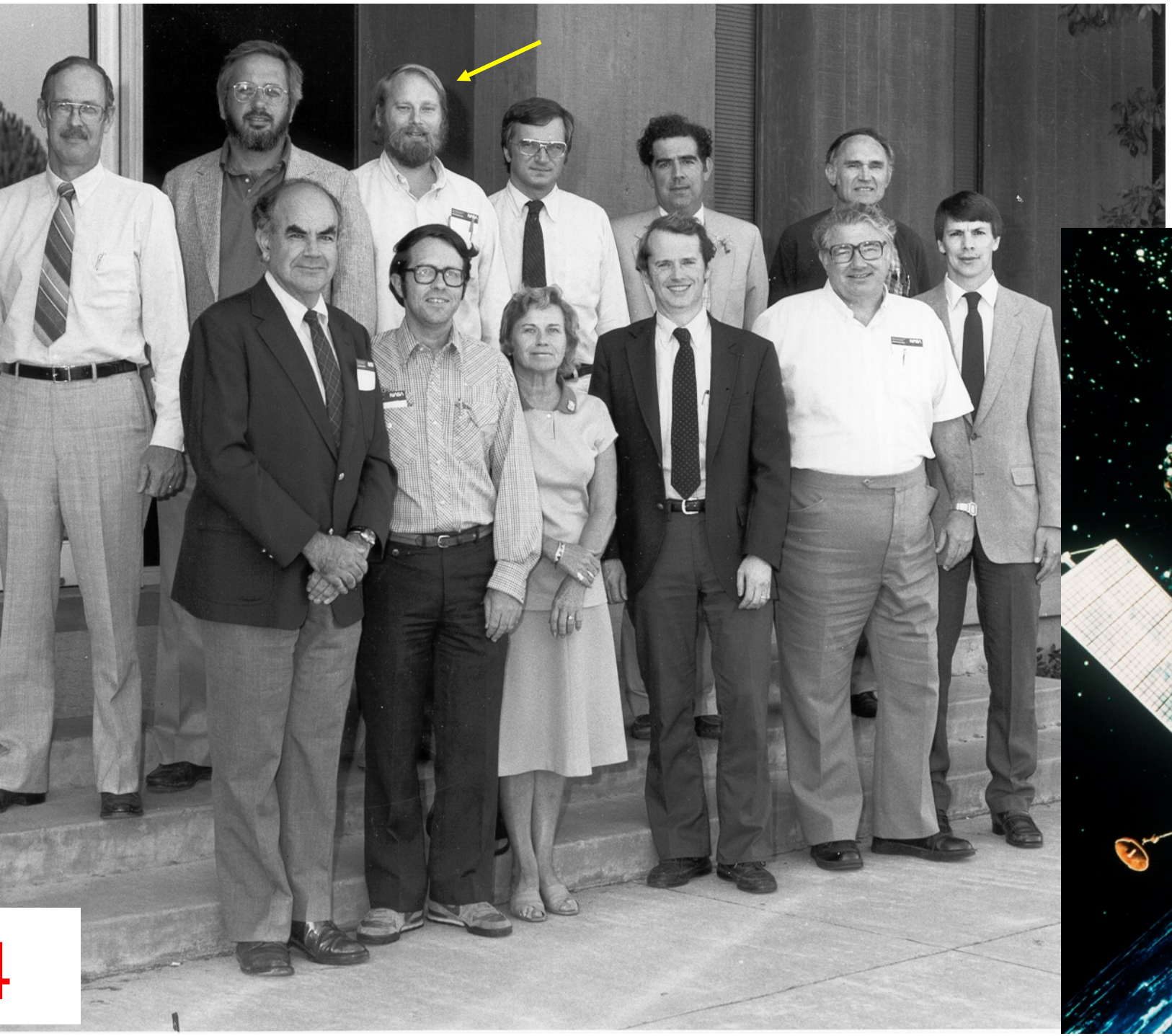
From SIRTF to Spitzer with Ned and Friends

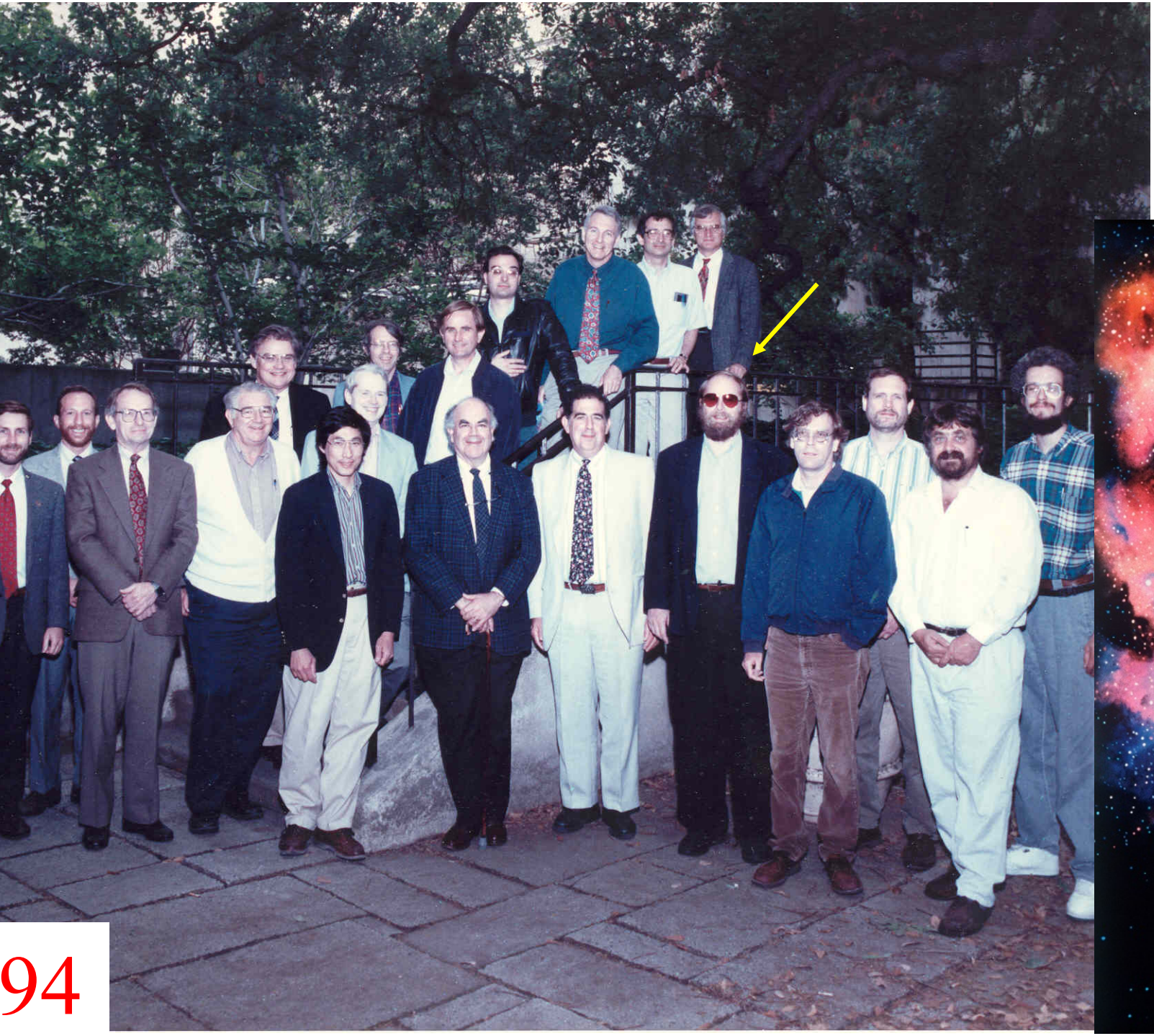
Michael Werner, JPL/Caltech – August 25, 2017

