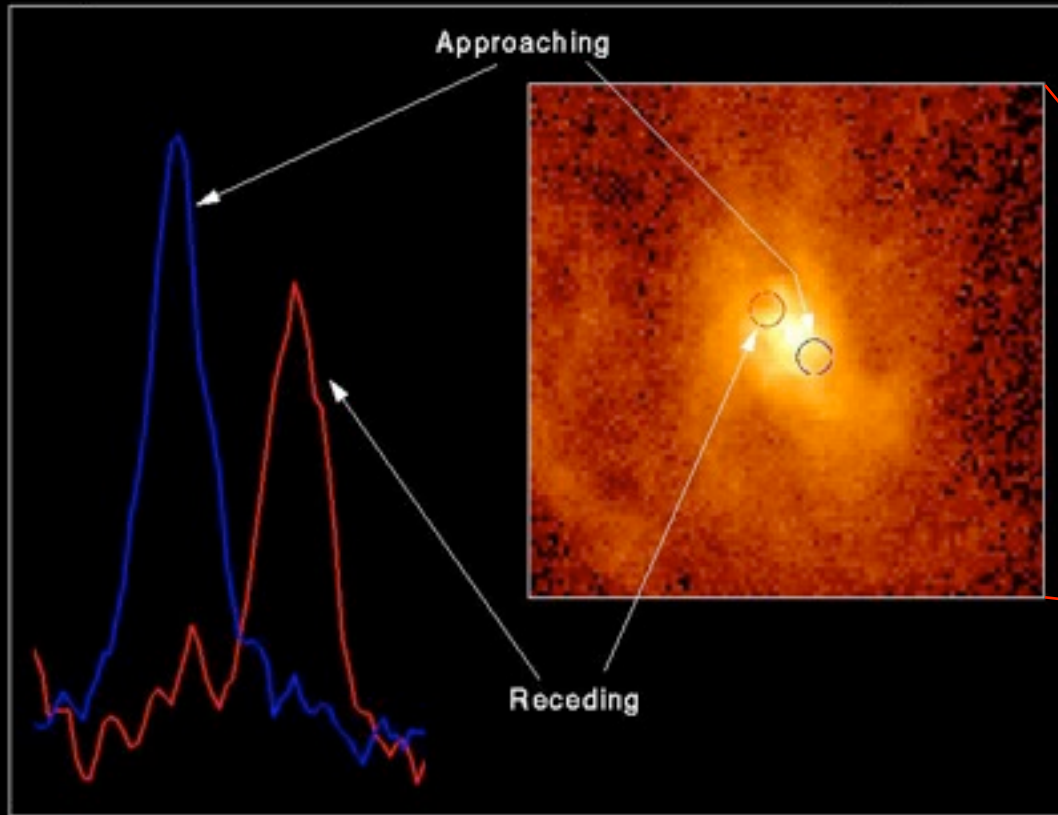




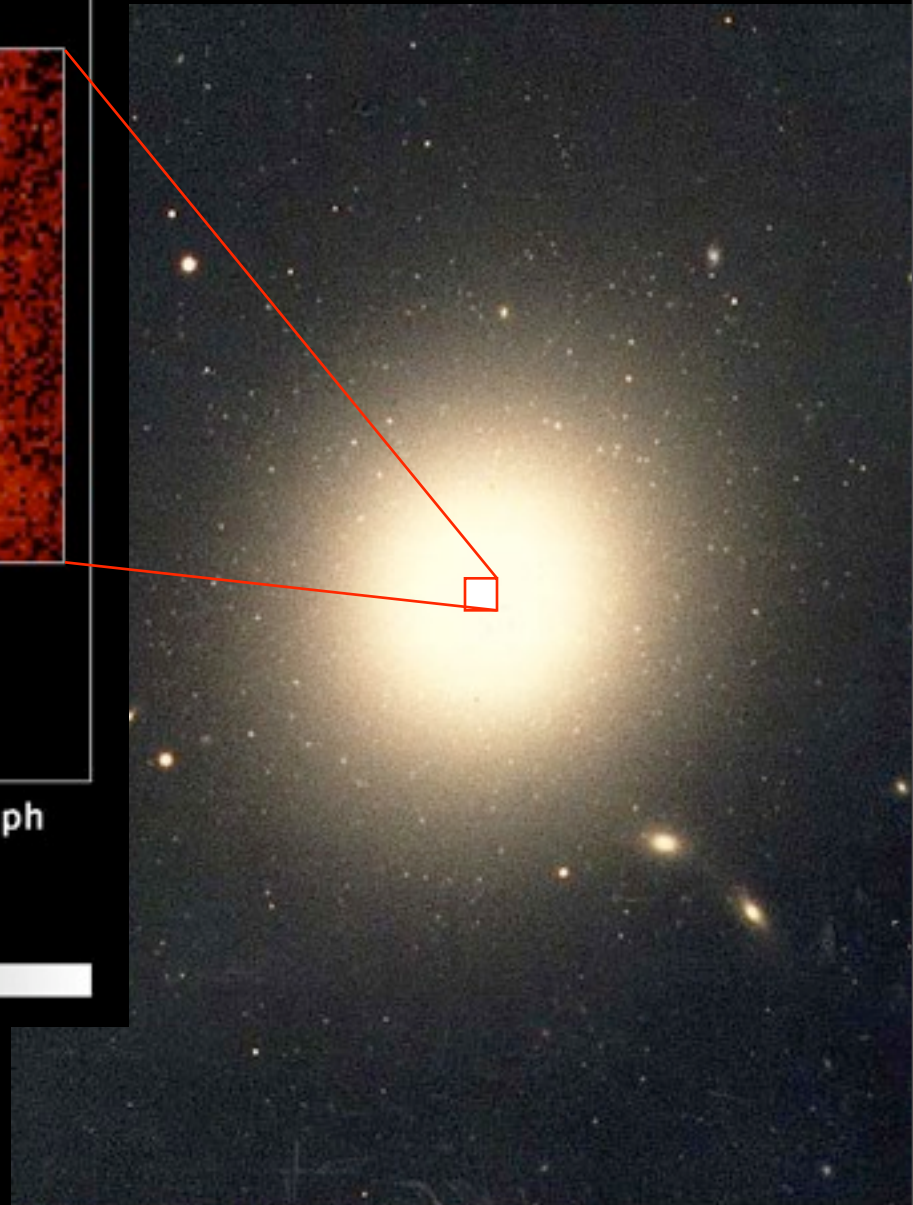




Spectrum of Gas Disk in Active Galaxy M87

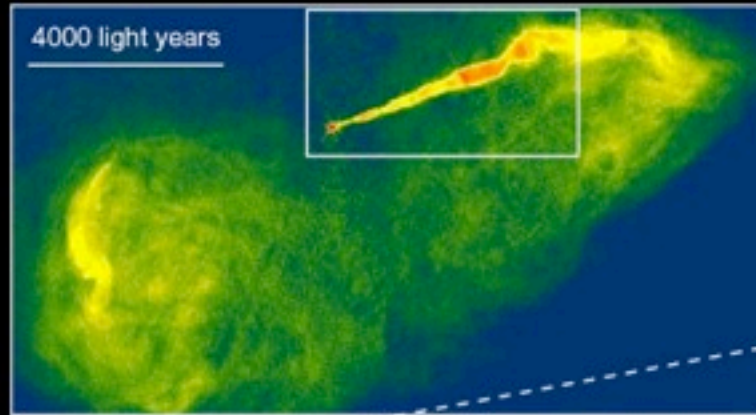


