Telescopes (and Art) at ASU

Hubble, James Webb and future Telescopes

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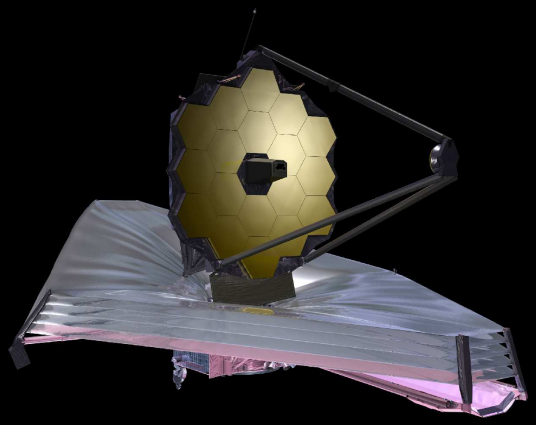
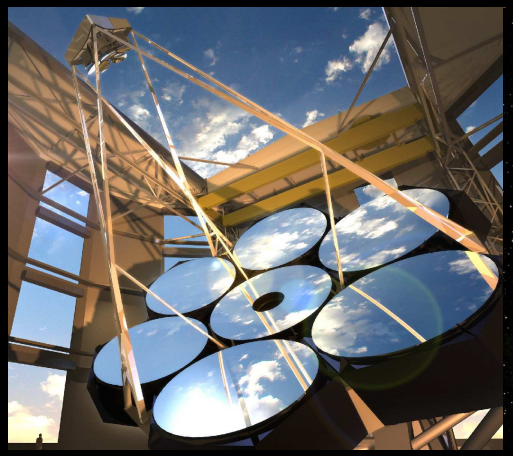
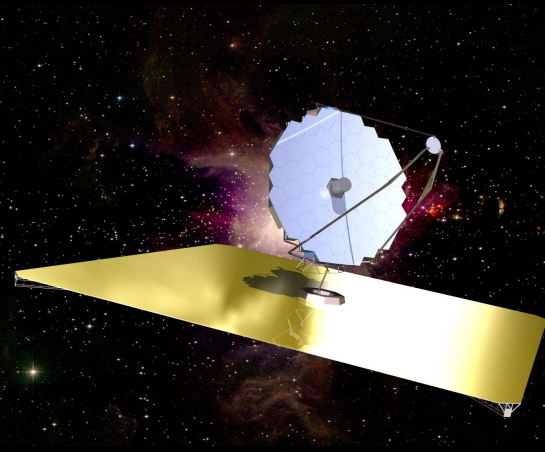
(Ex) ASU Grads: N. Hathi, H. Kim, M. Mechtley, R. Ryan, M. Rutkowski, B. Smith, & A. Straughn







1973∼2018^{+}; 1996∼2029; 2000∼2050^{+} 2020∼2050^{+}?

ASU SESE Special Event, Tempe, AZ

Wednesday, Sept. 13, 2017. All presented materials are ITAR-cleared.