Liftoff!
25 August 2003



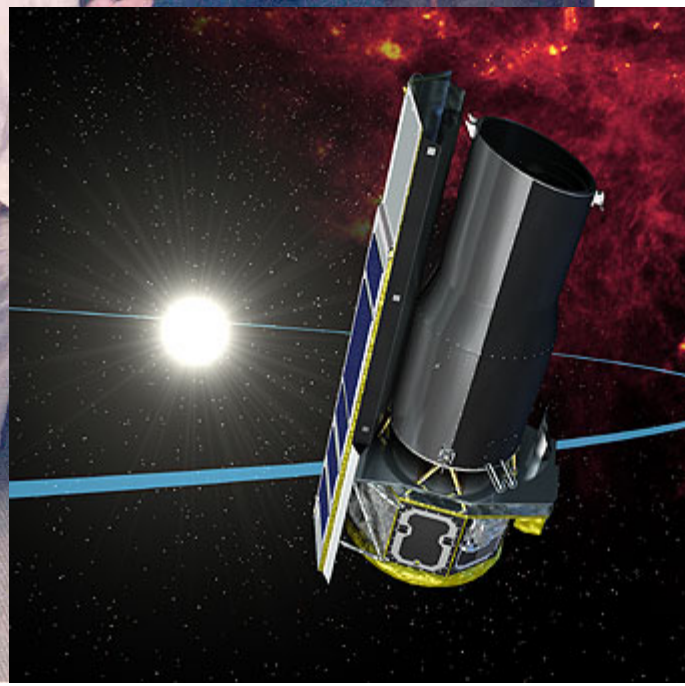

SPACE INFRARED
TELESCOPE FACILIT

1989

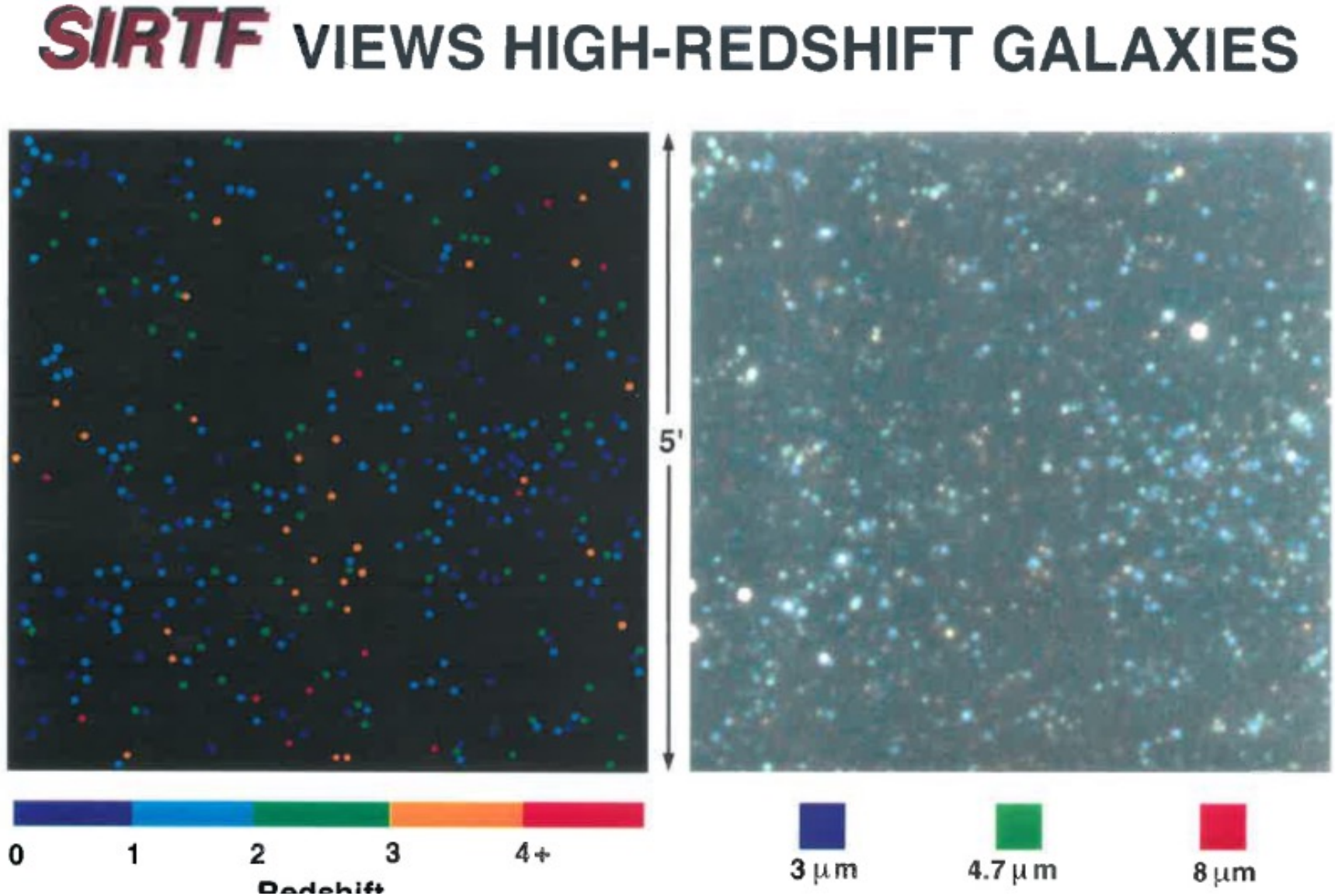


94

99



Ned was a tireless and effective spokesperson for deep extragalactic surveys with Spitzer



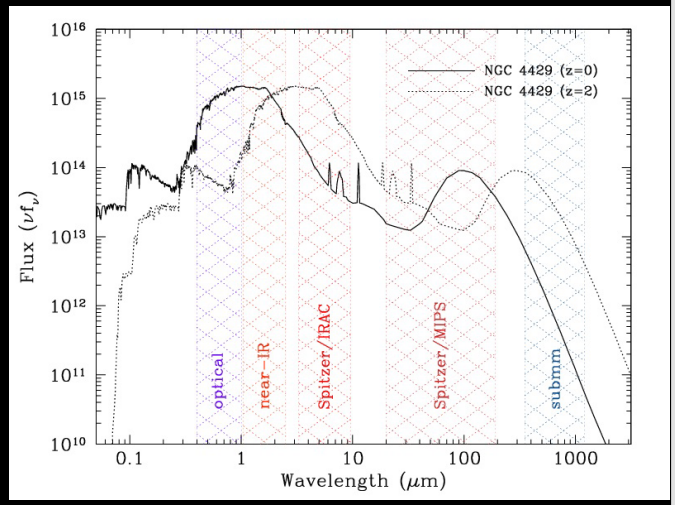
The IRAC Shallow Survey – Clusters Galore

3.5 degrees

4.5 μm image 8.5 sq degrees
90 sec/position - ~60 hrs. total
300,000 sources, most never before seen in the infrared