Hubble Space Telescope • Faint Object Spectrograph

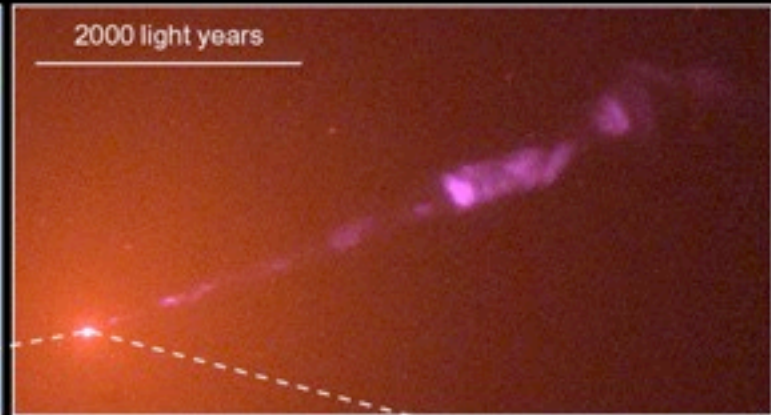


M87 © Anglo-Australian Observatory
Photo by David Malin

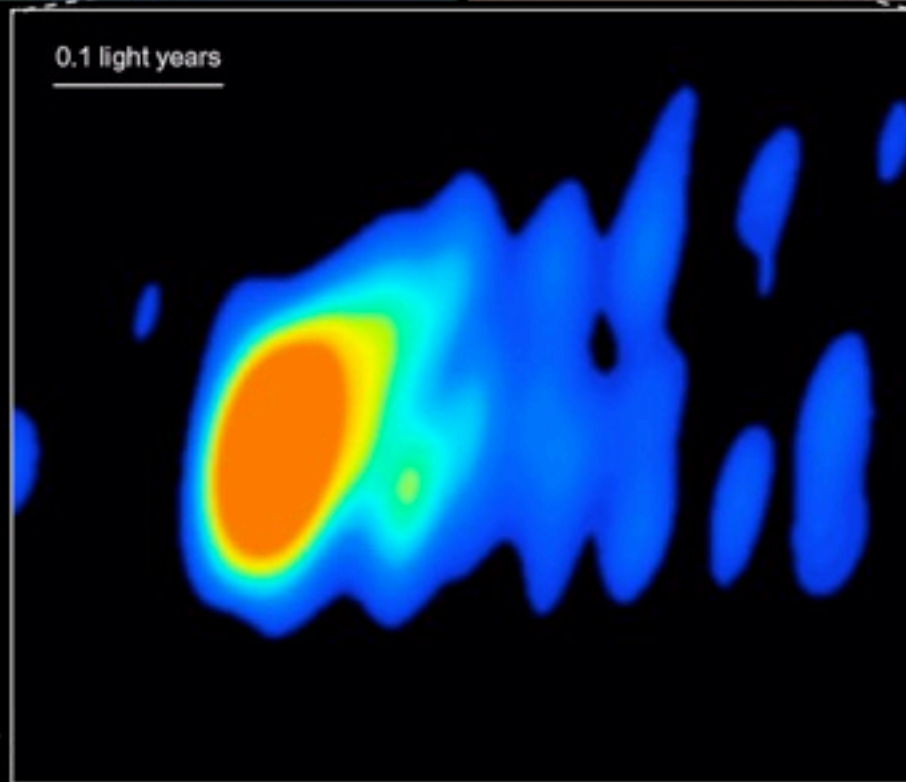
Galaxy M87



VLA
Radio



