Not another TLA!!
ERQs from SDSS-III BOSS and WISE; the WW4C and JWST MIRI ERS

Nic Ross

STFC Ernest Rutherford Fellow

IfA, University of Edinburgh

MJD 57576

Galaxies have two key energy sources: nuclear fusion and energy liberated in a strong gravitational field.

After dark matter, *dust* is probably the most poorly understood component in galaxies.

Galaxies have two key energy sources: nuclear fusion and energy liberated in a strong gravitational field.

After dark matter, *dust* is probably the most poorly understood component in galaxies.

Key Question: At Cosmic Noon*, what is the relation between nuclear fusion and gravitation accretion, and how does it influence the galaxy population?

Galaxies have two key energy sources: nuclear fusion and energy liberated in a strong gravitational field.

After dark matter, *dust* is probably the most poorly understood component in galaxies.

Key Question: At Cosmic Noon*, what is the relation between nuclear fusion and gravitation accretion, and how does it influence the galaxy population?

***Which comes shortly after Cosmic Elevenses ;-)**

SpIES: *Spitzer*-IRAC Equatorial Survey

Spitzer Space Telescope

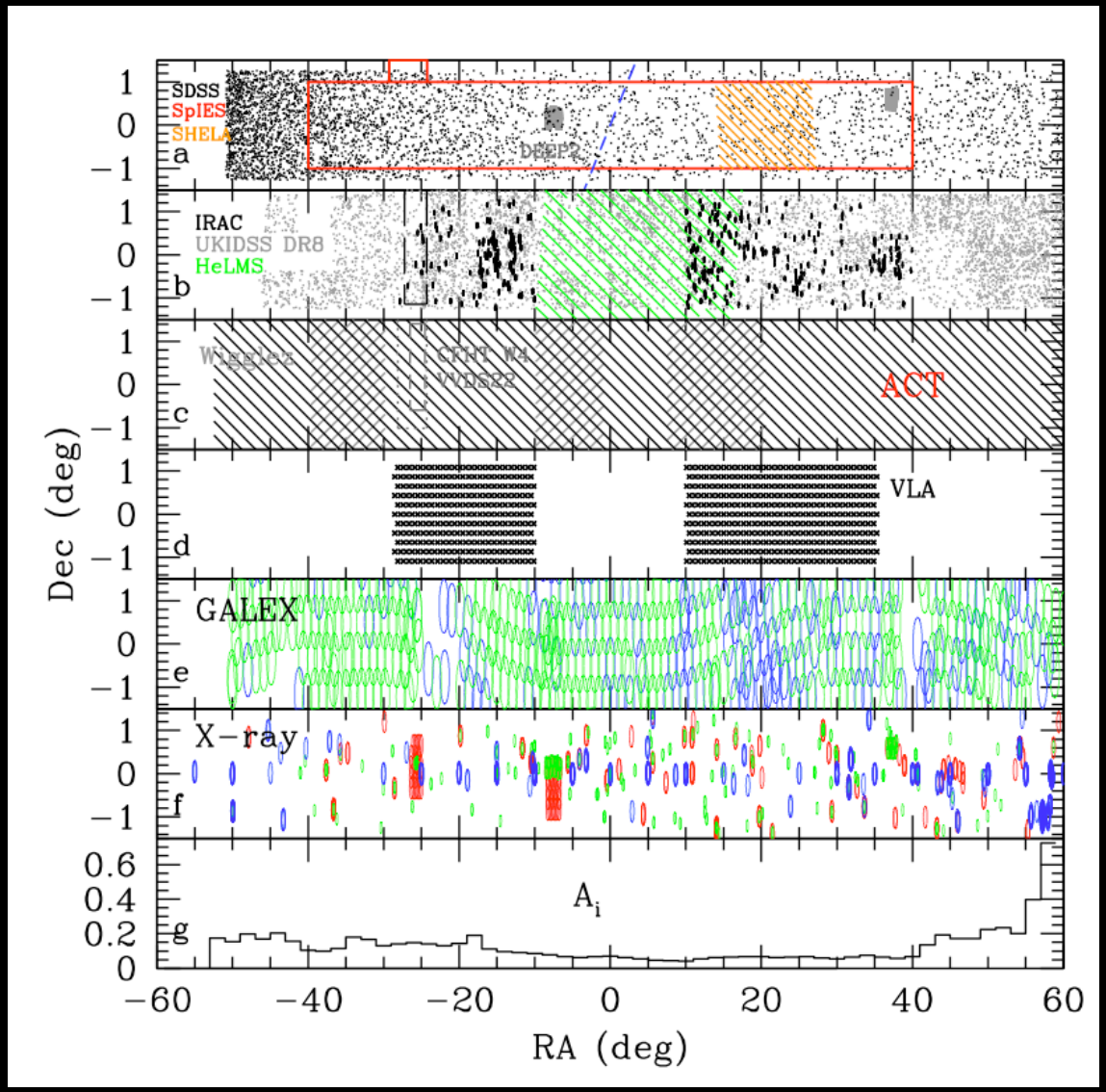
Exploration Science Programme

820hrs awarded

Catalogs and Survey Paper:

Timlin, *NPR et al. 2016, ApJS, 225, 1*

SDSS Stripe 82 field



Science Case:

Quasar LF + Clustering at z~3.5 and 4.5

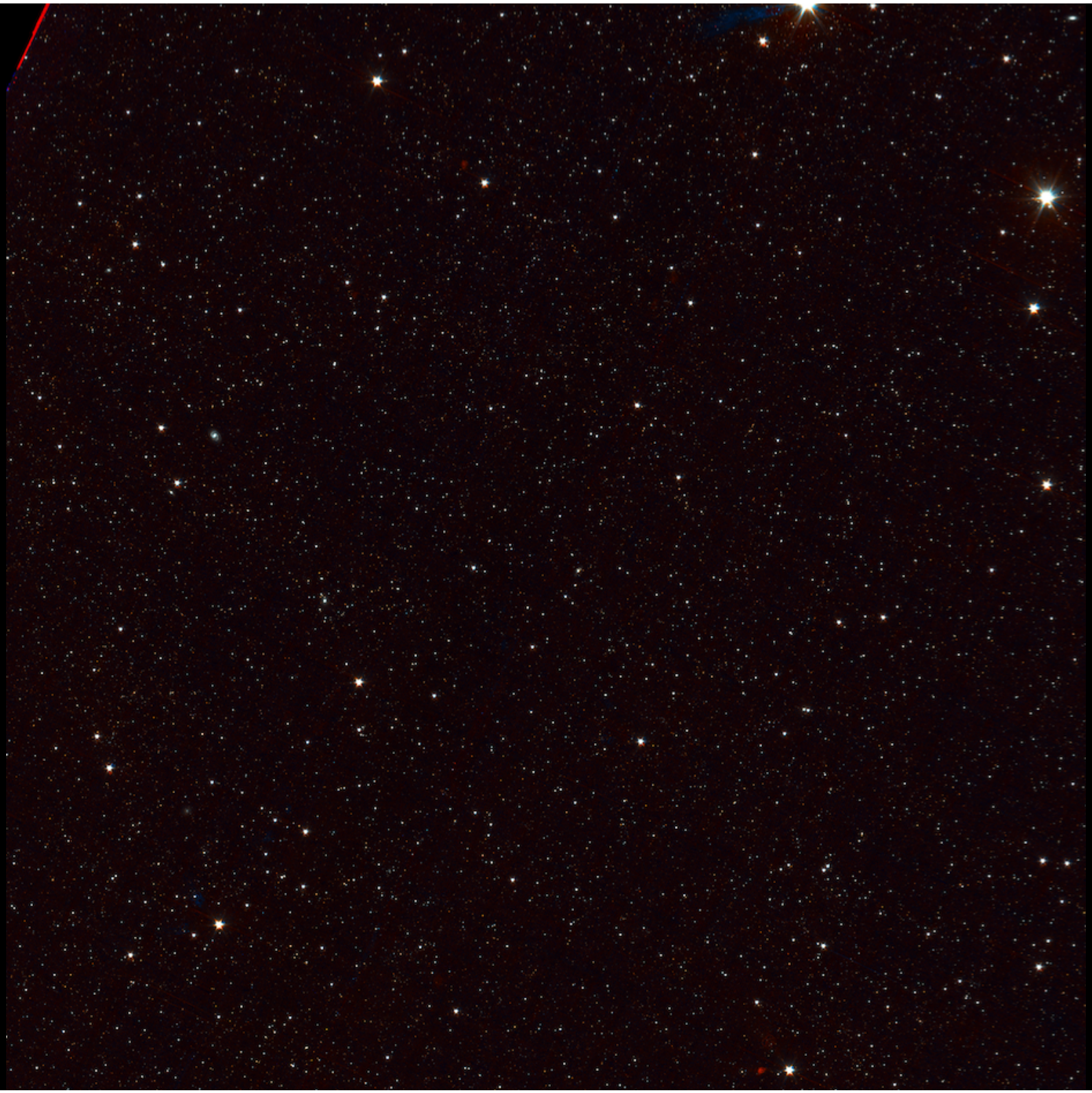
Obscured AGN

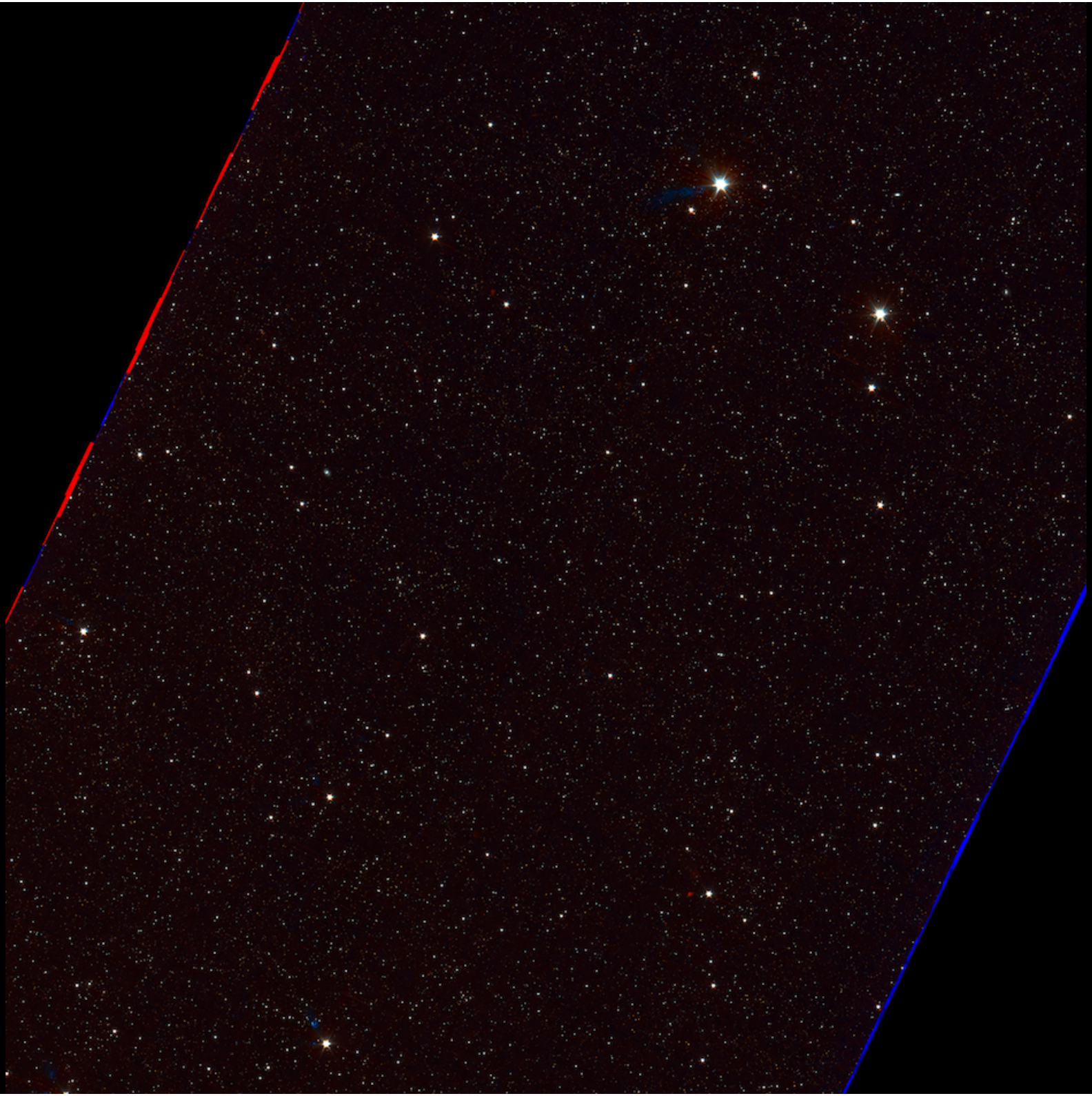
z>6 QSOs

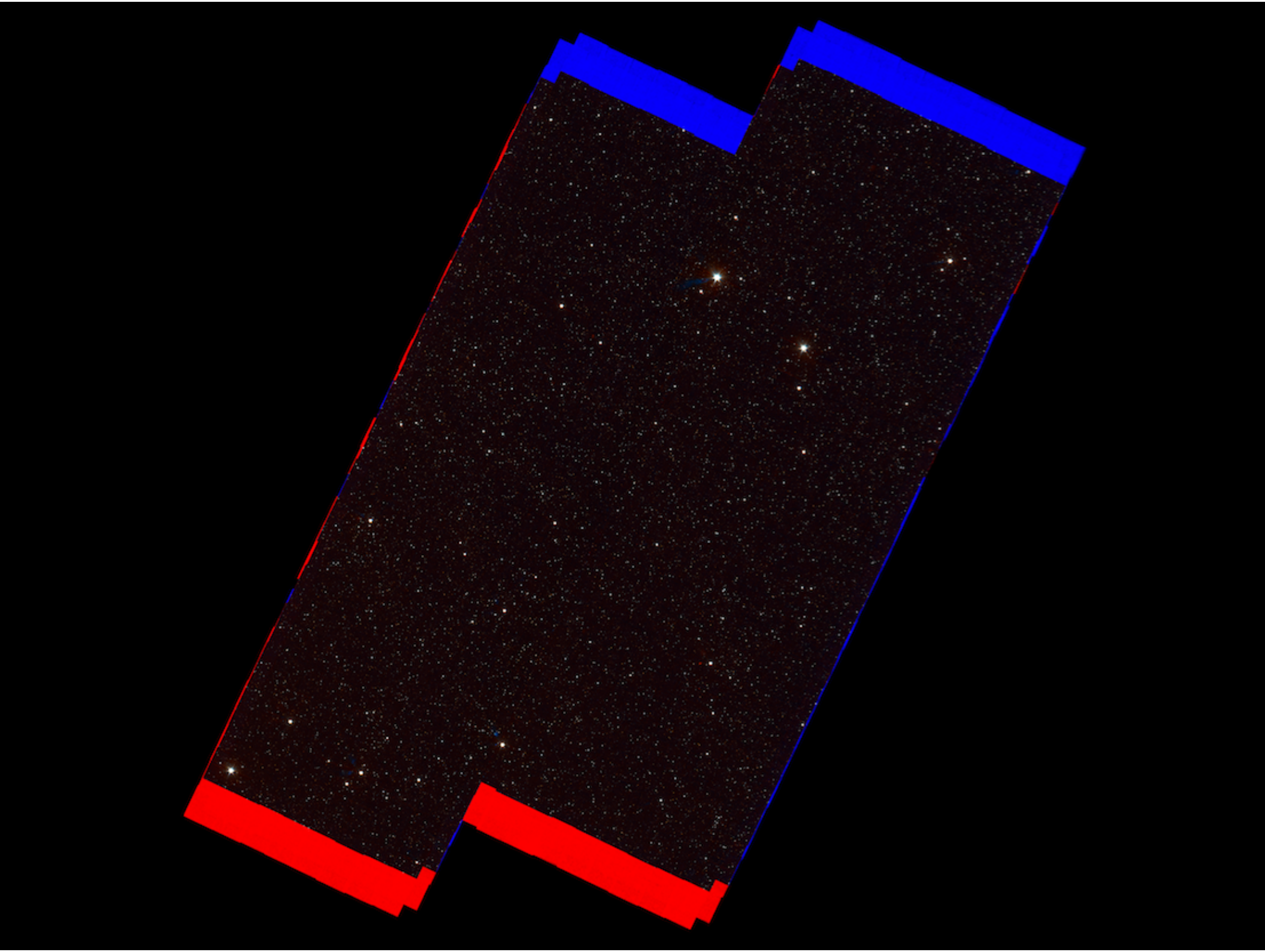