Follow on SDWFS survey went twice as deep + looked for variability

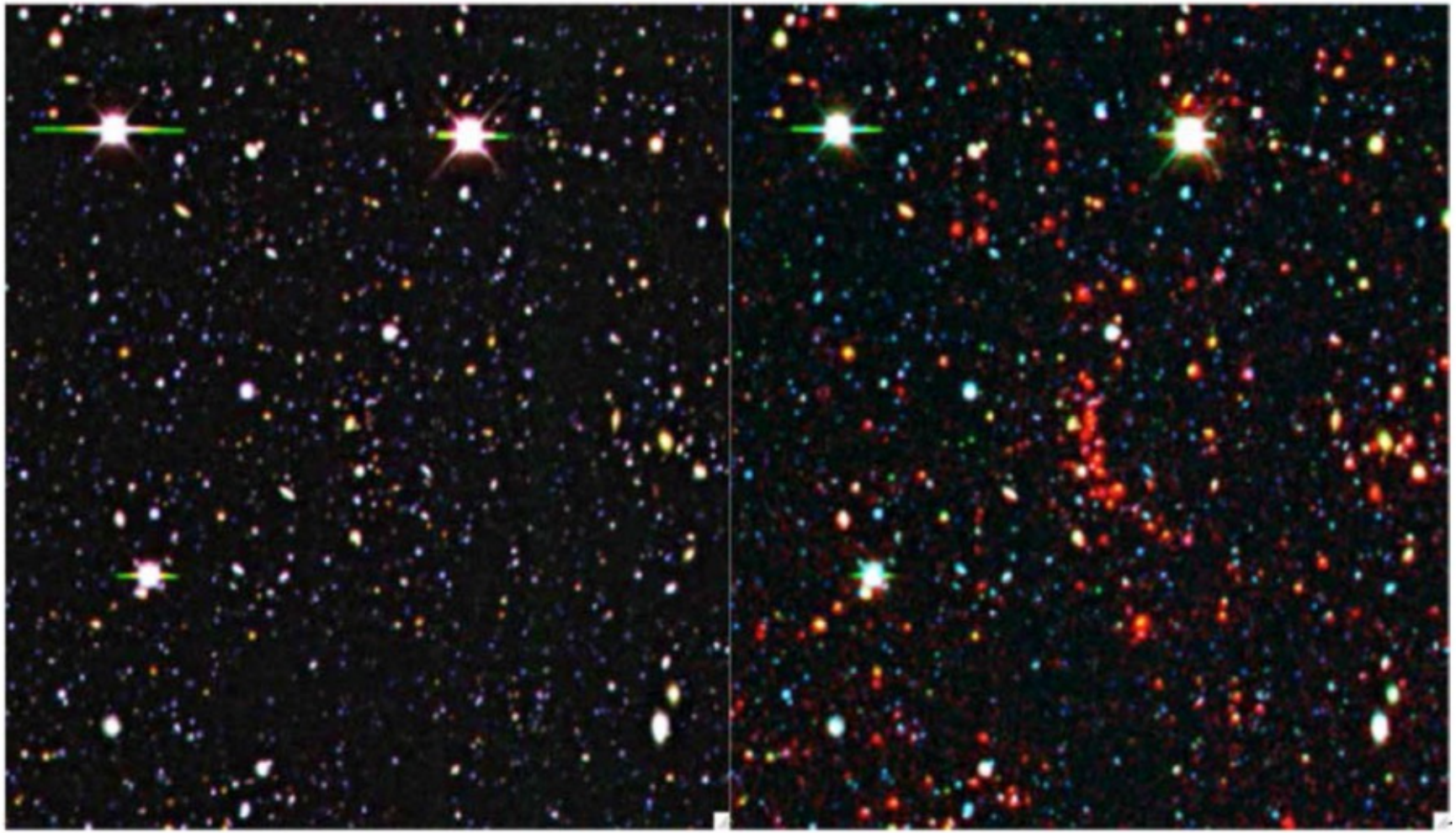
Clusters of galaxies are the largest self-gravitating structures in the Universe, and hold clues to the formation of structure in the early Universe



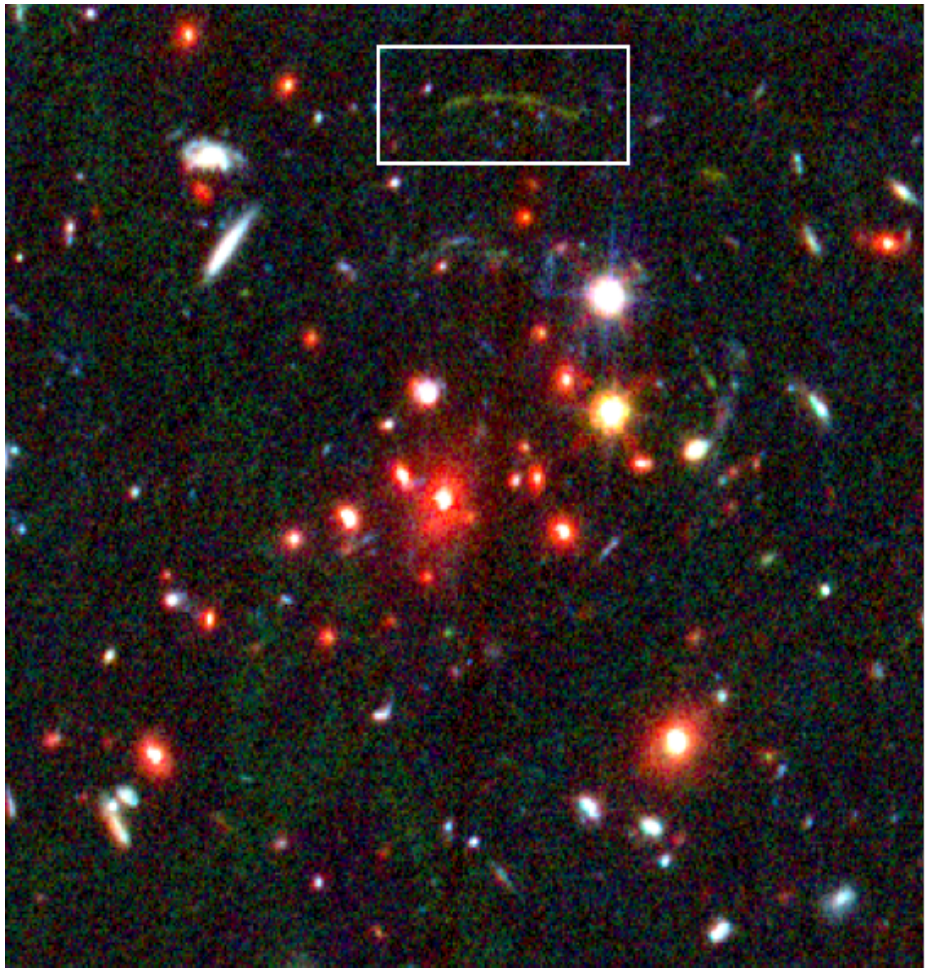
Spitzer's very high sensitivity and large imaging arrays facilitate extragalactic surveys. They exploit the cosmic redshift to find clusters of galaxies at z>1