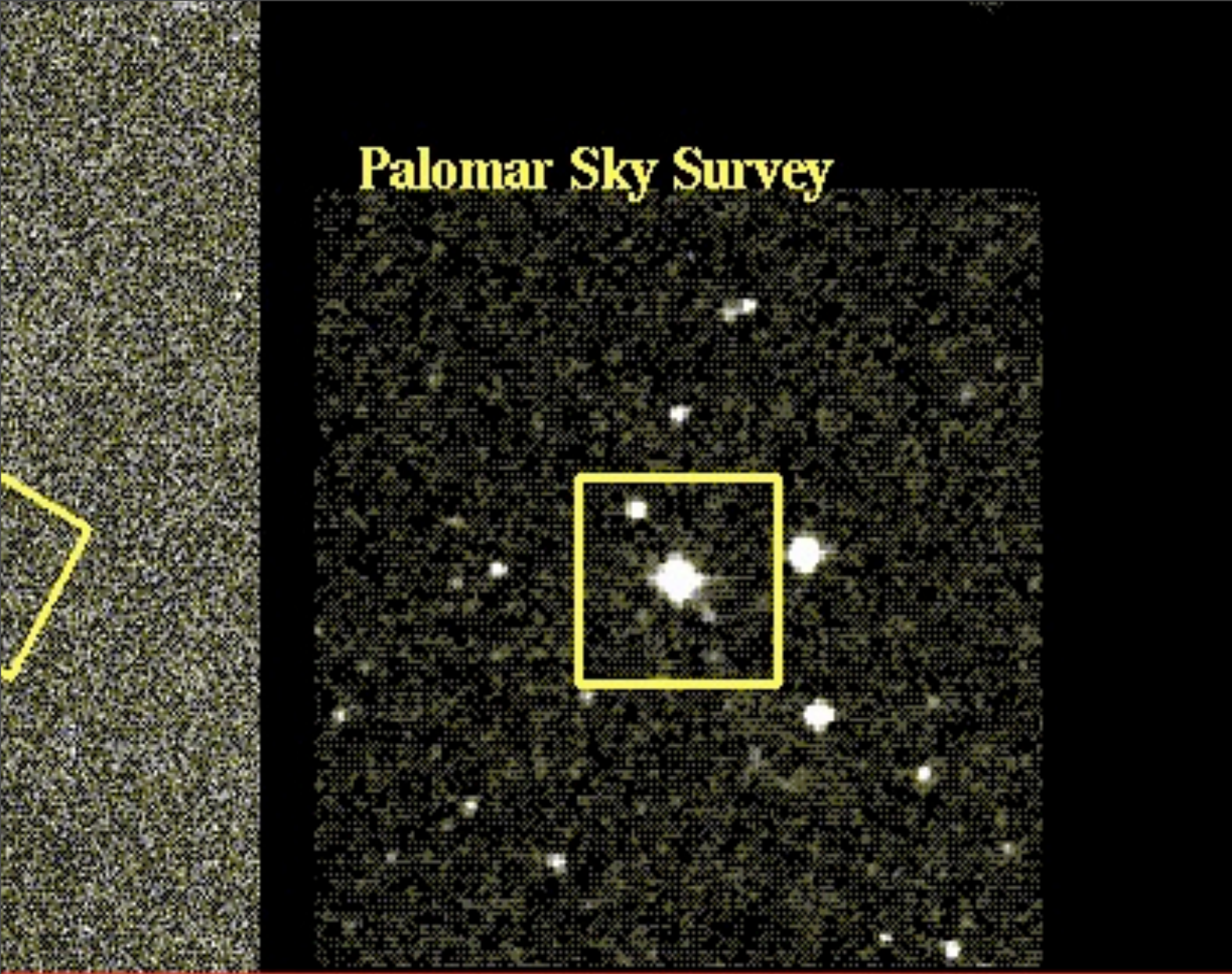
HST • WFPC2
Visible



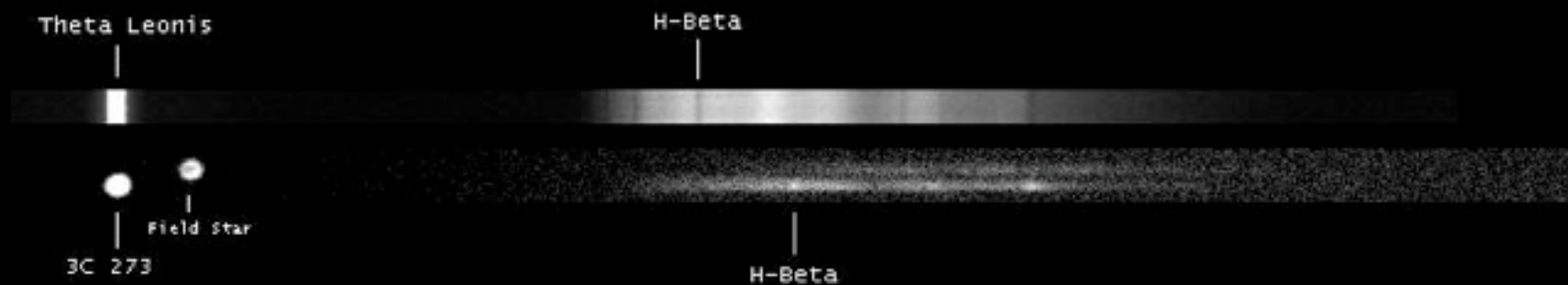
VLBA
Radio

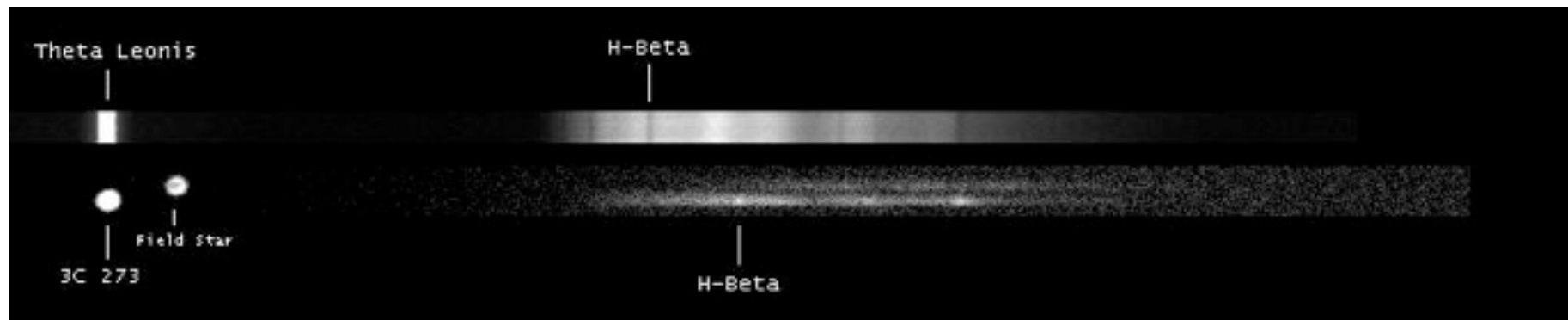
NASA, NRAO and J. Biretta (STScI) • STScI-PRC99-43