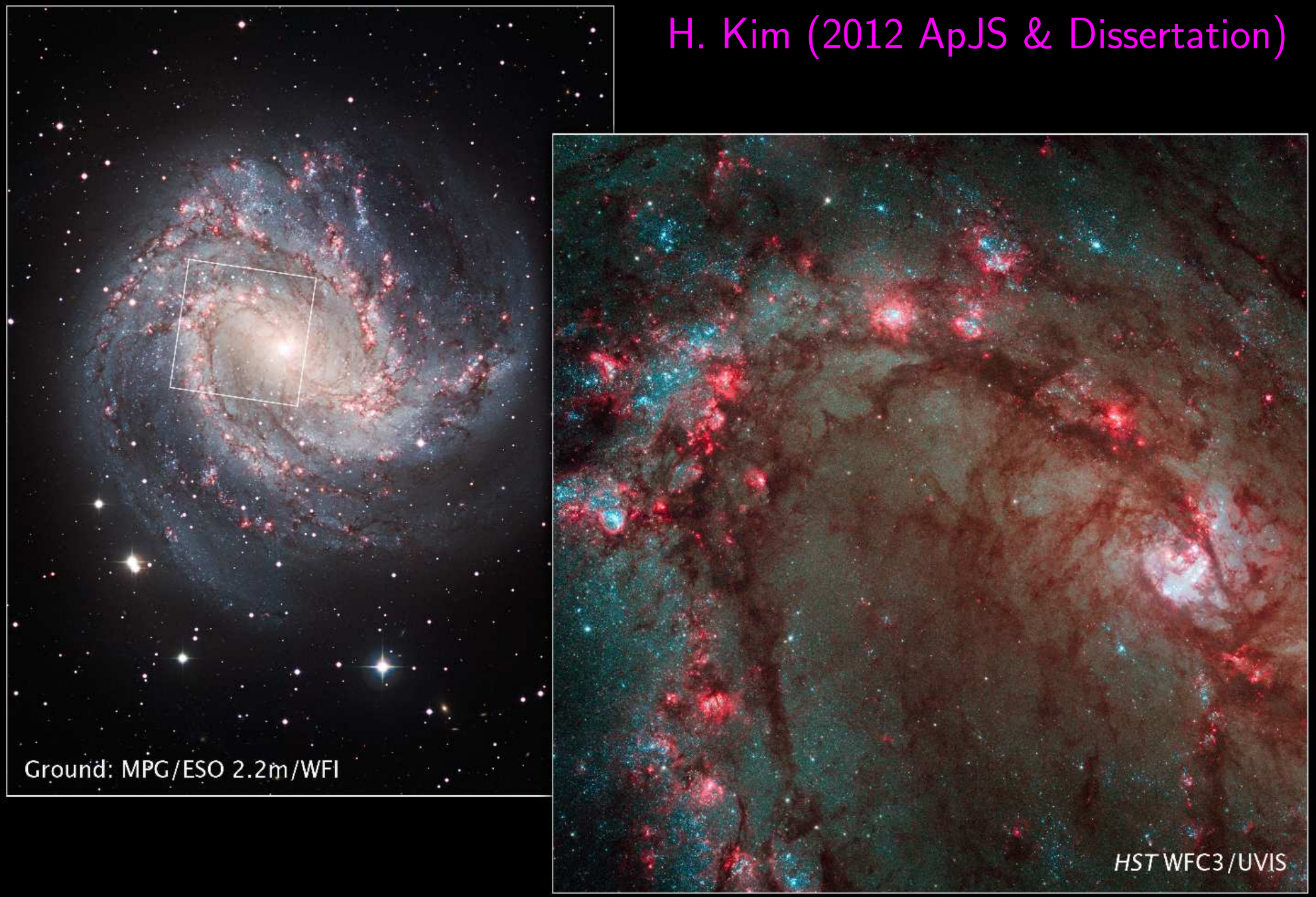
Edwin P. Hubble (1889–1953) — Carnegie astronomer

James E. Webb (1906–1992) — Second NASA Administrator

Hubble: Concept in 1970's; Made in 1980's; Operational 1990–$\gtrsim$2020?.

JWST: The infrared sequel to Hubble from 2018–2023 (–2029?).

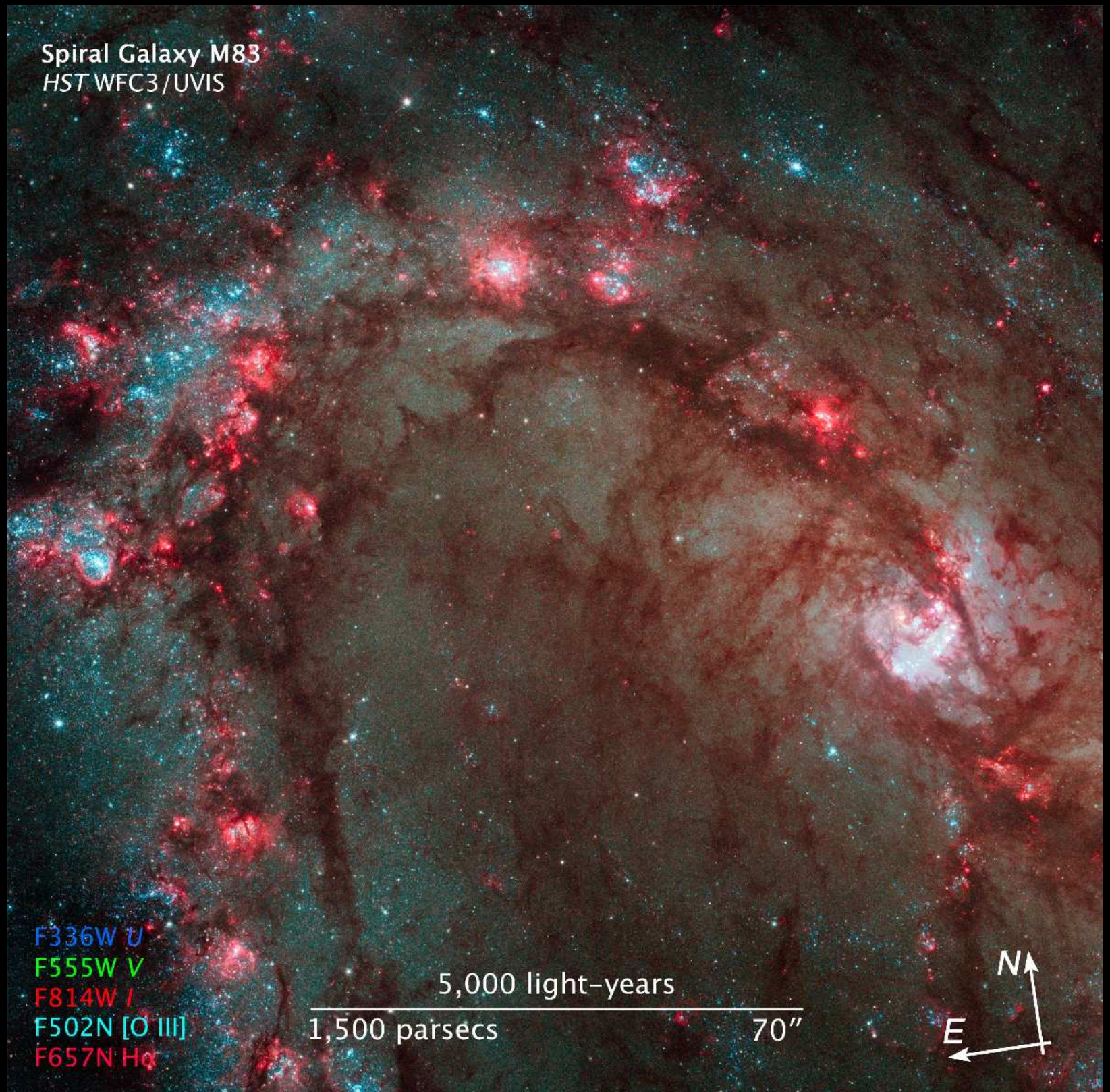
H. Kim (2012 ApJS & Dissertation)