Massive red galaxies at z>1

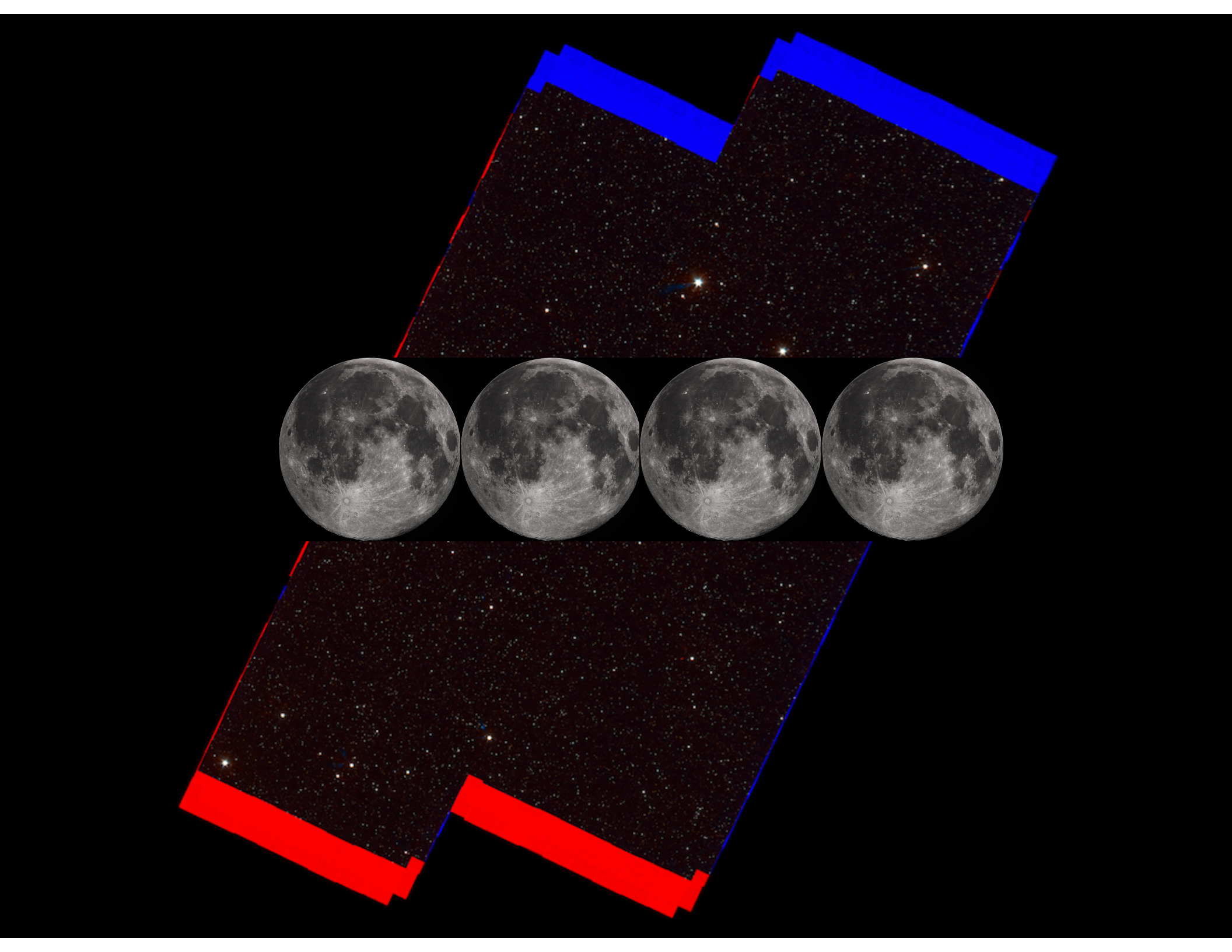
Cool stars

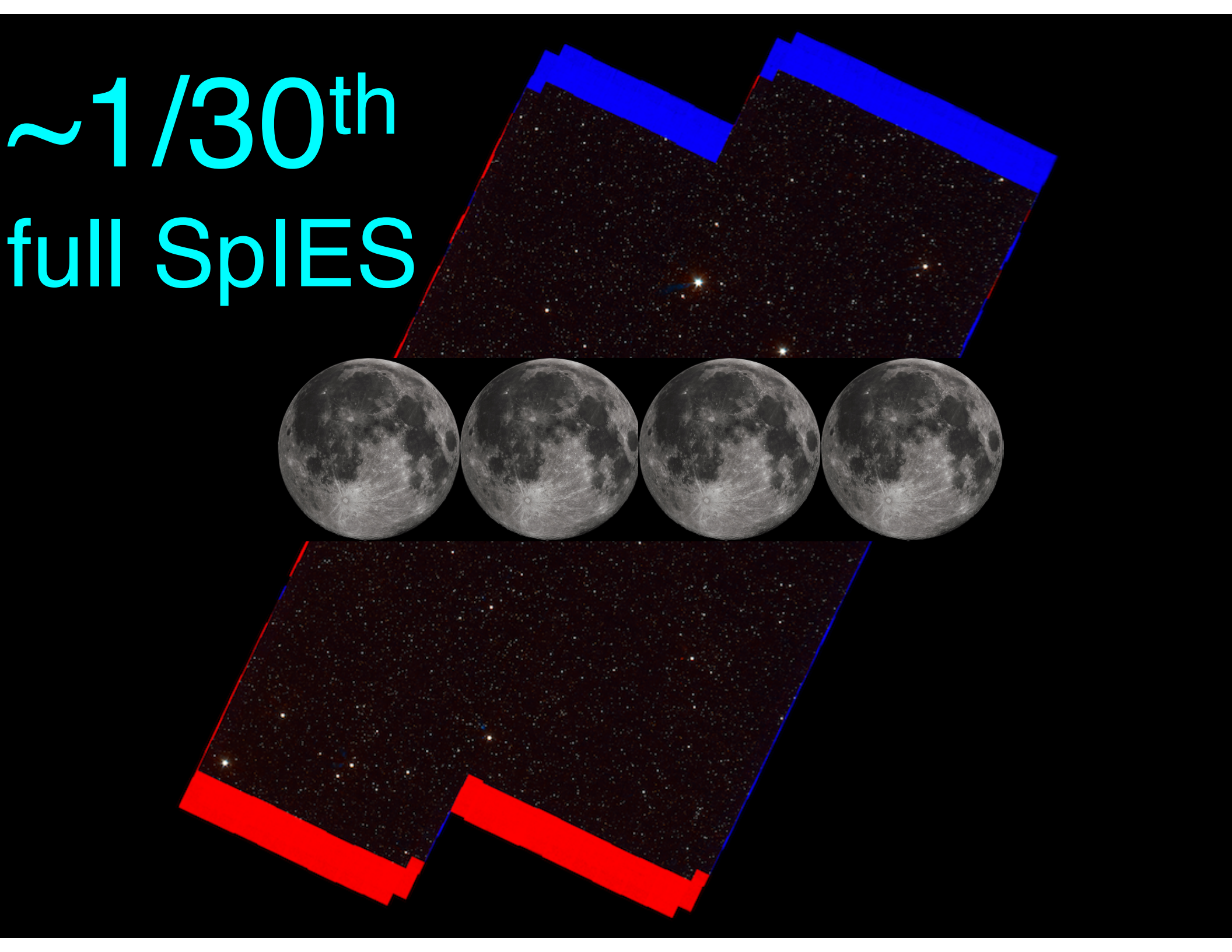
110 deg^2 **3.4 µm** (5µJy) and **4.5µm** (7µJy)