Spitzer Space Telescope

Spitzer Has Found Many Clusters of Galaxies At Redshifts 1 to 2



Arc Shouldn't Be There

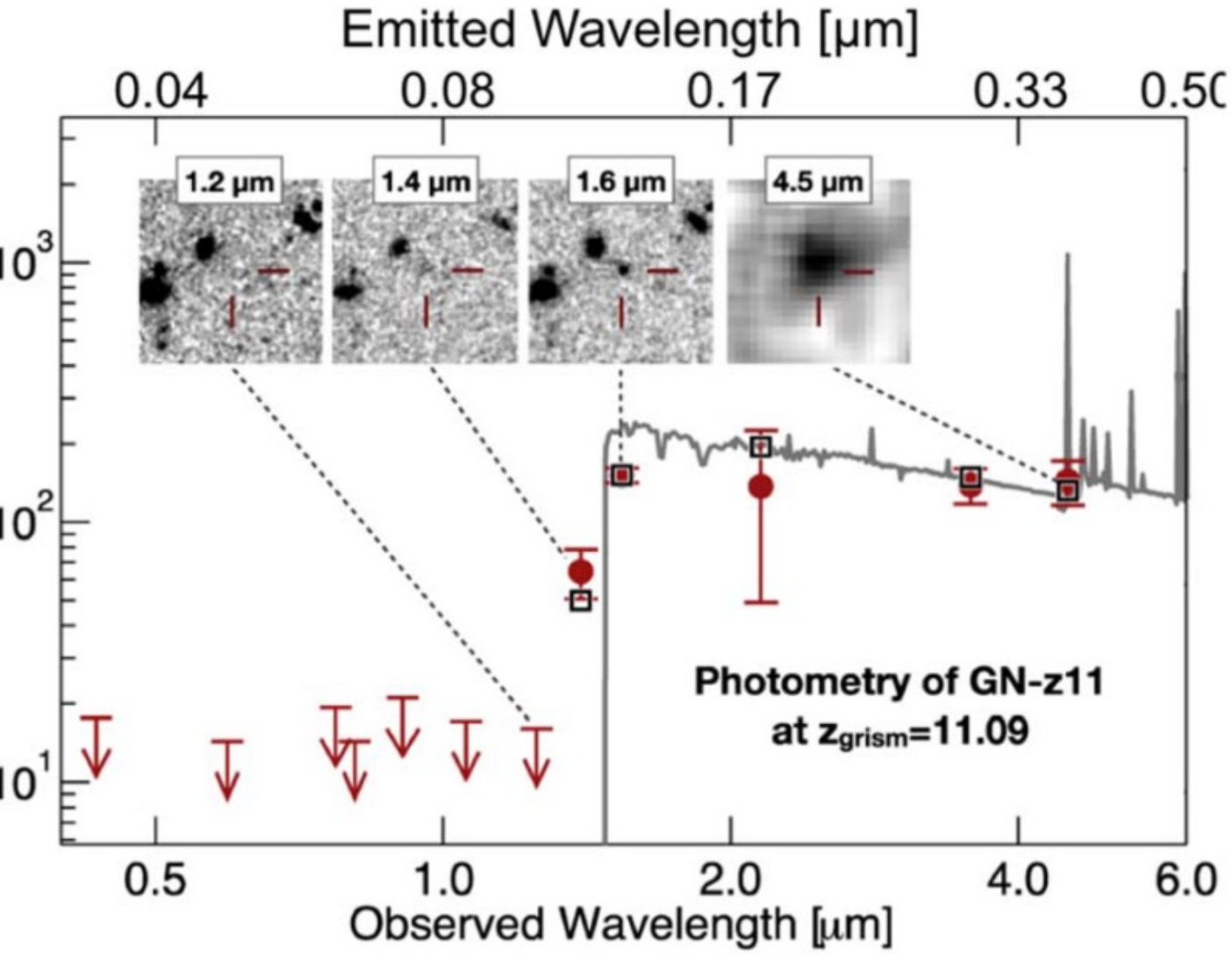


The faint, lensed arc seen behind this distant [z=1.75] cluster, and itself at z>4.5, discovered by Spitzer, shouldn't be there

The probability of its occurrence is zero according to conventional theory and analysis

Perhaps our picture of the mass distribution in clusters, or the number of bright high redshift galaxies, is incorrect

The Most Distant Galaxy Known!



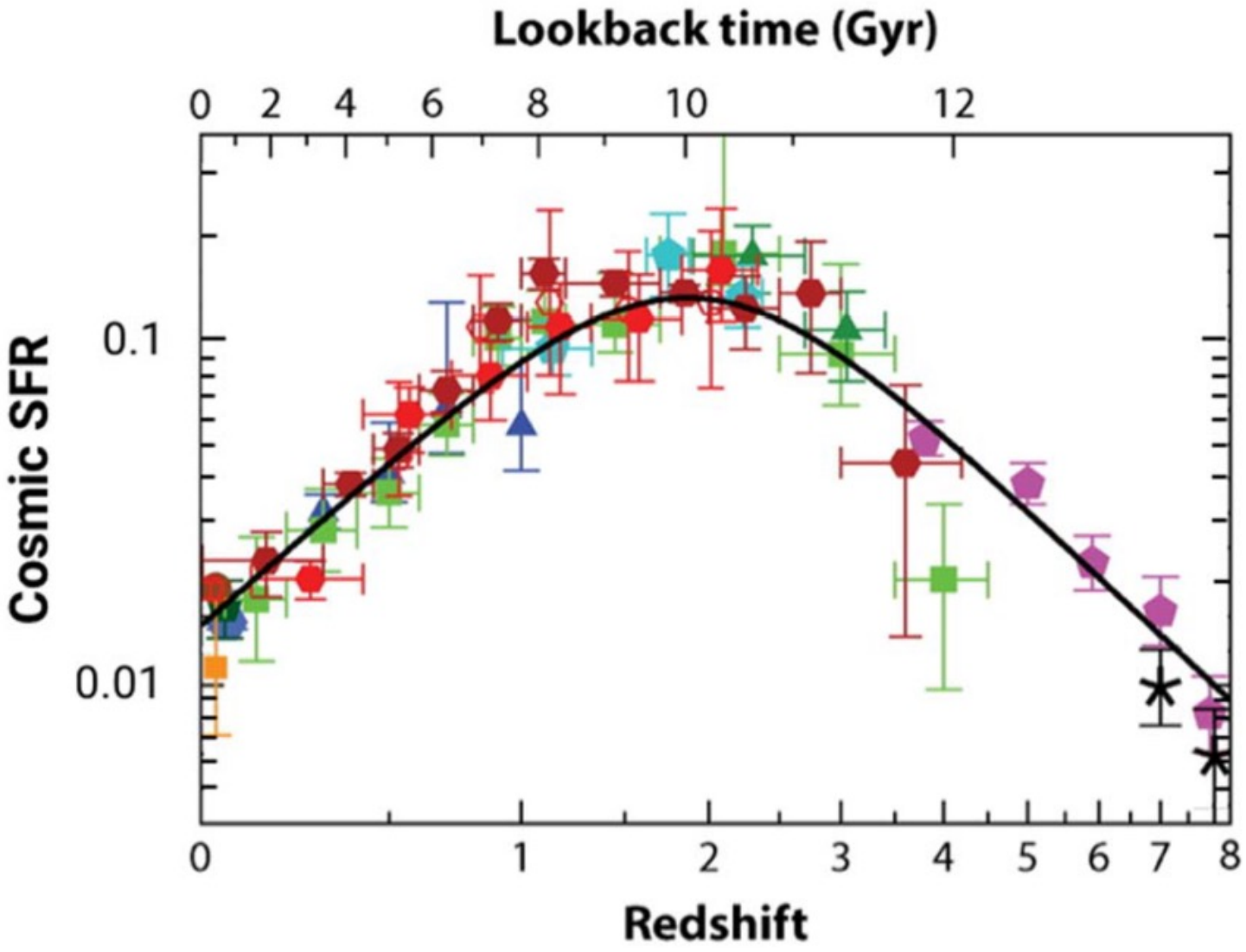
This galaxy has a grism-measured redshift of z~11

Using Ned's cosmology calculator, we find that we see it when the universe w but 3% of its current age.