Spiral Galaxy M83
Hubble Space Telescope ▪ WFC3/UVIS

NASA, ESA, R. O'Connell (University of Virginia), the WFC3 Science Oversight Committee, and ESO

STScI-PRC09-29


Spiral Galaxy M83
HST WFC3/UVIS
F336W *U*
F555W *V*
F814W *I*
F502N [O III]
F657N Hα
5,000 light-years
1,500 parsecs
70″
N
E

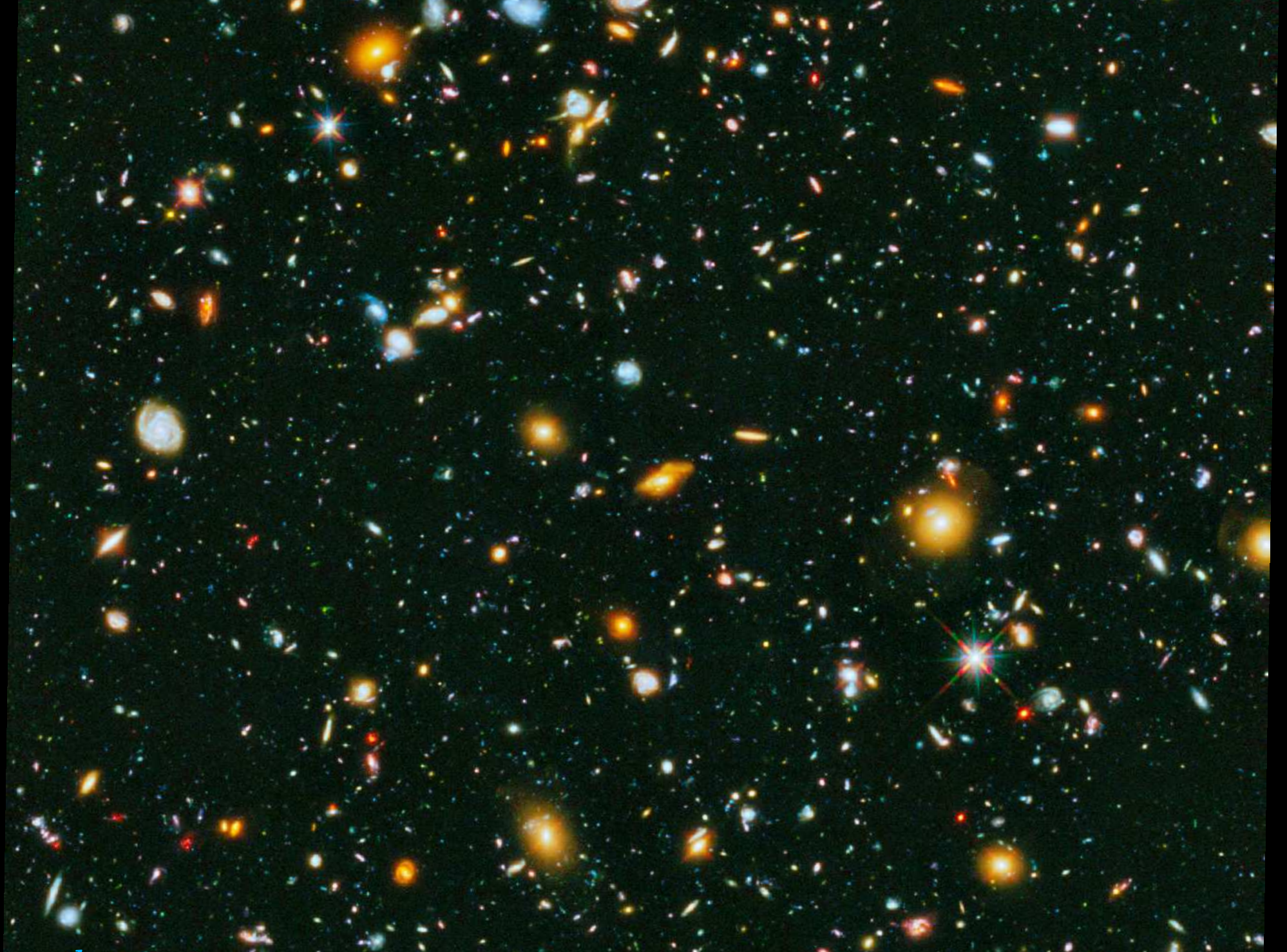
Active Galaxy Centaurus A

Hubble Space Telescope • Wide Field Planetary Camera 2

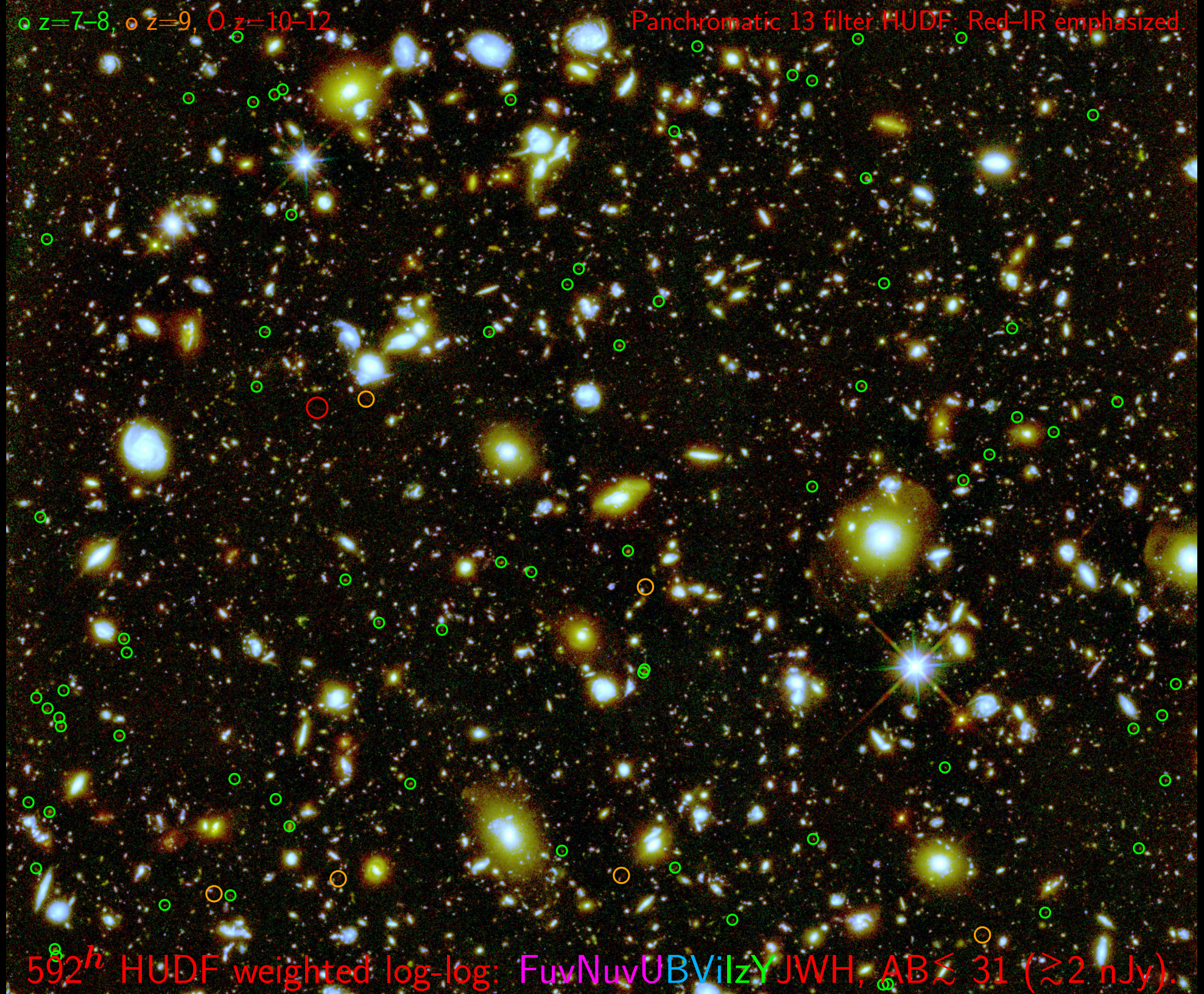
PRC98-14a • ST ScI OPO • May 14, 1998 • E. Schreier (ST ScI) and NASA