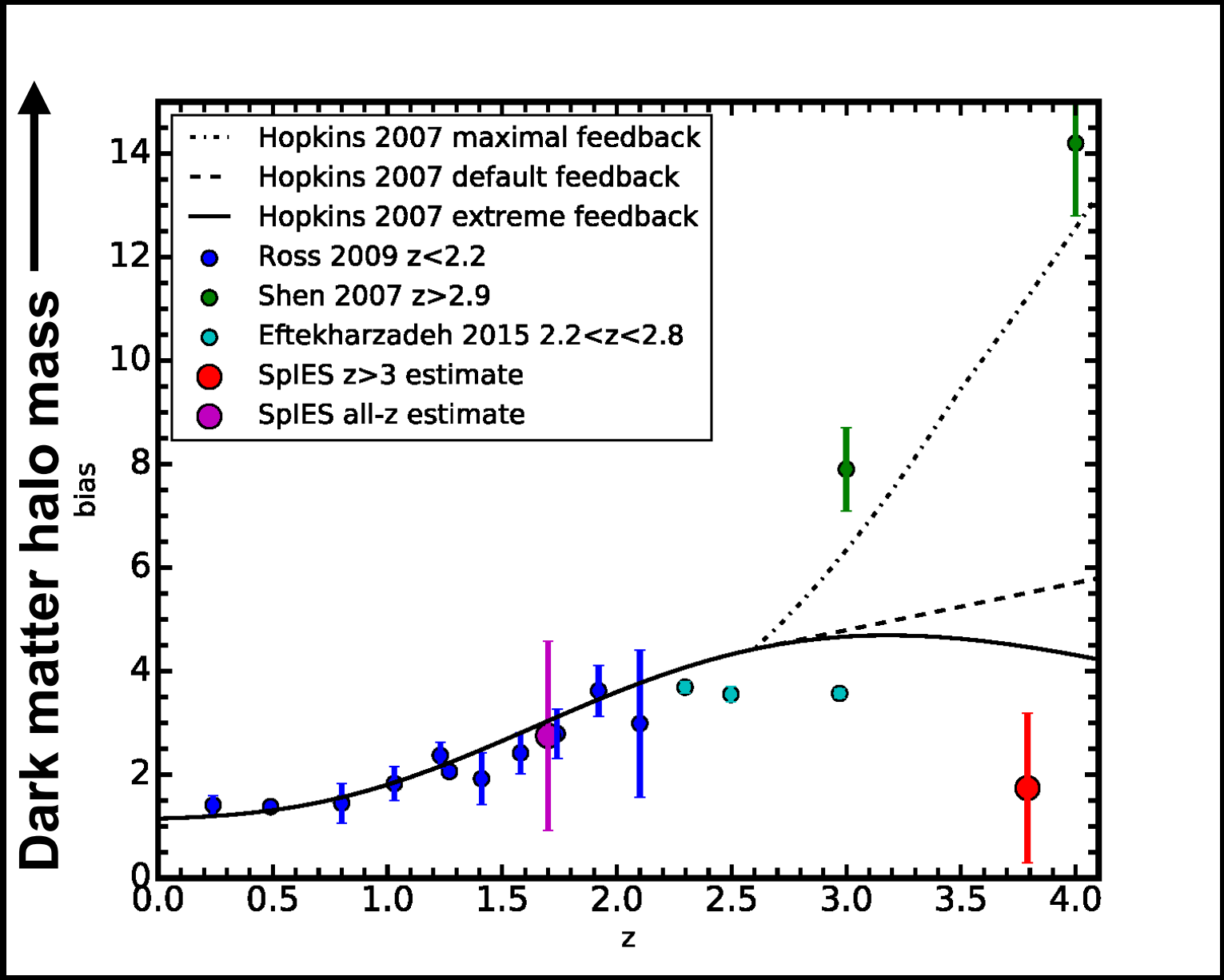






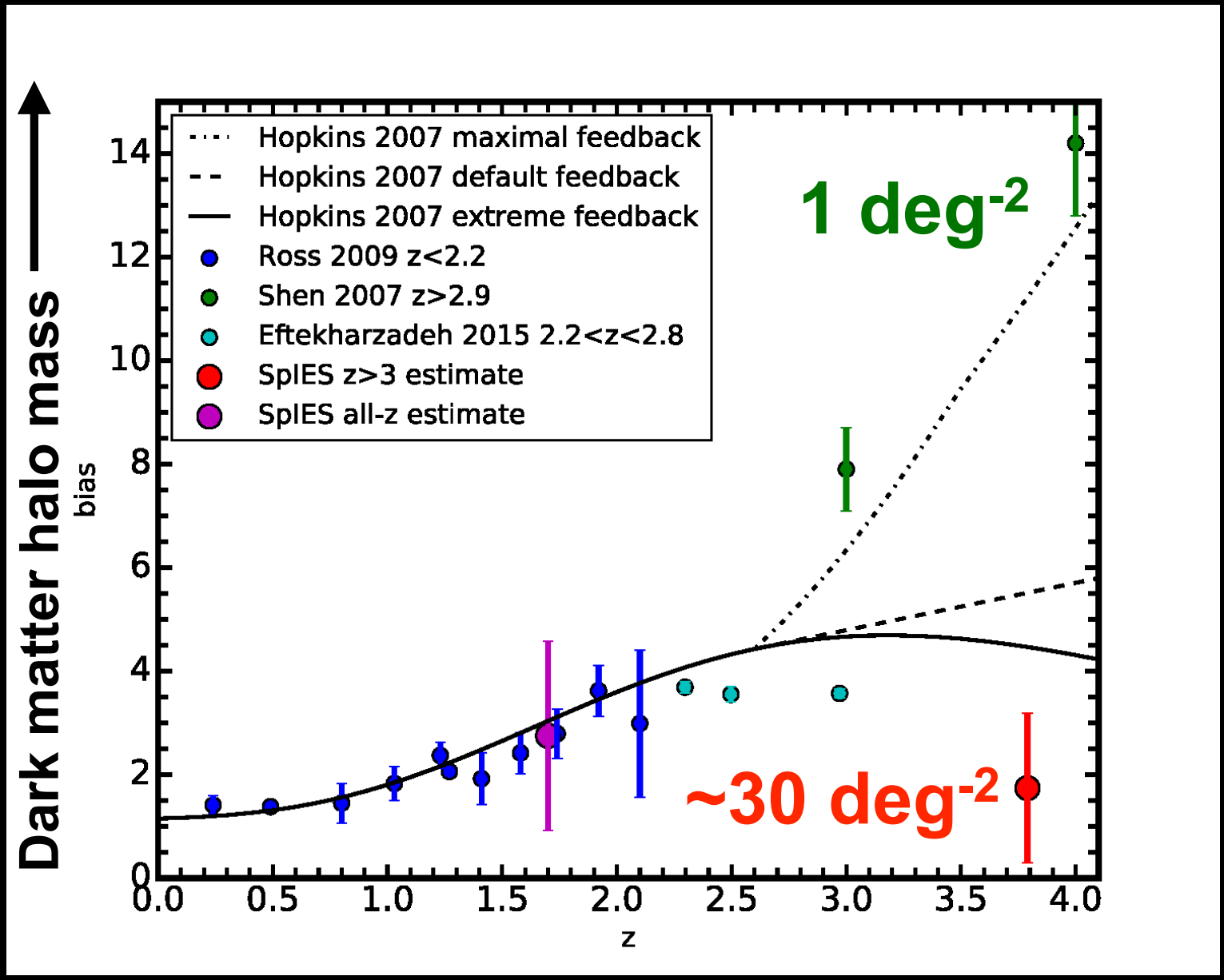

~1/30th
full SpIES

SpIES: First IR QSO Clustering at z>2



Timlin, *NPR et al.*, 2016b, ApJ, *in prep.*

SpIES: First IR QSO Clustering at z>2



Timlin, *NPR et al.*, 2016b, ApJ, *in prep.*

Wide Infrared Survey Explorer (WISE)