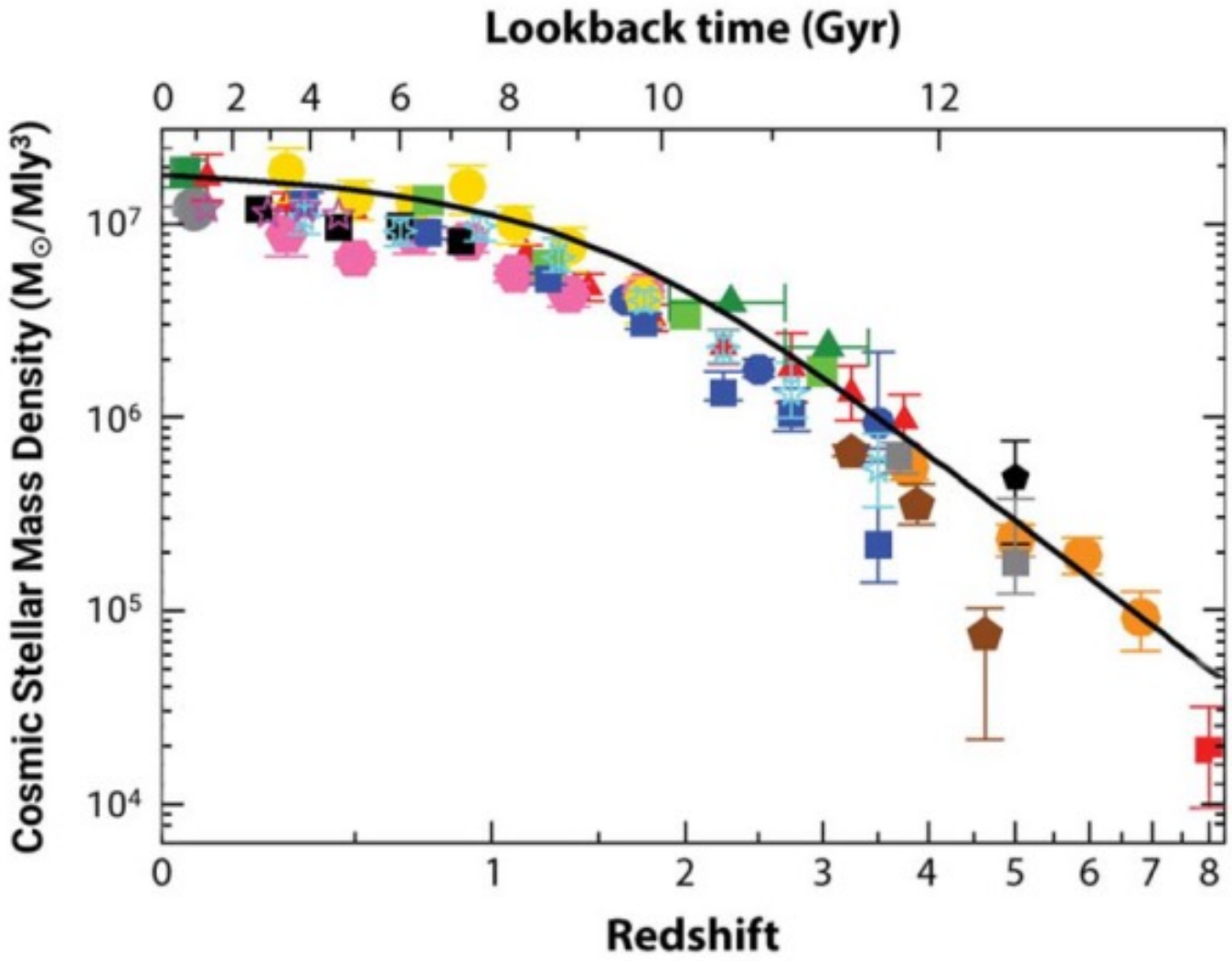
It was not anticipated that galaxies of this size could form so quickly