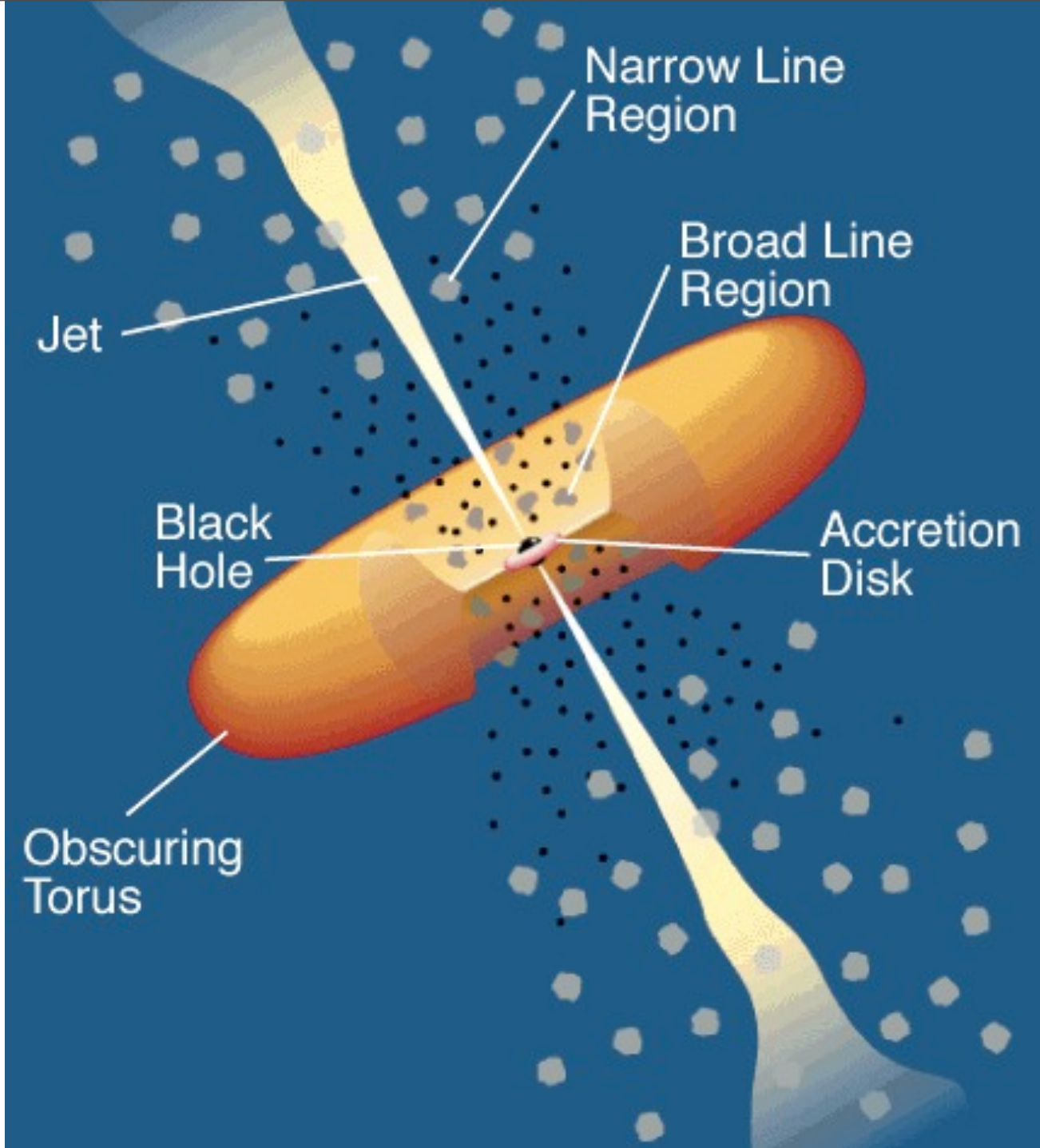
Palomar Sky Survey

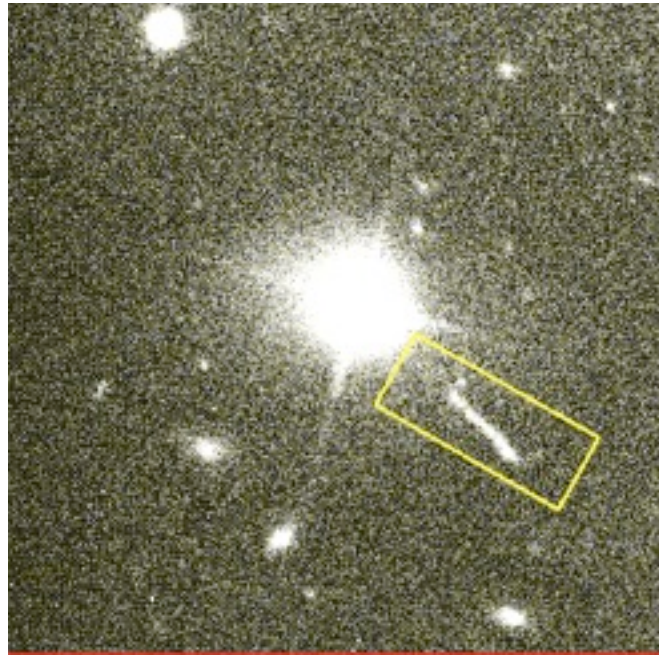


3C 273: one of the brightest quasars