3.4, 4.6, 12, 22 μm

0.08, 0.11, 1, 6 mJy

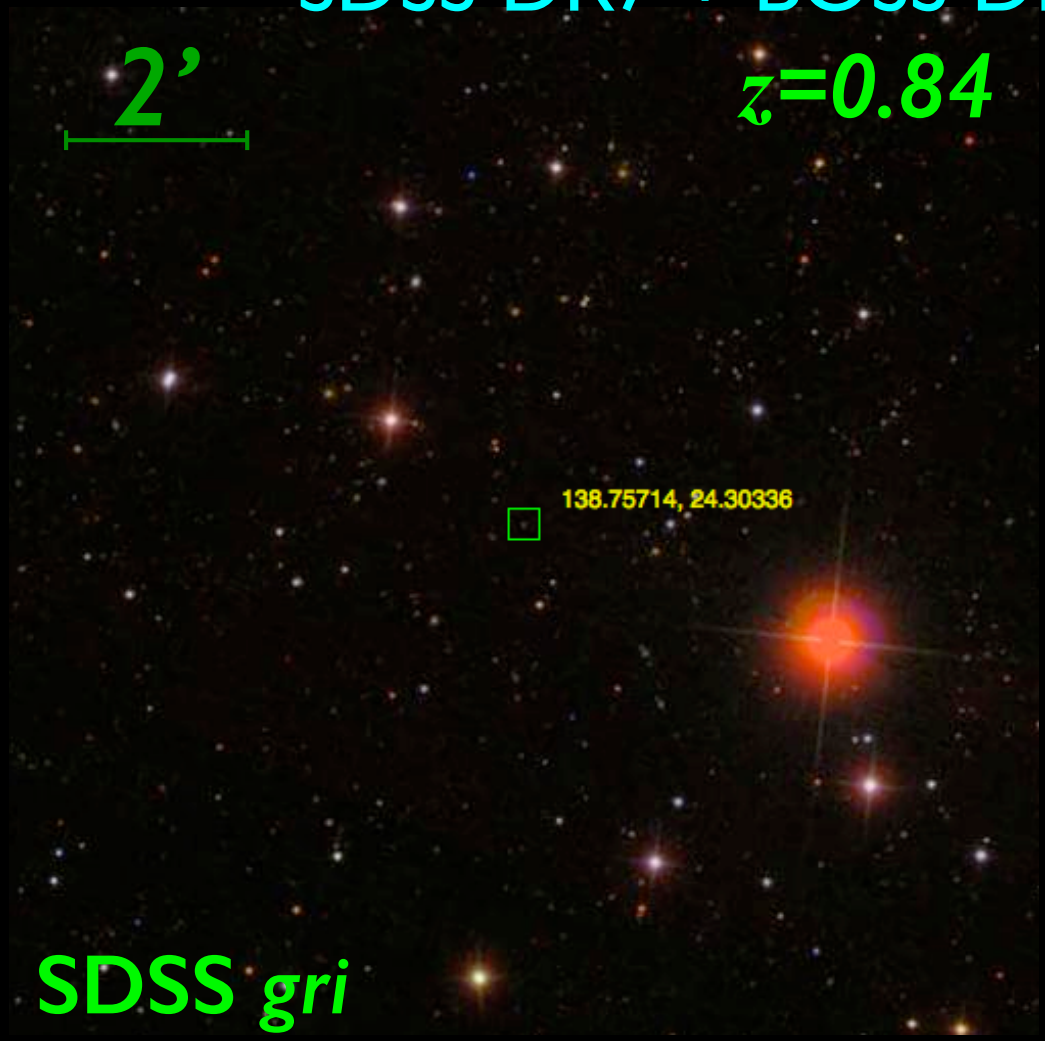
All-Sky Survey

Wright et al. (2010)

wise.ssl.berkeley.edu

Extremely Red Quasars

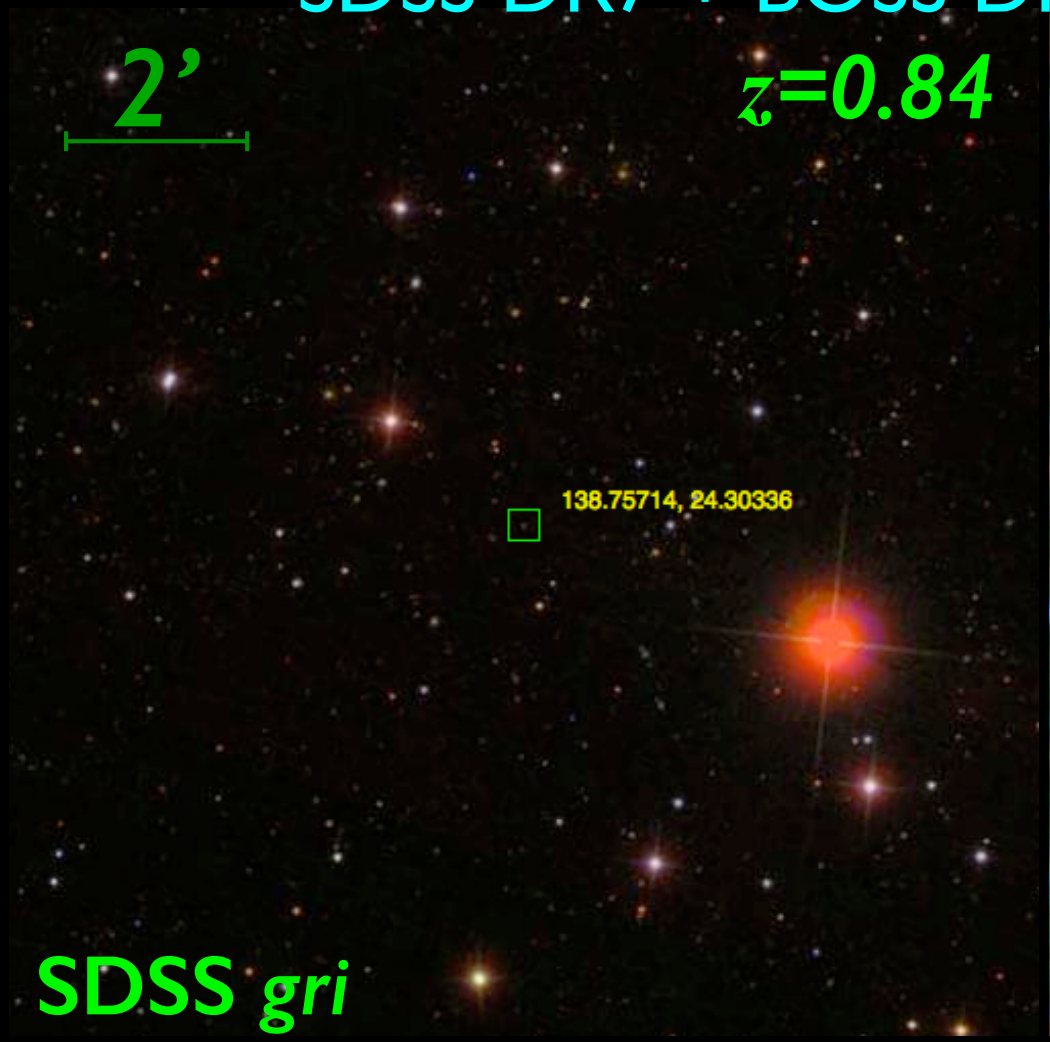
65 / 255,950 (0.025%) of
SDSS DR7 + BOSS DR10 have *r*-[22]>14.0