This and others of its ilk ic spectroscopic targets for JWST

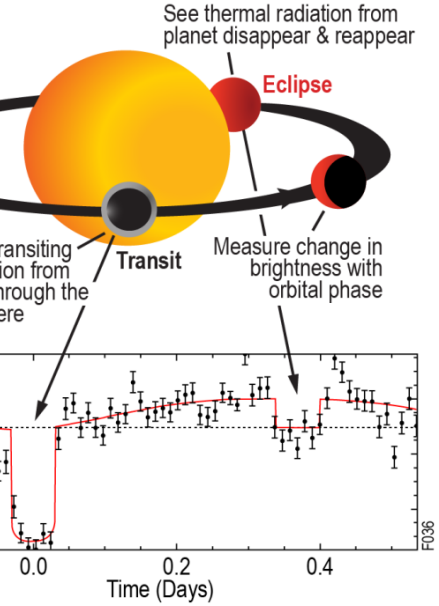
Extinction Corrected Madau Plot

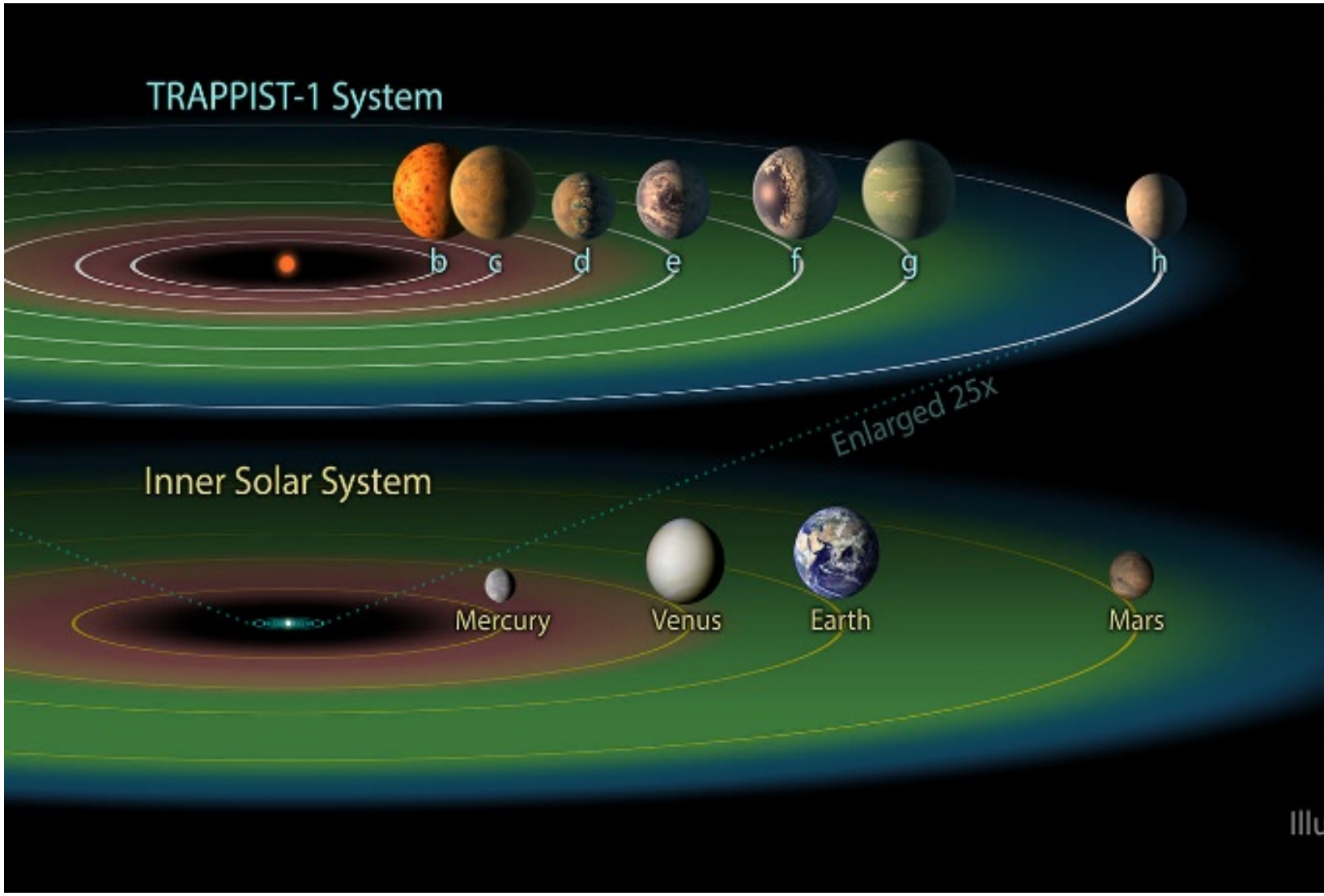


Build up of Stellar Mass with Cosmic Time

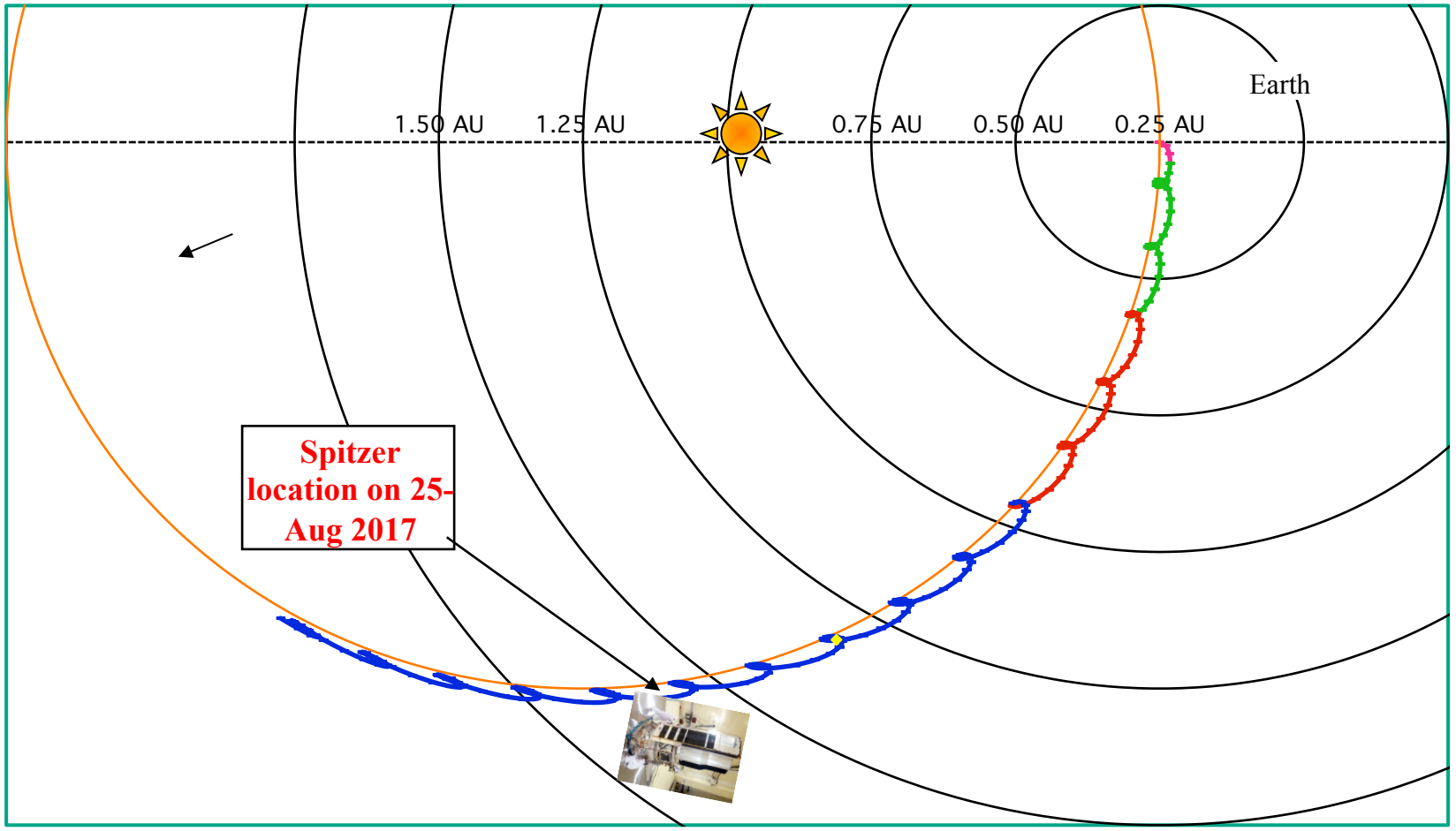


TRAPPIST-1 Exoplanets: Spitzer's Greatest Hit



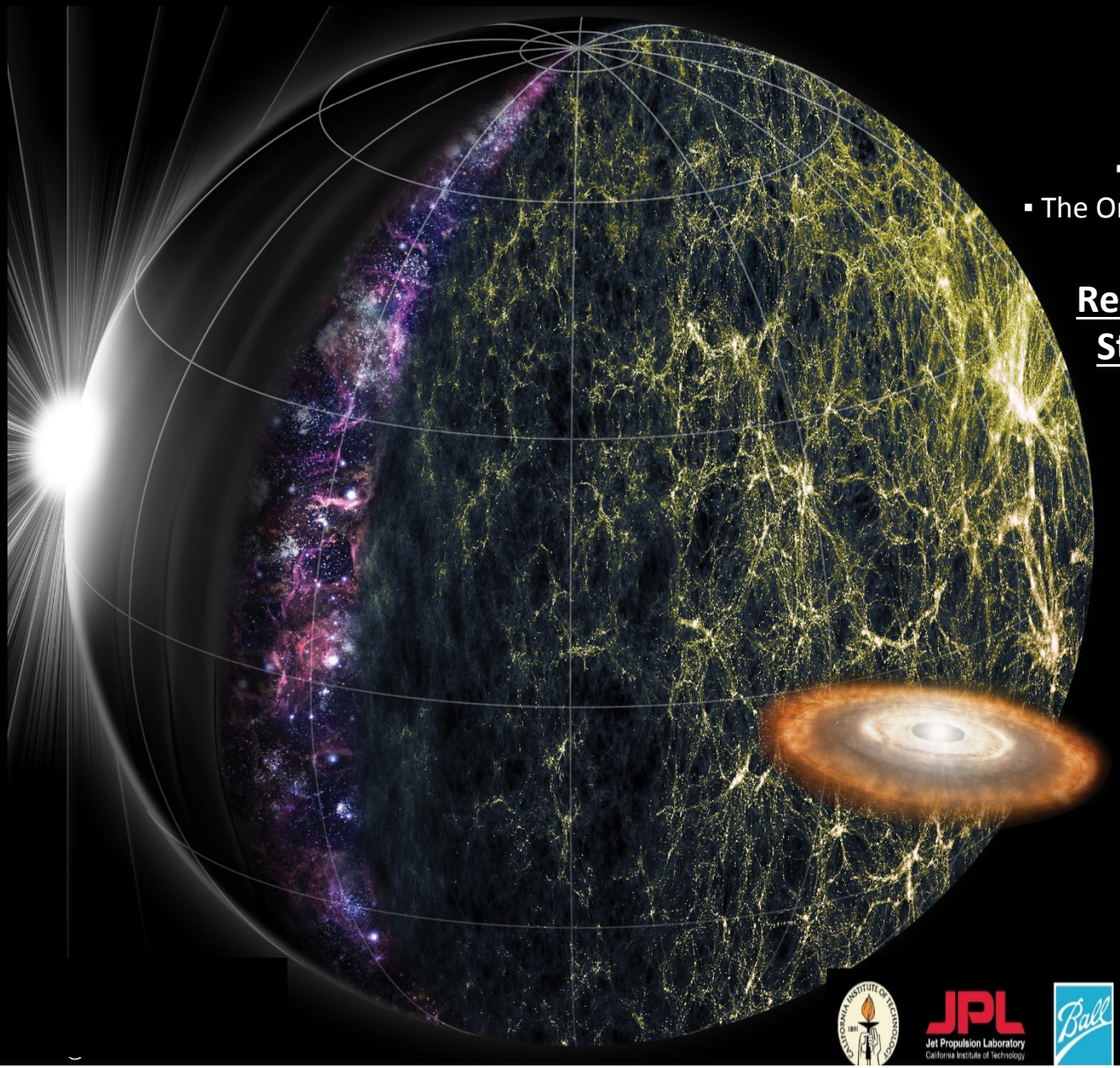


Earth-Trailing Solar Orbit is Key to Much of Spitzer's Success and Helps Us to Understand Lifetime



We are curre
funded throu
Spring 2019.
expect to be
to operate
through the
of 2019 and
exploring
operating int
2020

SPHEREx: An All-Sky Spectral Survey



Designed to Explore

- The Origin of the Universe
- The Origin and History of Galaxies
- The Origin of Water in Planetary Systems