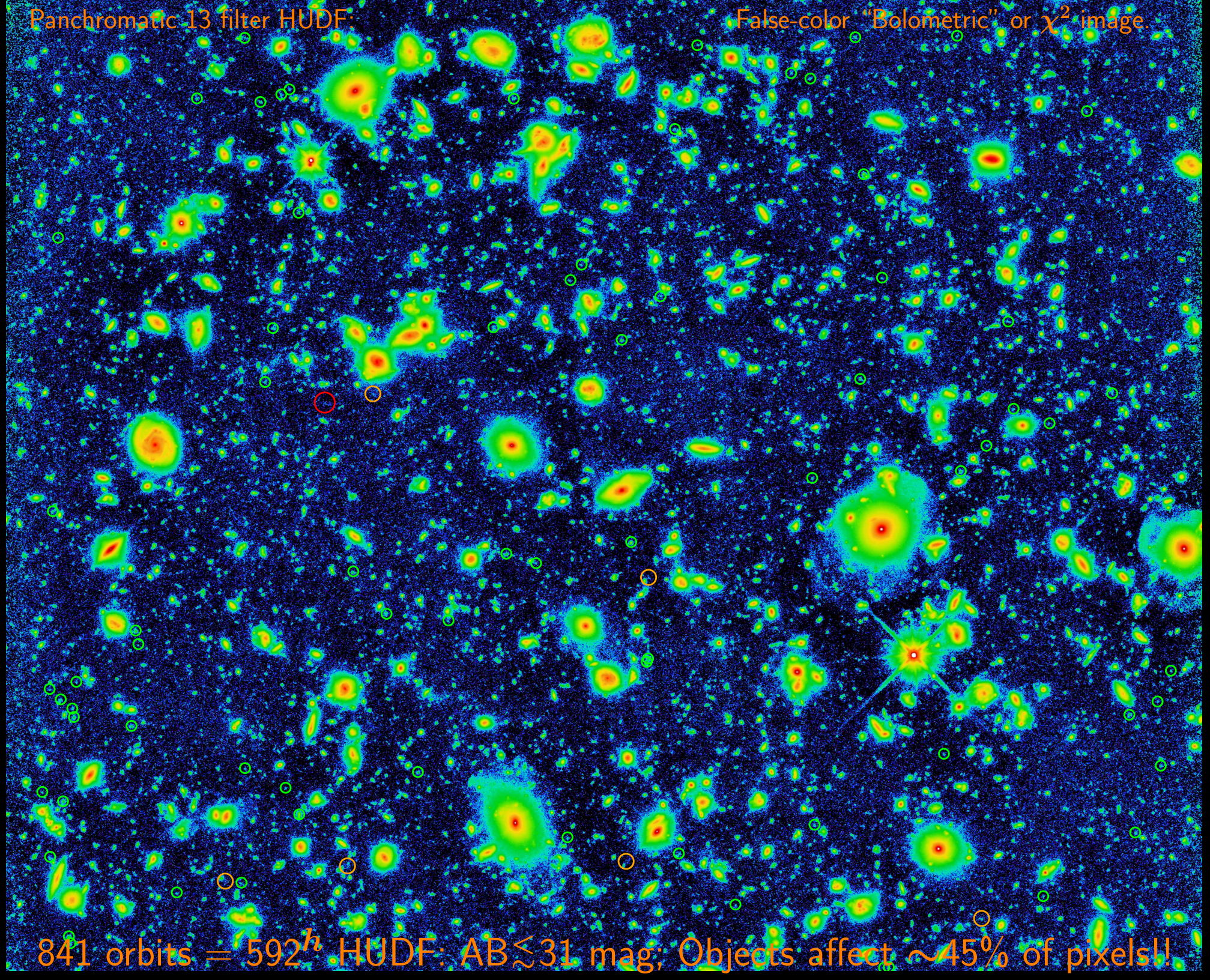

Centaurus A
NGC 5128
HST WFC3/UVIS
F225W+F336W+F438W
F487N Hβ
F502N [O III]
F547M y
F657N Hα+[N II]
F673N [S II]
F814W *I*
3000 light-years
1400 parsecs
56″
E
N