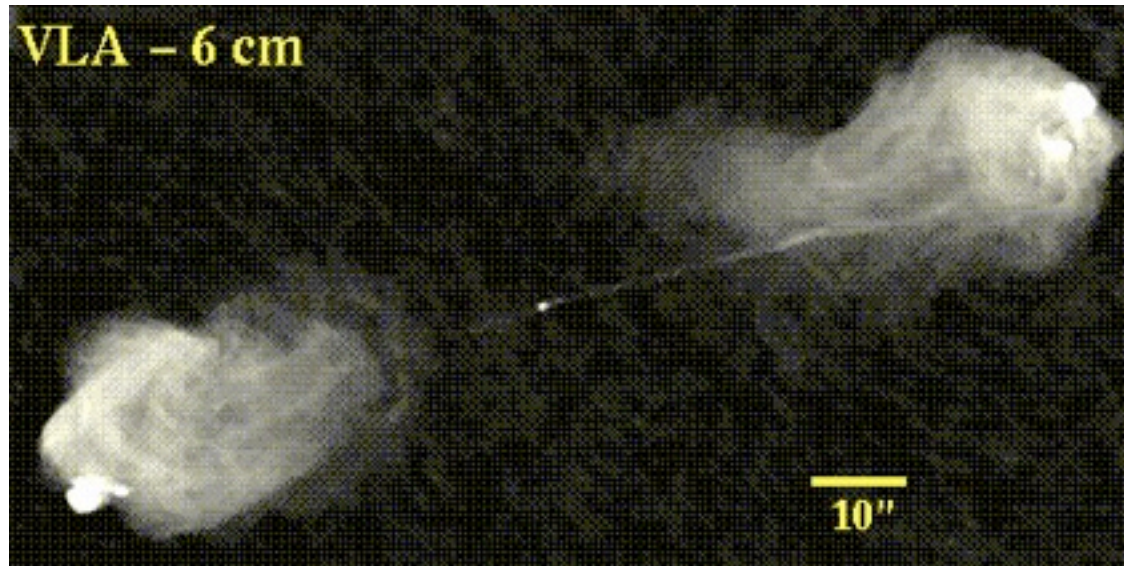




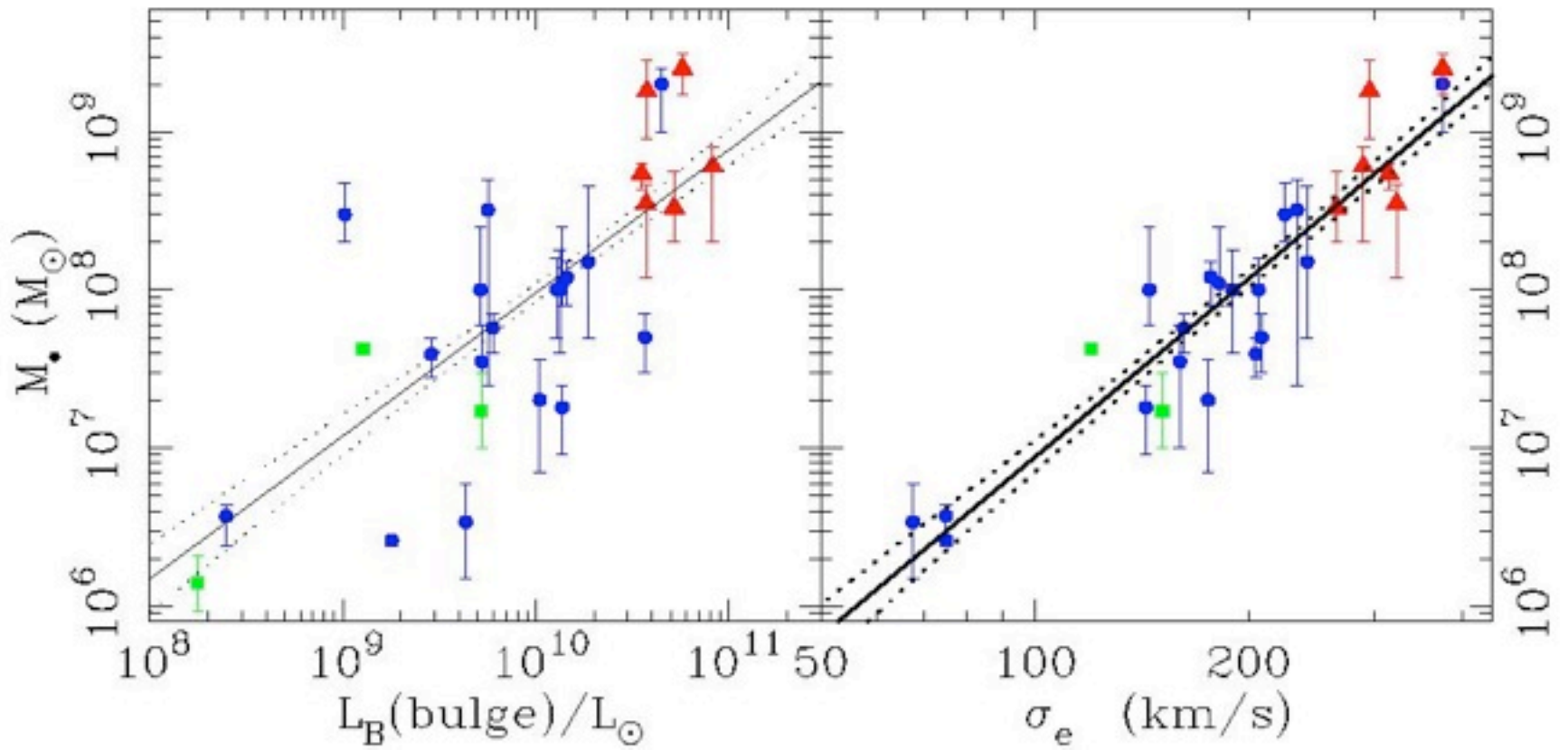


(ignore yellow box)