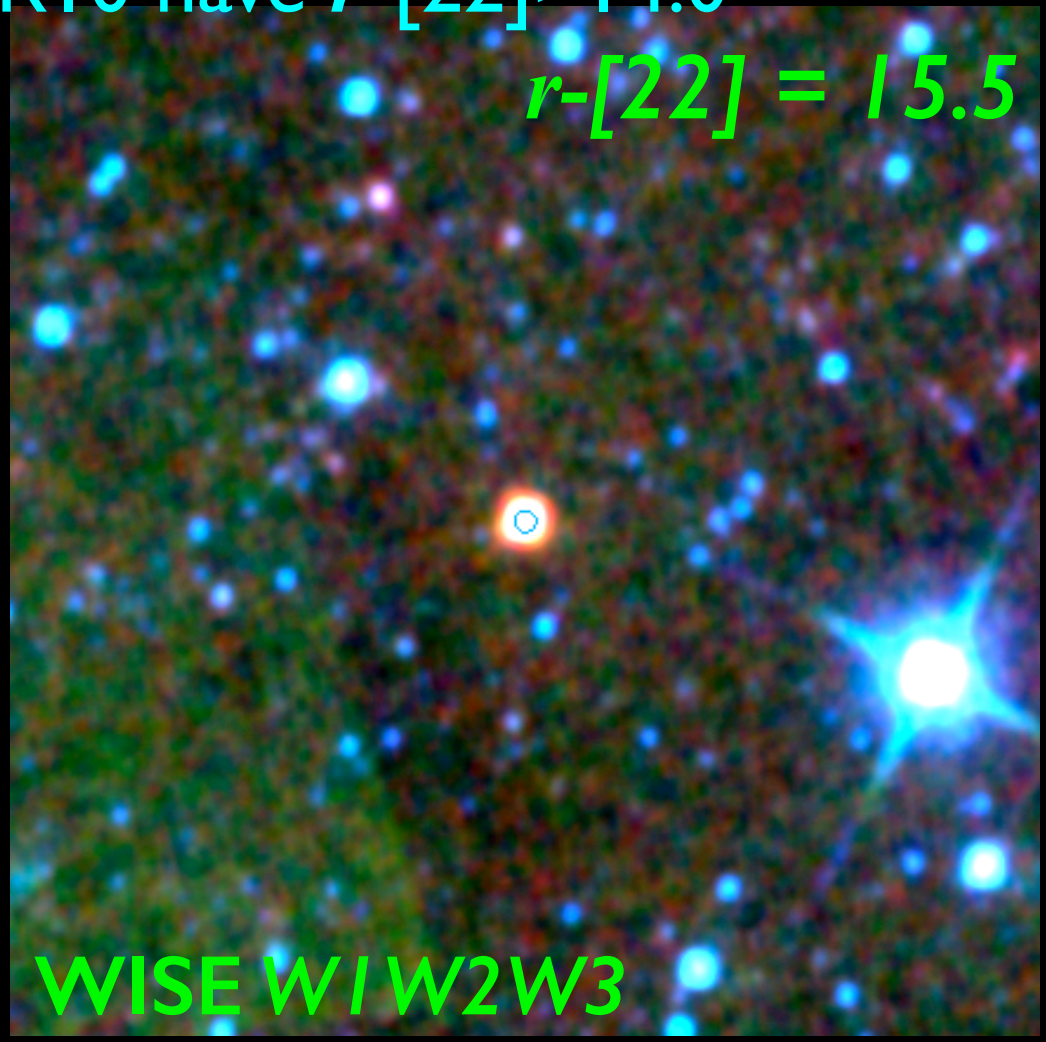


Ross et al., 2015, MNRAS, 453, 3932

Extremely Red Quasars

65 / 255,950 (0.025%) of
SDSS DR7 + BOSS DR10 have *r*-[22]>14.0

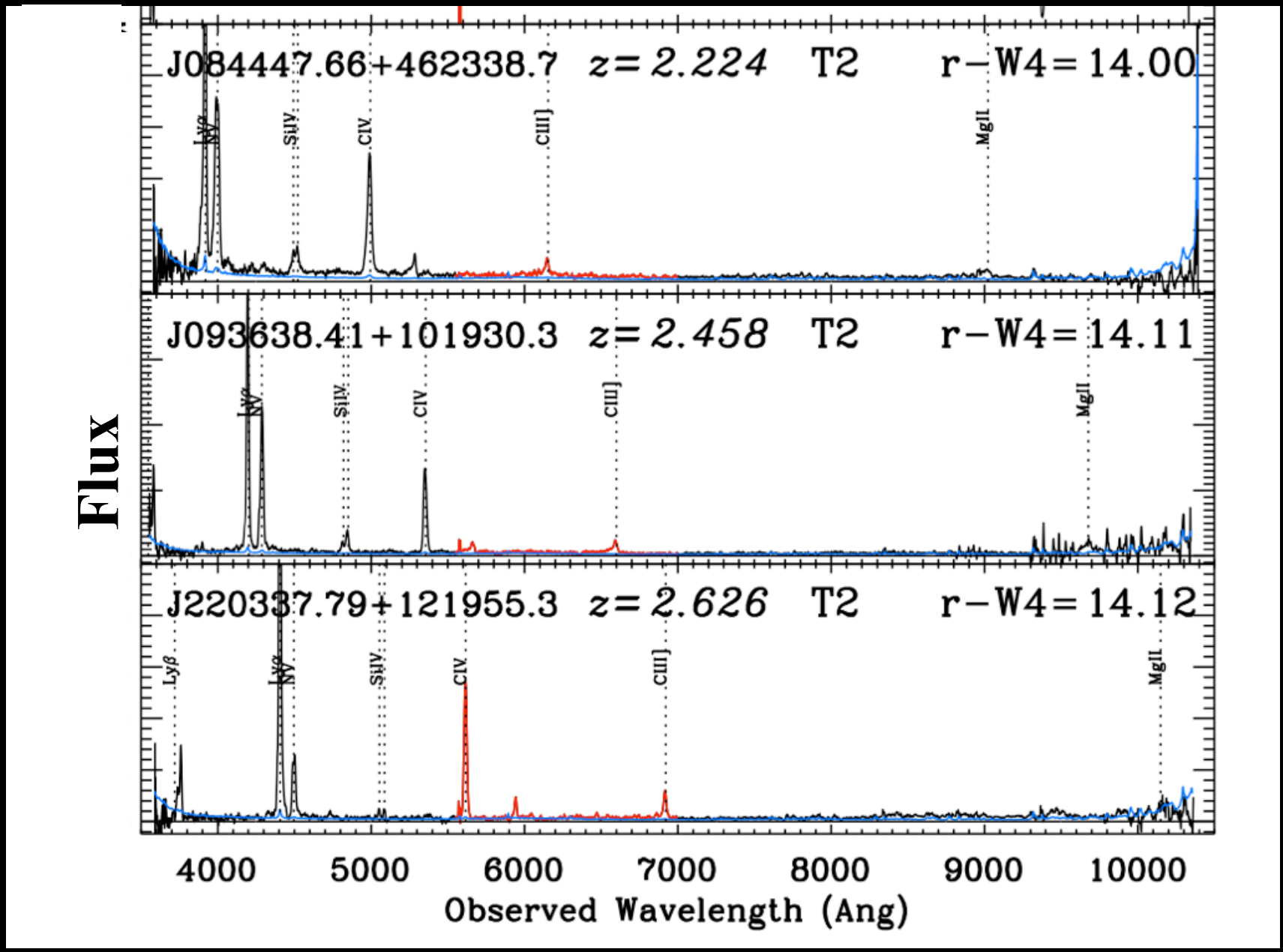




Ross et al., 2015, MNRAS, 453, 3932