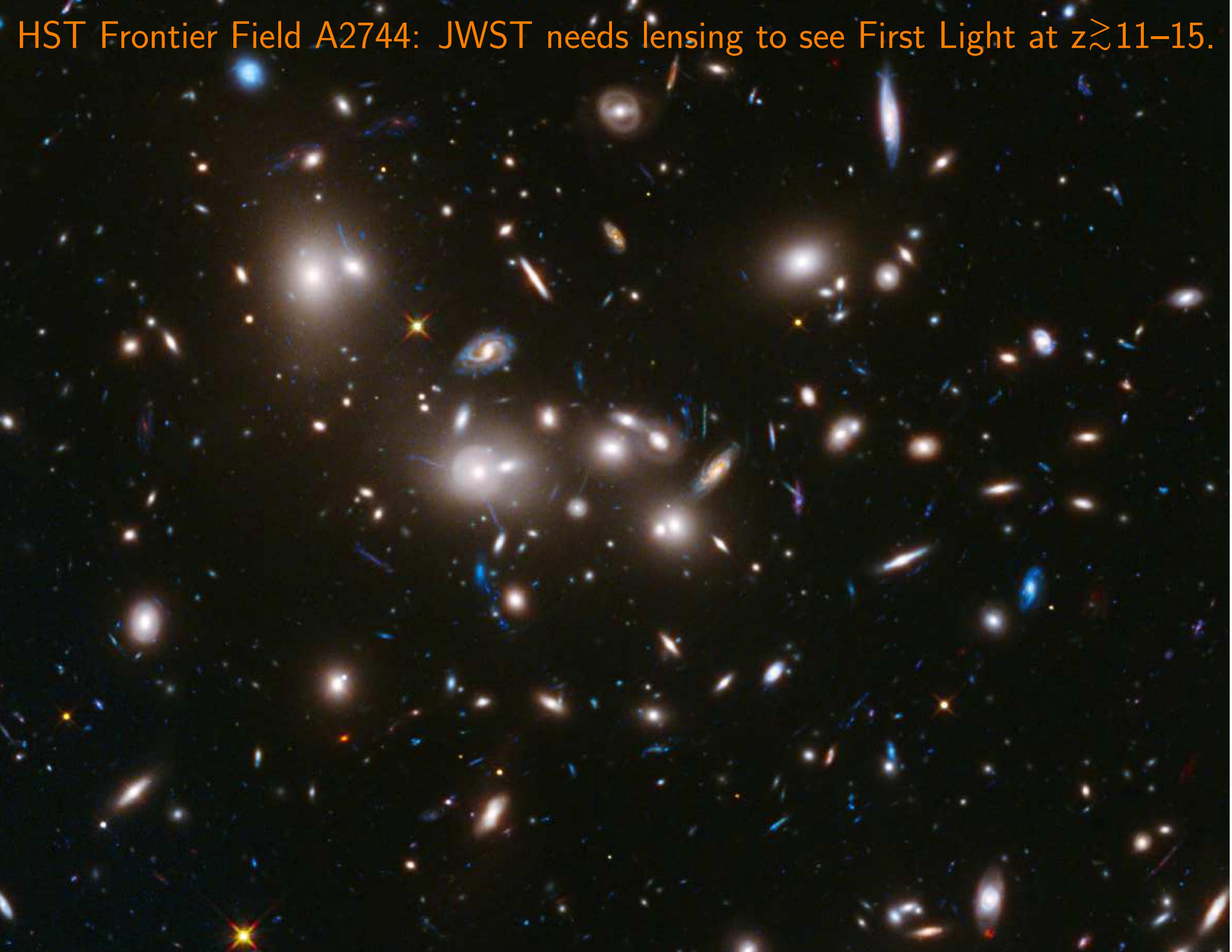
30 Doradus: Giant young star-cluster in Large Magellanic Cloud (150,000 ly), triggering birth of Sun-like stars (and surrounding debris disks).



592^h HUDF weighted log-log: FuvNuvUBViIzYJWH, AB$\lesssim$28–31 ($\gtrsim$2 nJy).

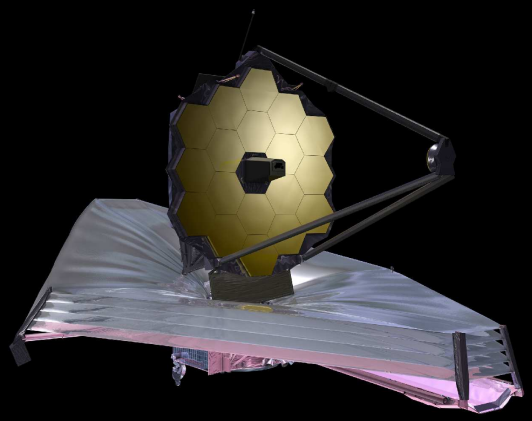

z=7–8, z=9, z=10–12
Panchromatic 13 filter HUDF: Red–IR emphasized.
592^h HUDF weighted log-log: FuvNuvUBViIzYJWH, AB≲ 31 (≳2 nJy).