Type I



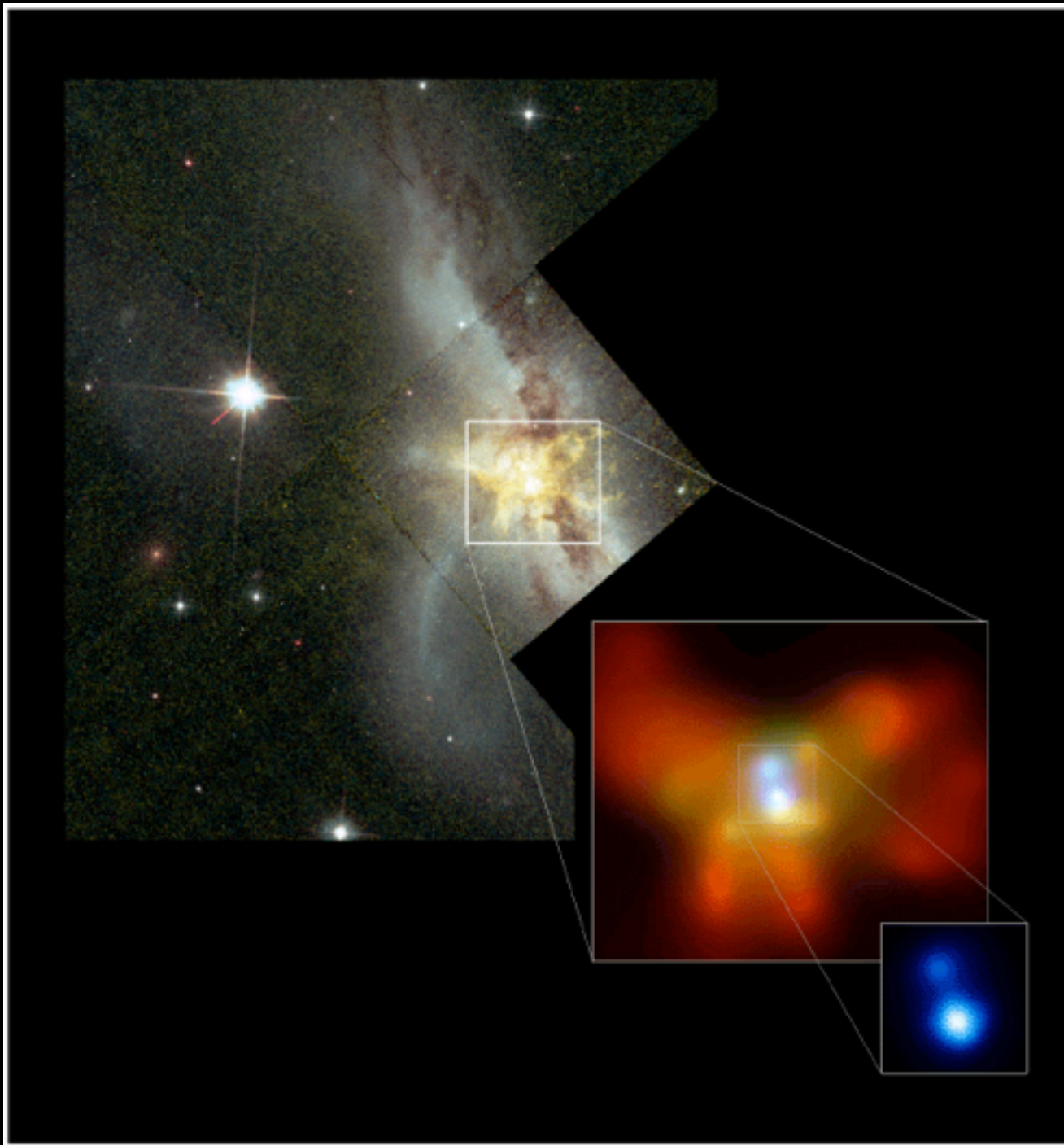
Type II

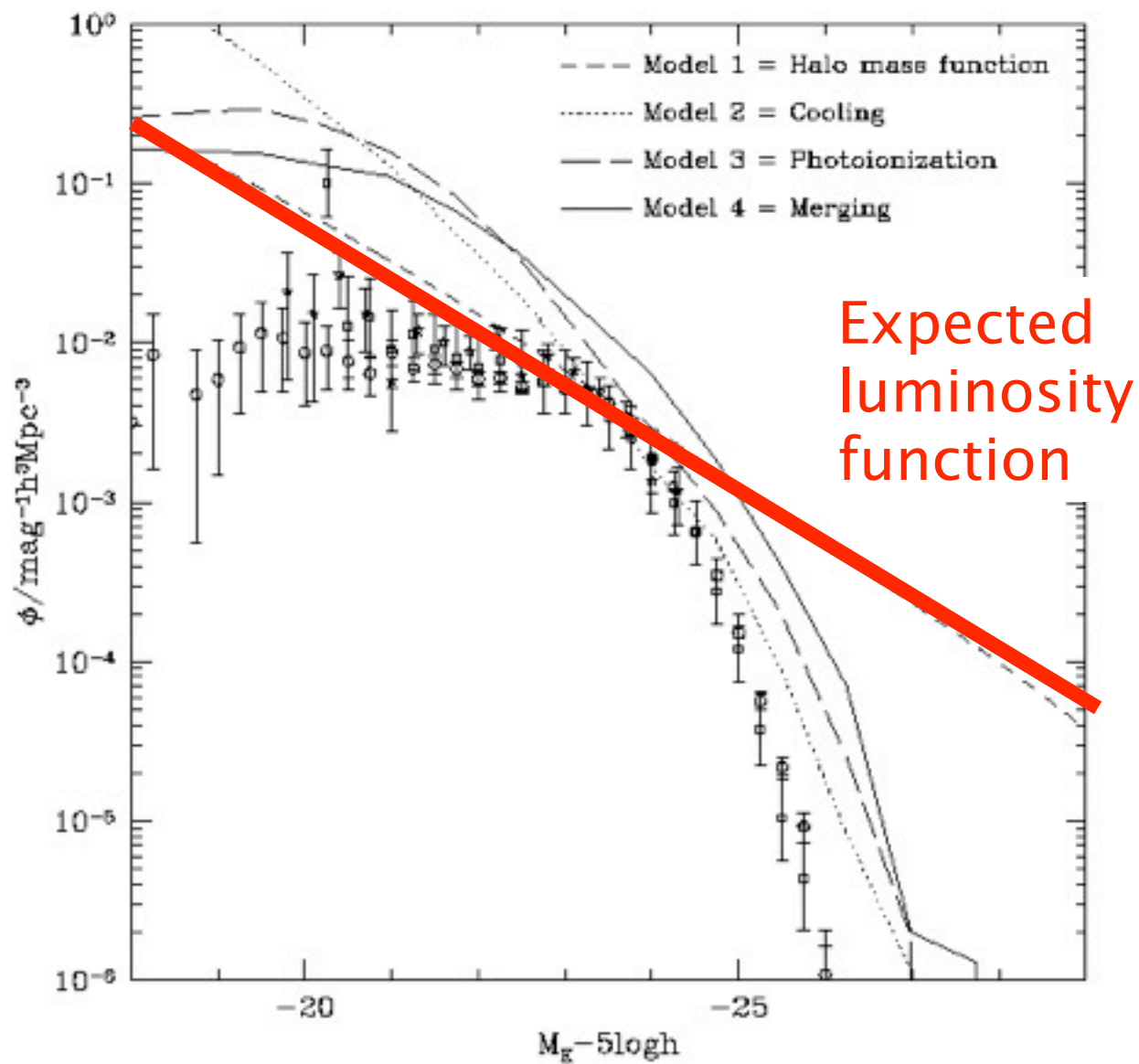