Recently Selected for Phase A Study in MIDEX Competition

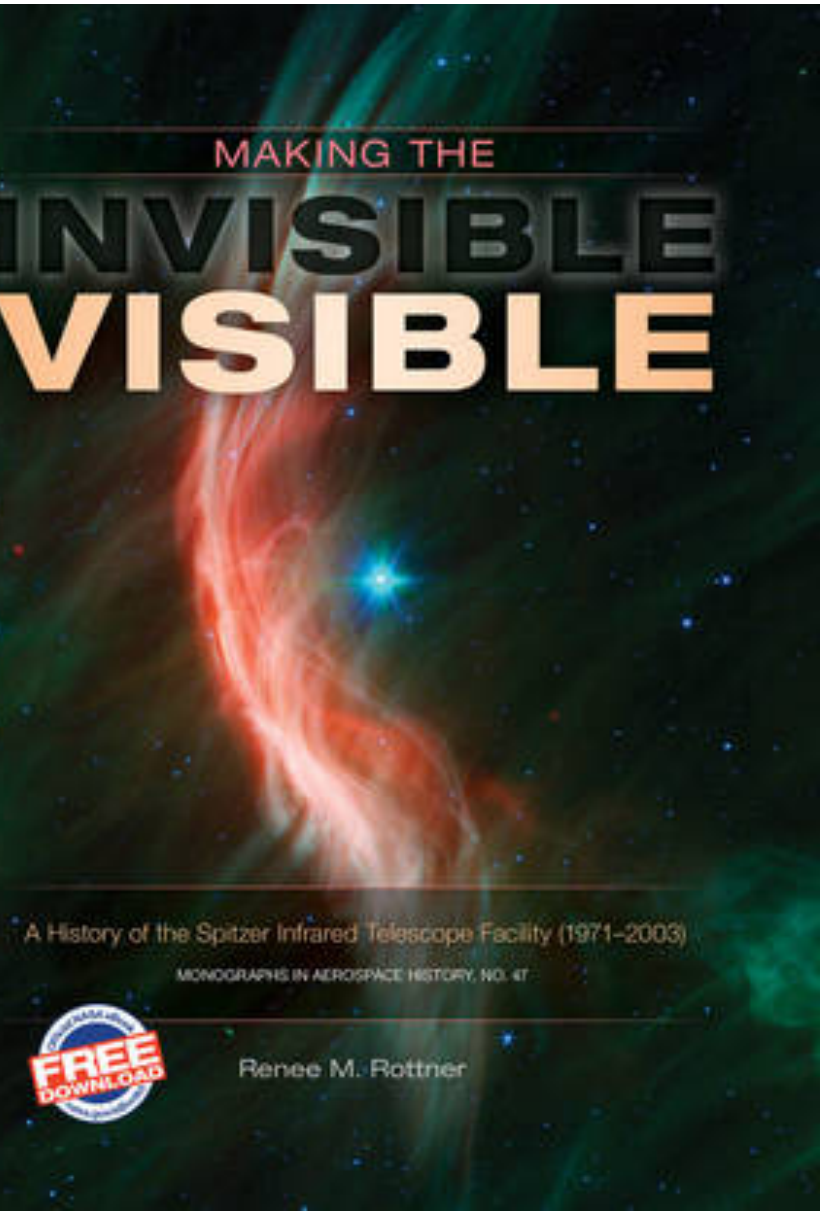
Jamie Bock, Caltech, is PI
Covers 0.75-to-4um with R~40
Covers 4-to5um with R~150
Obtains 4 complete all sky spectra
In 2 year lifetime with ~6" pixels

The First All-Sky Near-IR Spectral Survey

A Rich Legacy Archive for the Astronomy Community with Spectra of 100s of Millions of Stars and Galaxies