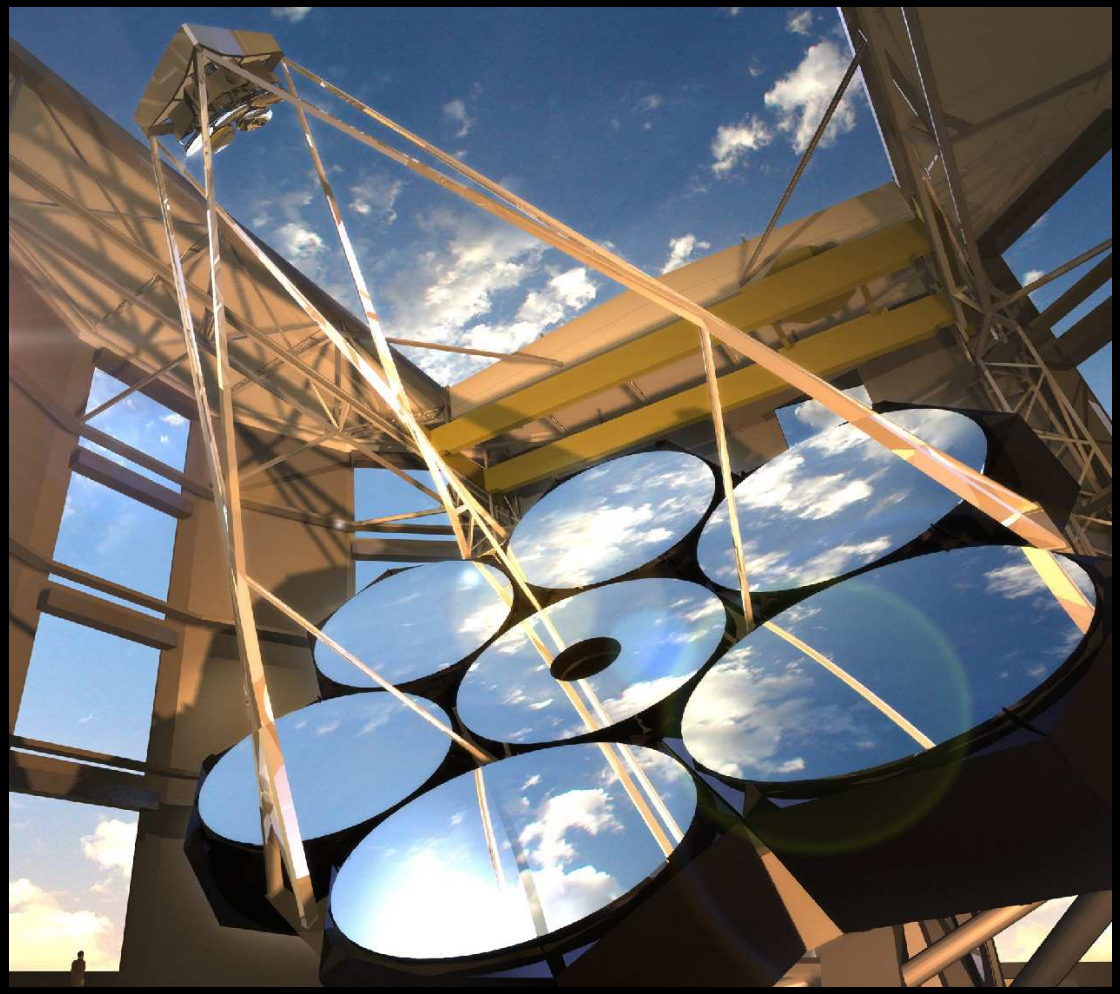

Panchromatic 13 filter HUDF:
False-color "Bolometric" or χ^2 image
841 orbits $=592^h$ HUDF: AB$\lesssim$31 mag; Objects affect $\sim$45% of pixels!!


HST Frontier Field A2744: JWST needs lensing to see First Light at z≳11–15.