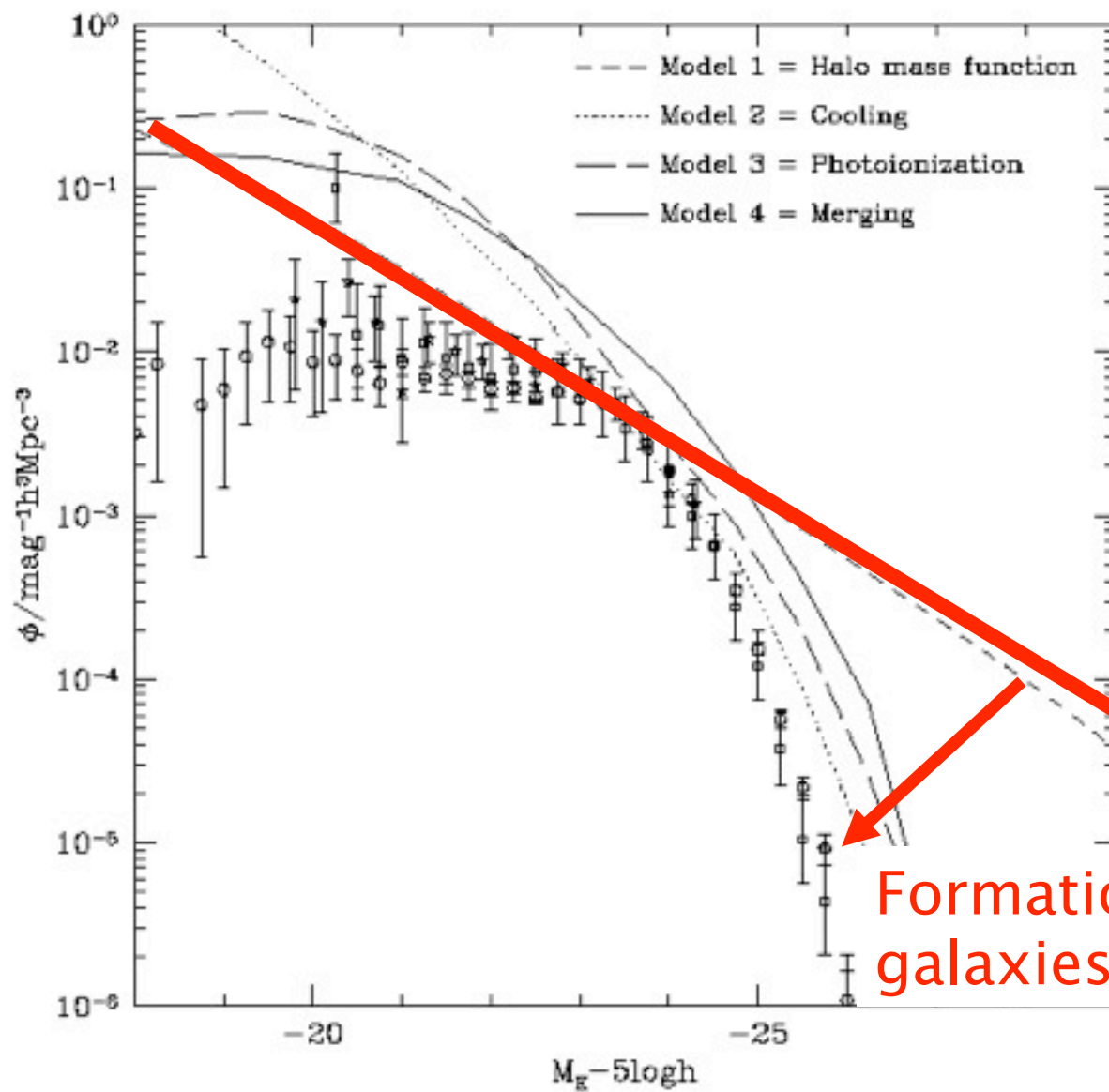
Gebhardt et al 1999
 (also: Ferrarese & Merritt 1999)