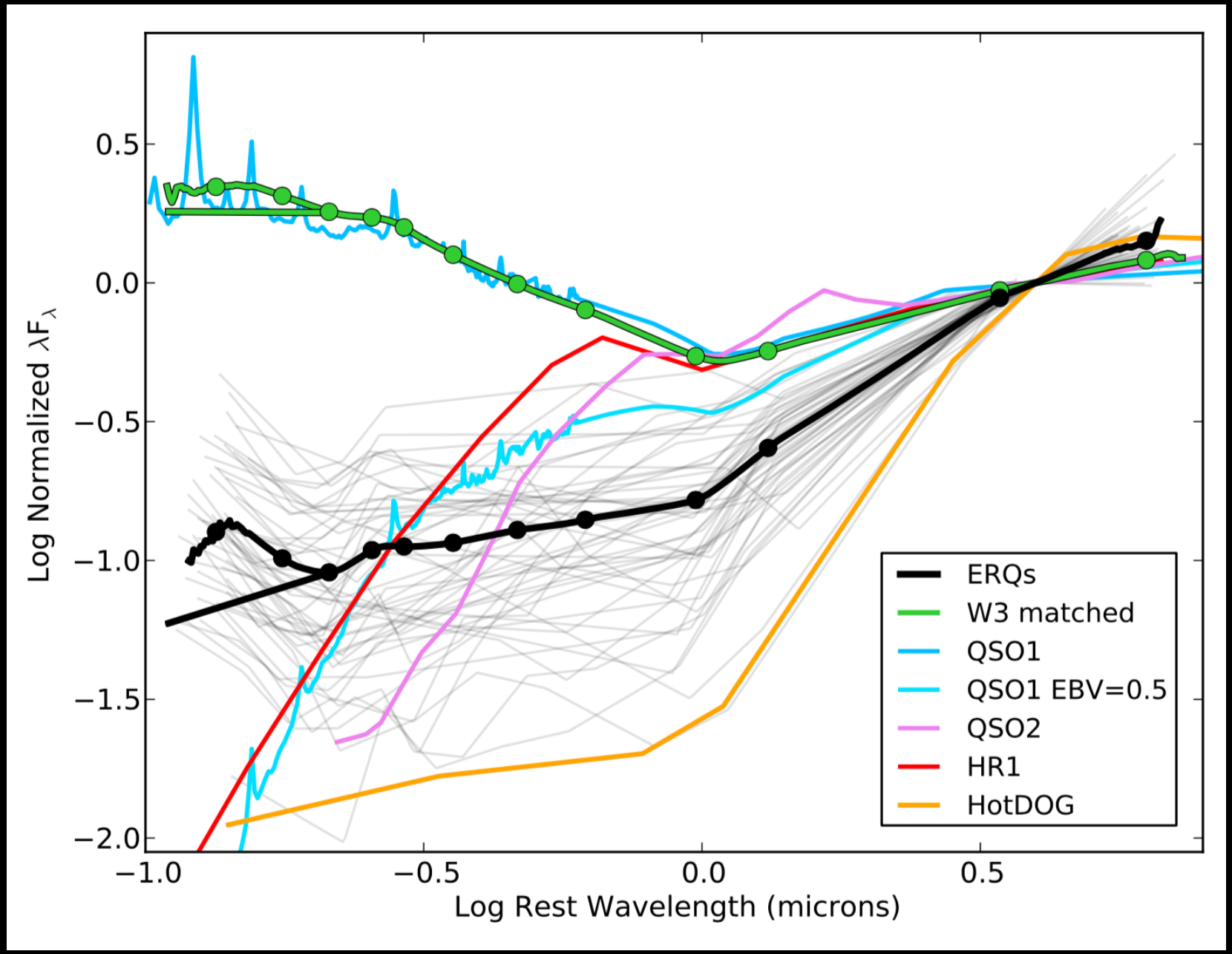
SDSS J0915+2418

"Type 2" QSOs at high-z



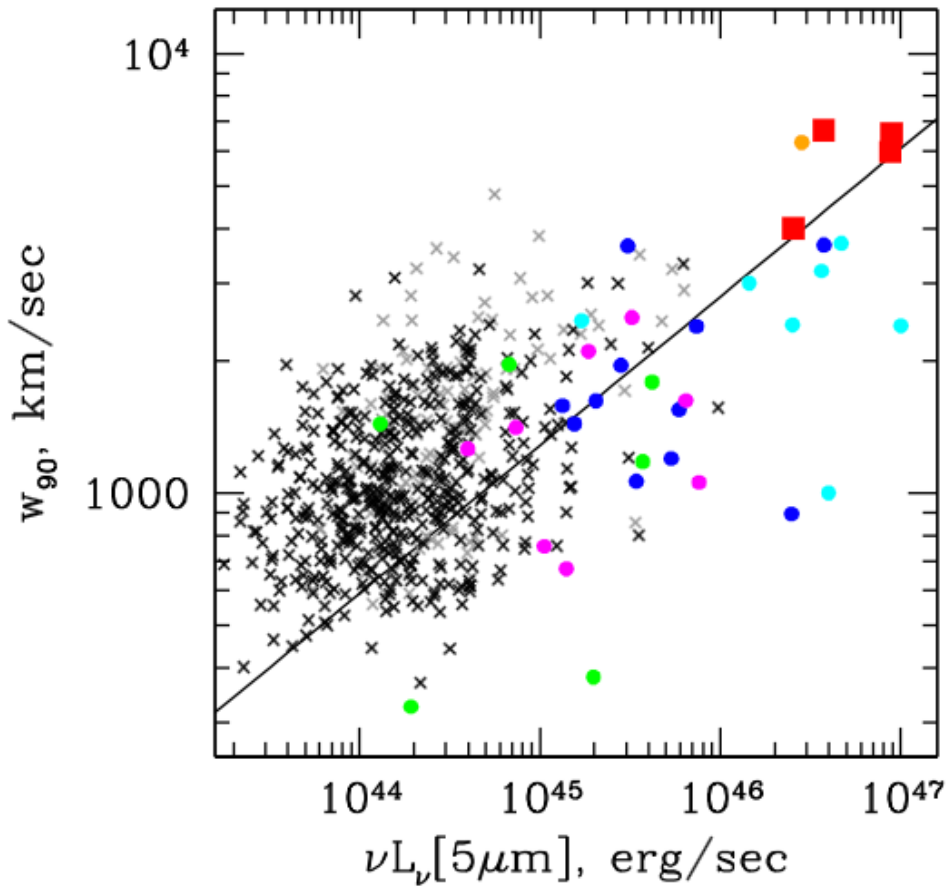
Ross et al., 2015, MNRAS, 453, 3932

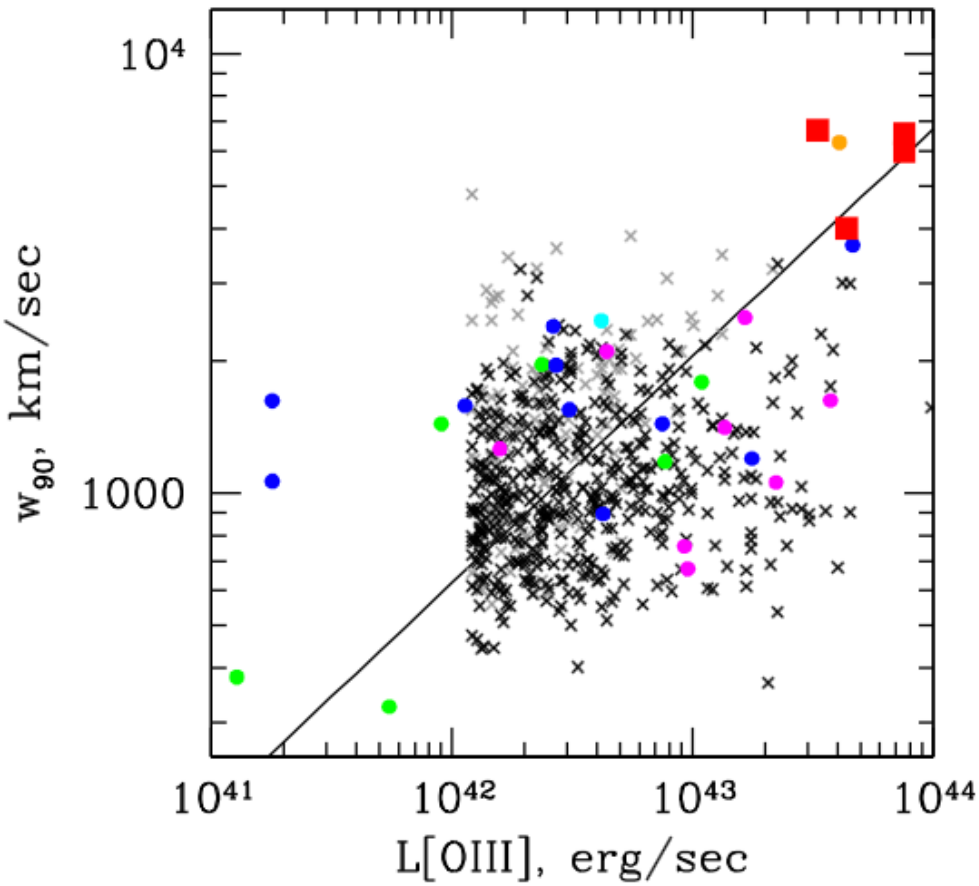
ERQ SEDs: An Evolutionary trend?