(5) Future: Next generation 20–40 m ground-based telescopes and ATLAST

True relative size: Hubble, James Webb, & Giant Magellan Telescope

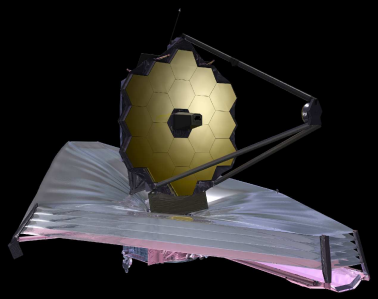


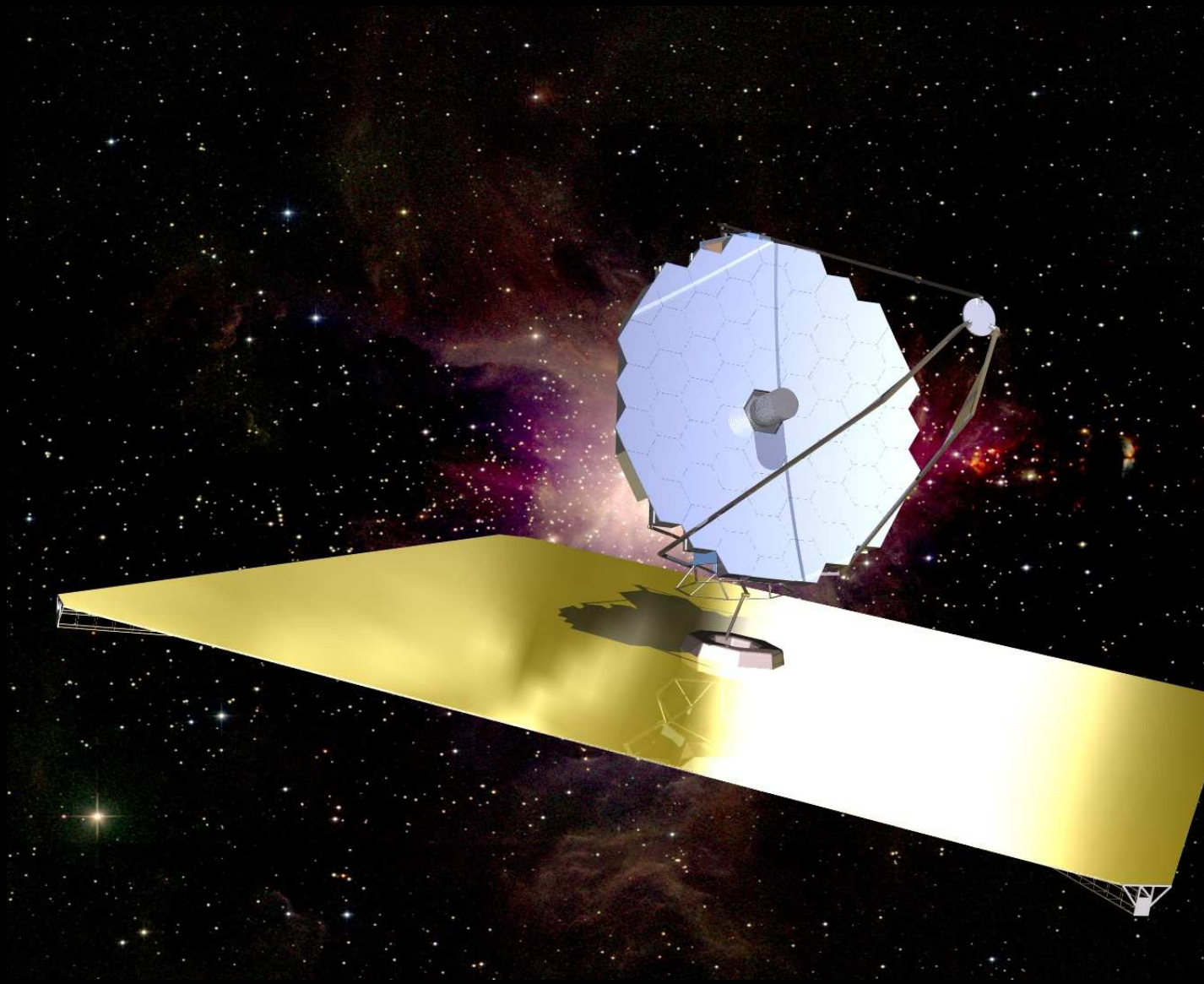


18 B$ (1973∼2018); 9 B$ (1996∼2029); ∼1 B$ (2000∼2050^{+}).

(5) Future: Next generation 20–40 m ground-based telescopes and ATLAST

True relative size: Hubble, James Webb, and ATLAST ...





18 B$ (1973∼2018); 9 B$ (1996∼2029); 15–20 B$ (2020∼2050^{+}?).

(5) Future: How can we knock it out of the ball-park in the next 30 years?

Each of GMT and ATLAST facility nearly fills the whole Yankee ballpark ...

- New paradigm: They are too large for an individual university to take on.
  - Universities need to collaborate nation-wide to make this happen.

SPARE CHARTS

Some of our ASU grad students do important outreach events:

Annual Girl Scout Stargazing at the White House South lawn (July 2015).

Our own Amber Straughn (right; now at NASA GSFC working for Nobel Laureate Dr. John Mather) informs the Obama's about NASA.

- References and other sources of material shown:

http://www.asu.edu/clas/hst/www/jwst/ [Talk, Movie, Java-tool]

http://www.asu.edu/clas/hst/www/ahah/ [Hubble at Hyperspeed Java–tool]

http://www.asu.edu/clas/hst/www/jwst/clickonHUDF/ [Clickable HUDF map]

http://www.jwst.nasa.gov/ & http://www.stsci.edu/jwst/

http://ircamera.as.arizona.edu/nircam/

http://ircamera.as.arizona.edu/MIRI/

http://www.stsci.edu/jwst/instruments/nirspec/

http://www.stsci.edu/jwst/instruments/fgs

Gardner, J. P., et al. 2006, Space Science Reviews, 123, 485–606

Mather, J., & Stockman, H. 2000, Proc. SPIE Vol. 4013, 2

Windhorst, R., et al. 2008, Advances in Space Research, 41, 1965

Windhorst, R., et al., 2011, ApJS, 193, 27 (astro-ph/1005.2776).