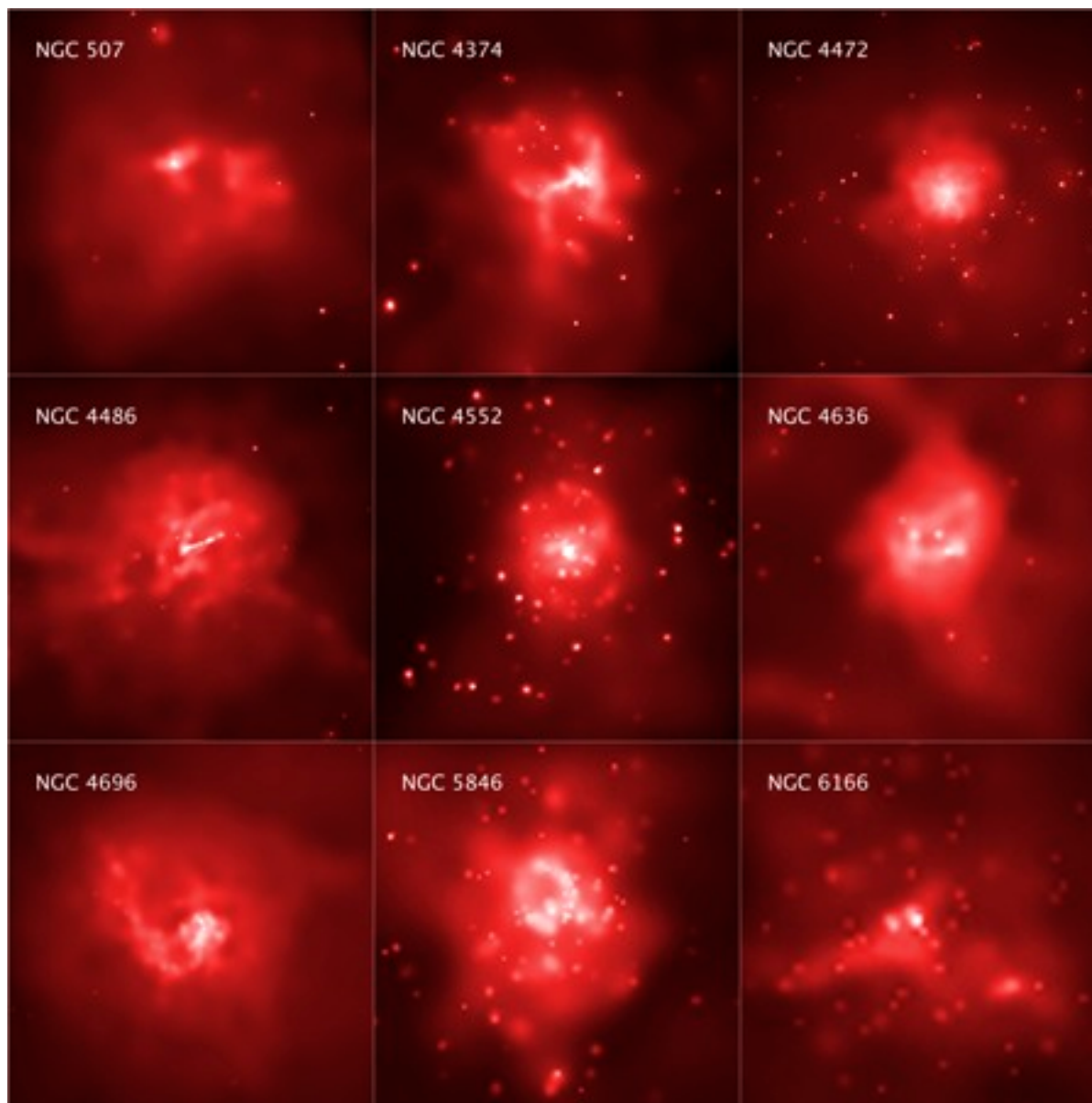








Formation massive galaxies suppressed



Hot gas in elliptical galaxies with active nuclei