Hamann, Zakamska, *NPR et al.*, 2016, MNRAS submitted

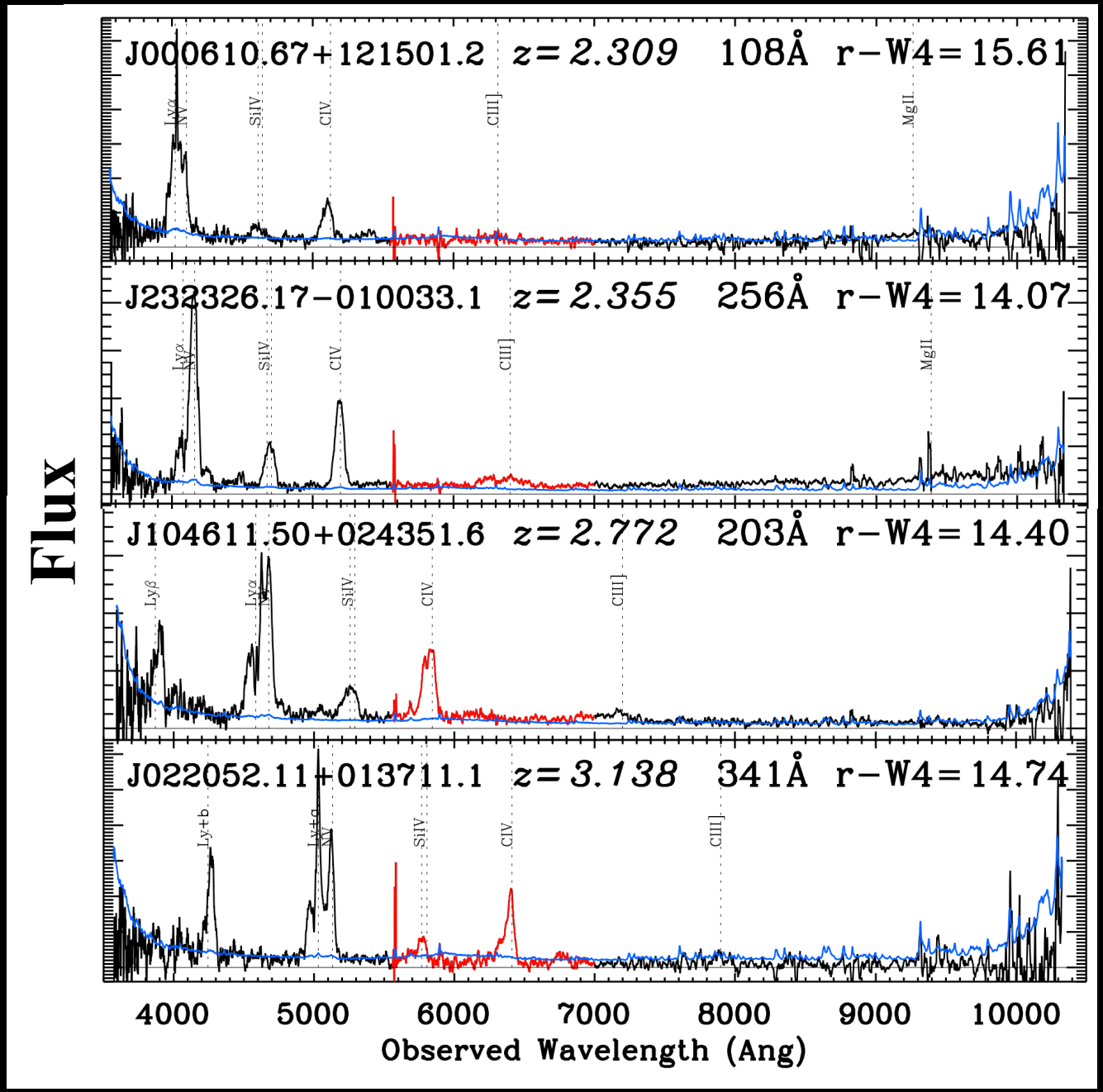
Emission Lines of ERQs: Feedback in Action





Zakamska *et al.*, 2016, MNRAS, 459, 3144

Very Unusual Spectra from ERQs....



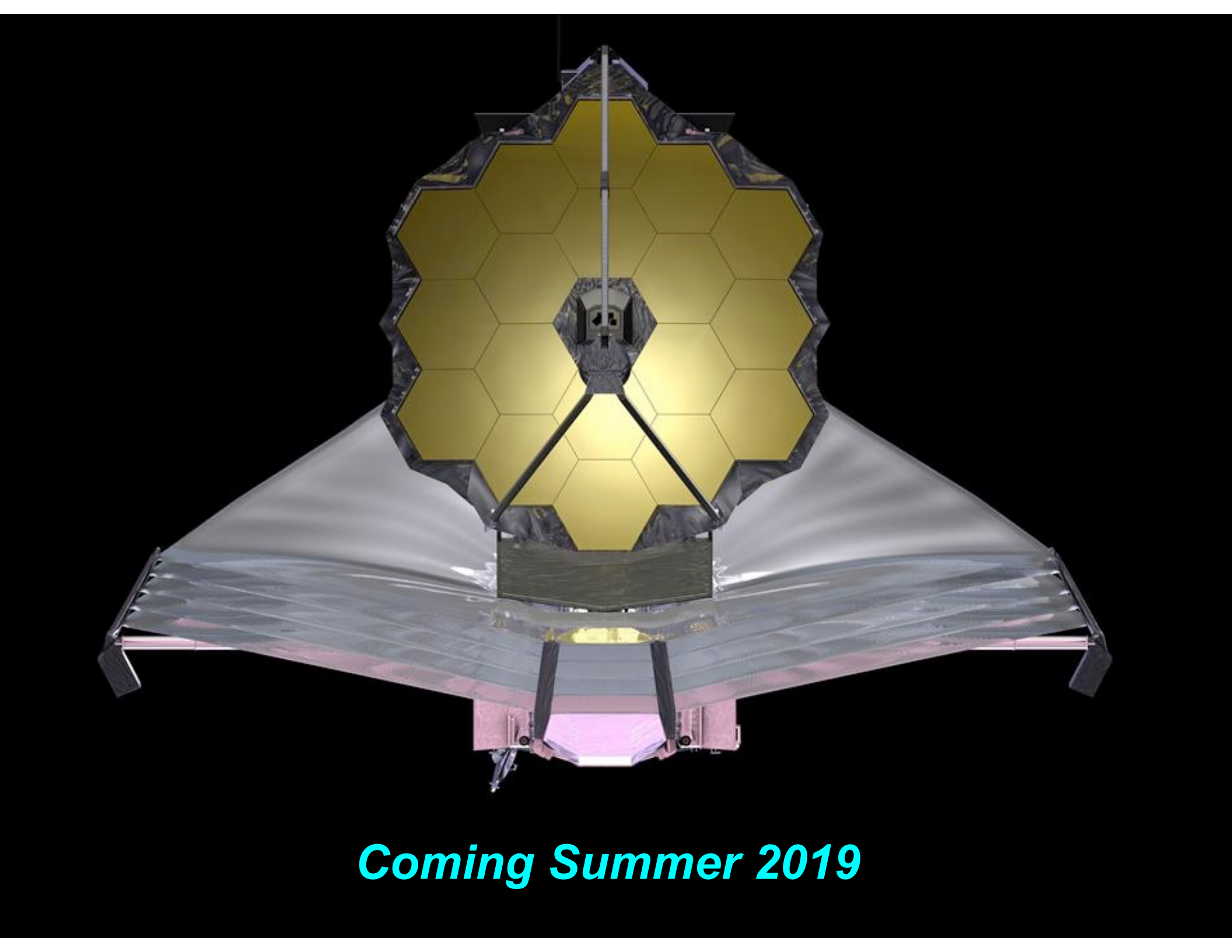
Ross et al., 2015, MNRAS, 453, 3932

The WISE W4 Compendium

- ✓ All 40 million detected objects in the WISE *W4*-band (20-28um); concentrating on objects with dust emission and AGN SEDs
- ✓ ***z~2.5*** object detected in WISE W4 has $L_{IR} \gtrsim 10^{13.5}\, L_{\odot}$
- ✓ ***(Might) Become a target catalogue for JWST MIRI spectroscopy…***

WISE band combination	det_bit	Number of objects	Percentage of AllWISE
W1-W2-W3-W4	15	25 882 083	3.5
W1-W2-W4	11	11 309 923	1.5
W1-W4	9	2 347 472	0.3
W1-W3-W4	13	859 426	0.1
W3-W4	12	454 160	0.1
W4	8	35 818	<0.1
W2-W3-W4	14	35 528	<0.1
W2-W4	10	15 556	<0.1
W4-any		40 939 966	5.5

Ross et al. (*in prep.*)


Coming Summer 2019