Jet Propulsion Laboratory
California Institute of Technology

Sorry, Ned, No Jingle

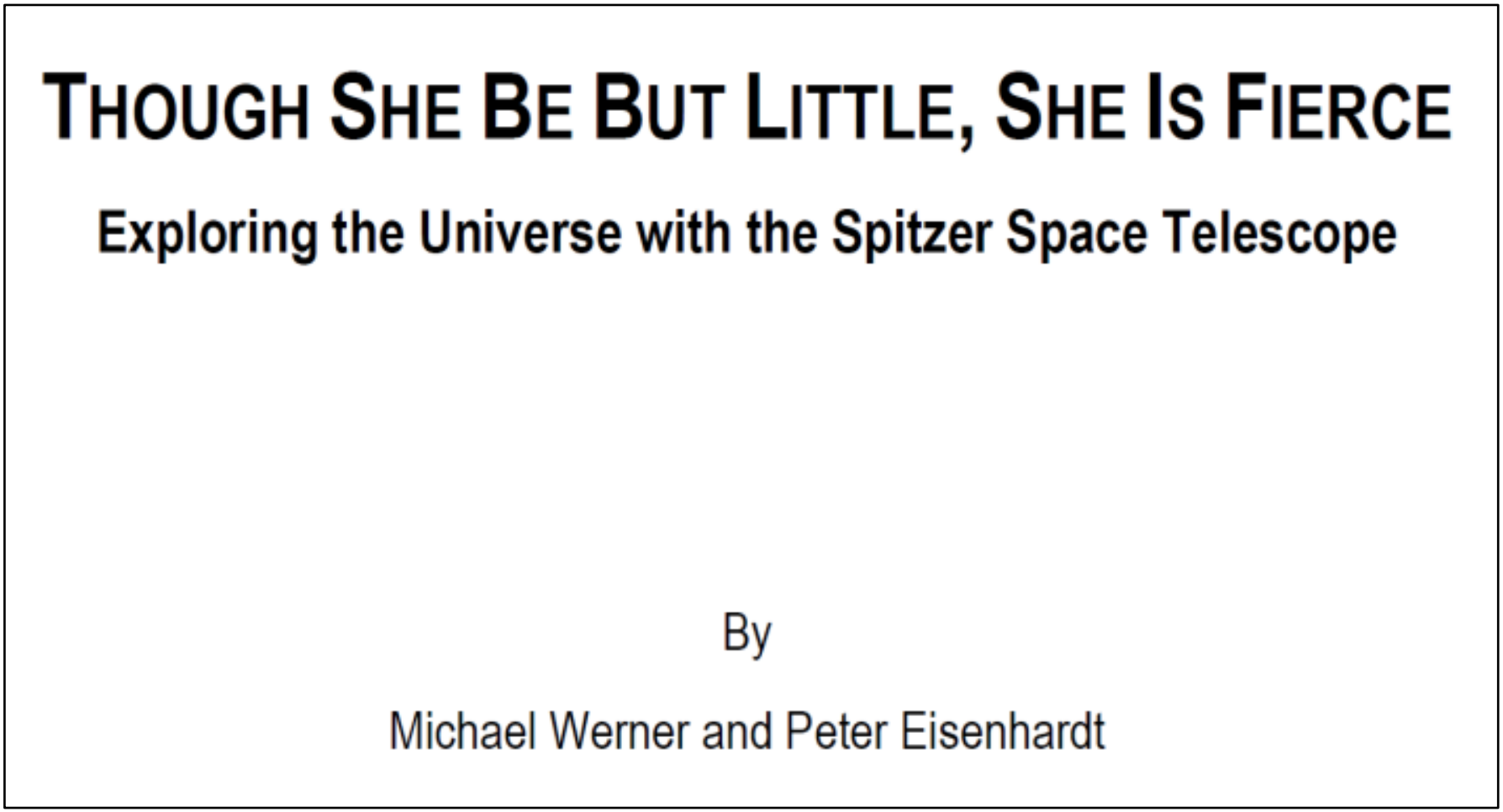


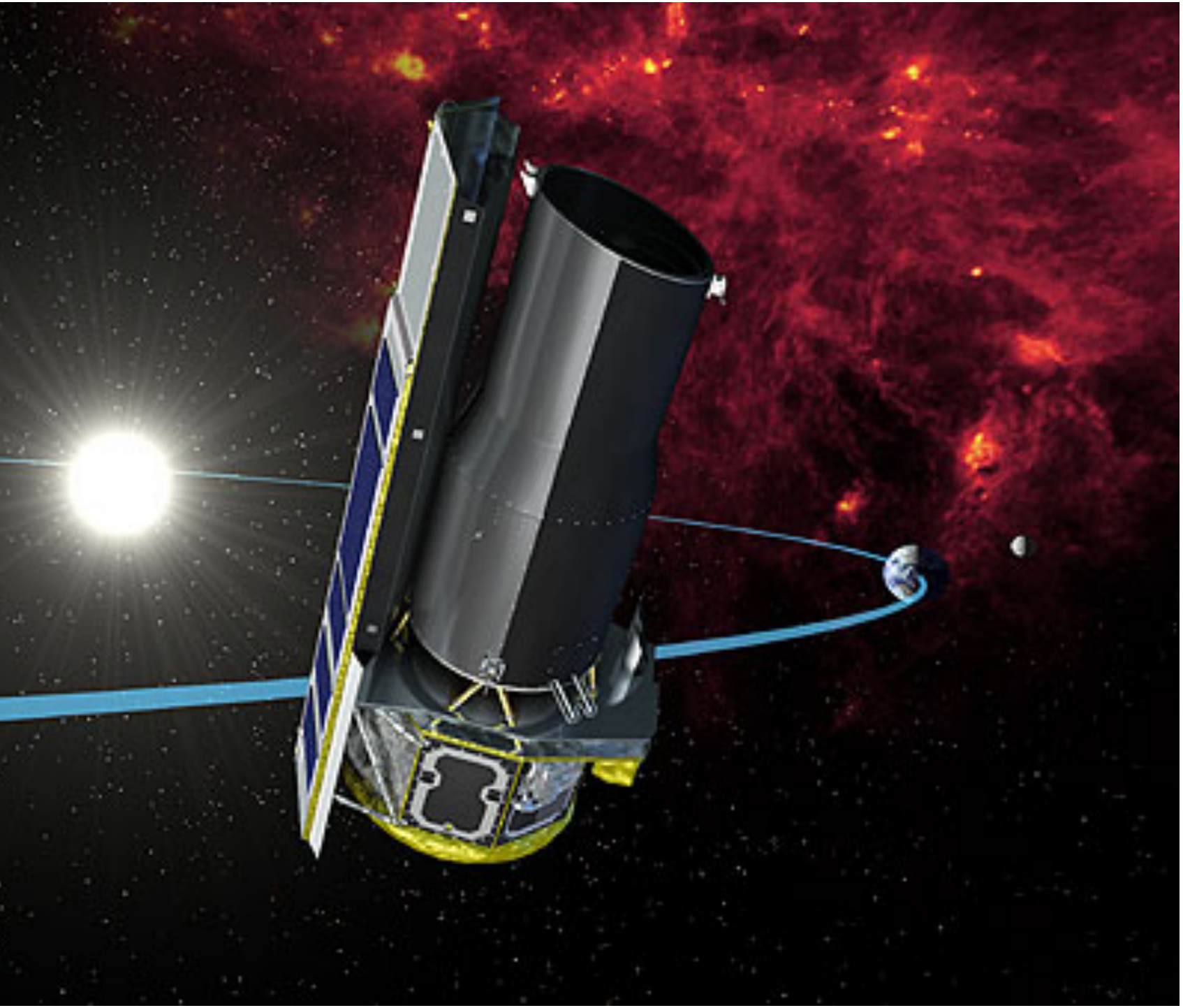
But, we do have a book [actually, several]….

New History of Spitzer by Renee Rottner available from NASA History Office at no cost for download

And a Pin [actually several!]

And A Slogan

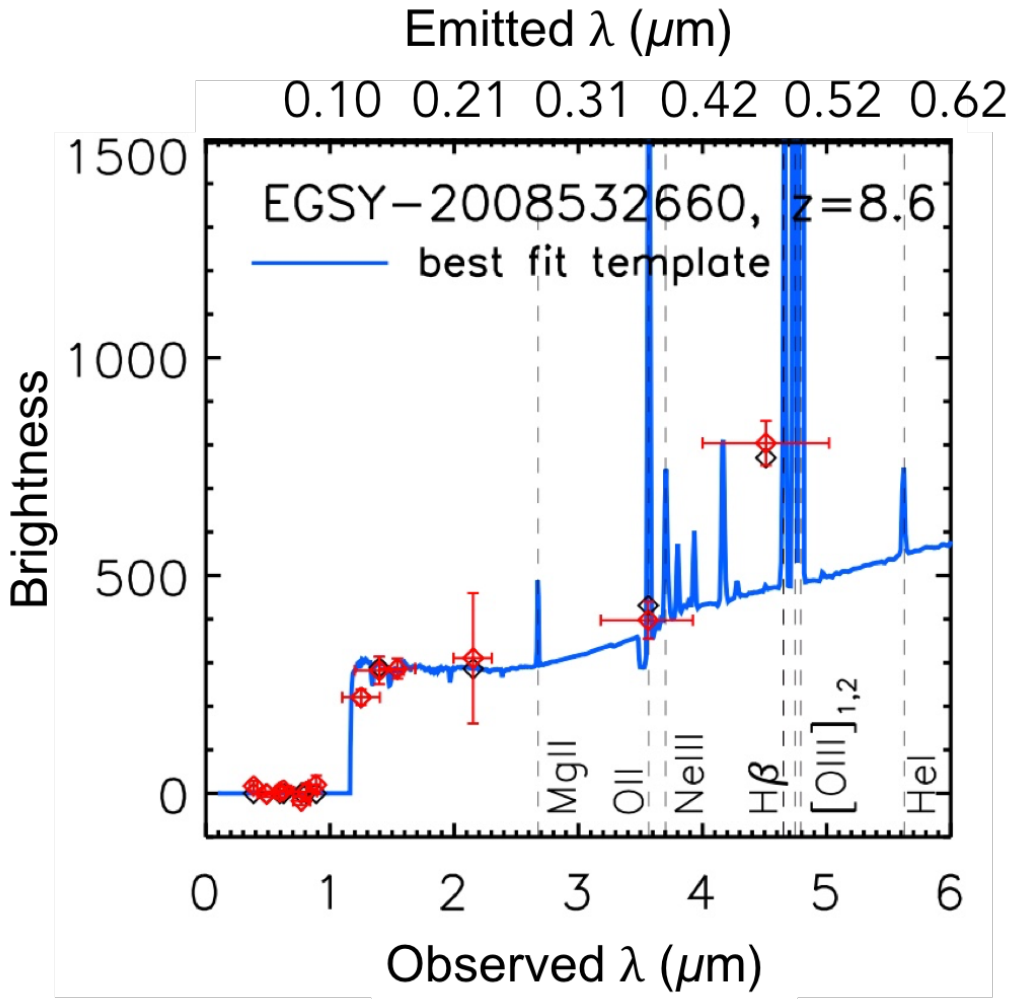

THOUGH SHE BE BUT LITTLE, SHE IS FIERCE
Exploring the Universe with the Spitzer Space Telescope
By
Michael Werner and Peter Eisenhardt

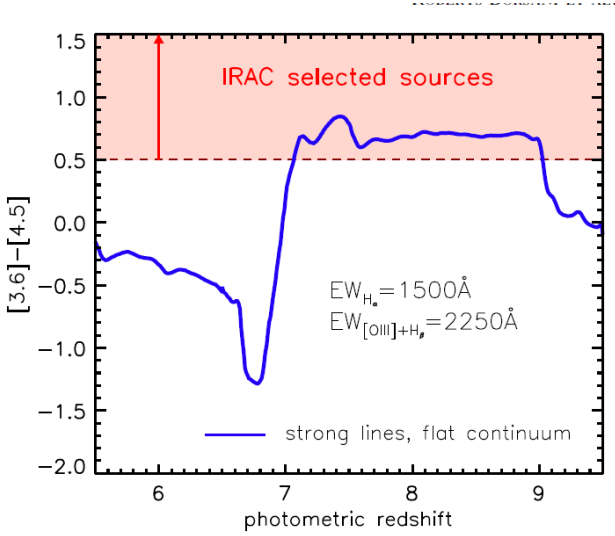


After 14 years +
day, and over 75
publications, it is
pleasure for me
say:

Thar
you
Ned

Spitzer Selects High-z Spectroscopic Targets





Color selection of high-redshift Lyman Break galaxy candidates based on IRAC Band1/Band2 rati has identified targets for spectroscopic followup at Keck, confirming redshift in range 7-to-9