COSMOS2020

A next-generation catalog to probe the 1<z<8 universe

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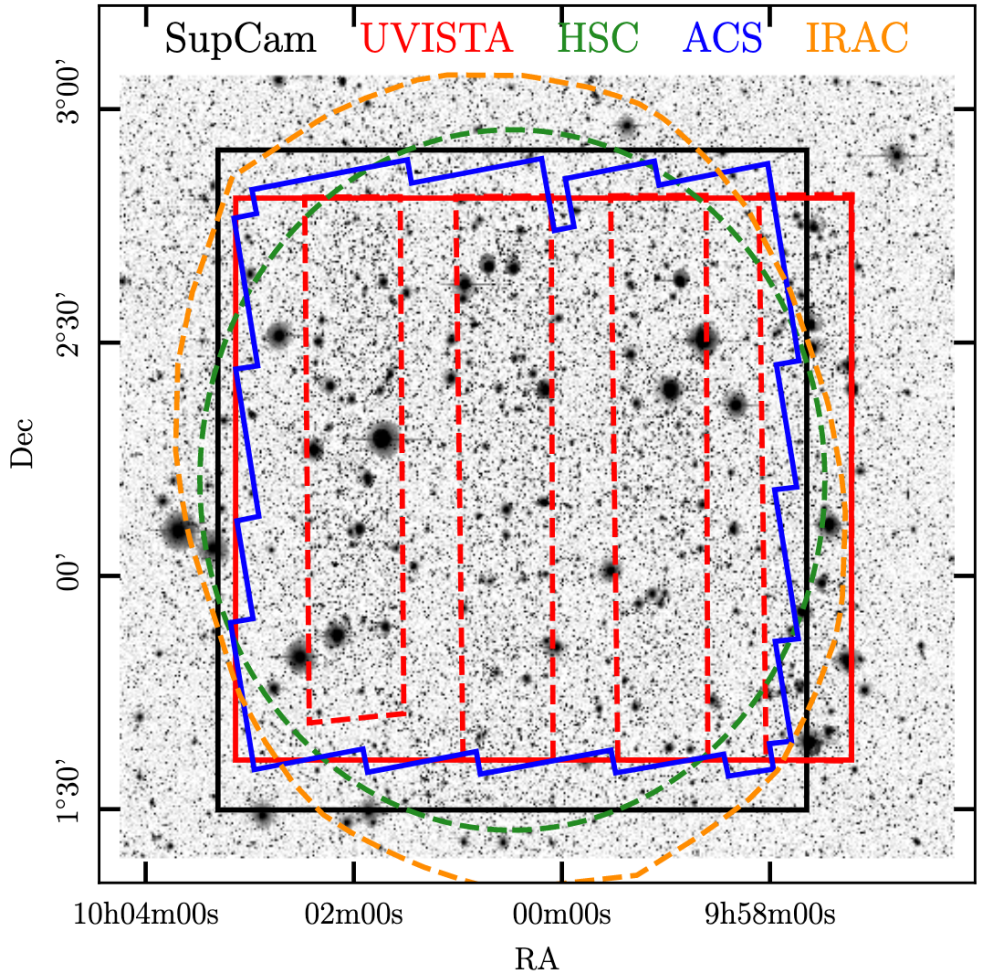
The COSMOS Field: Surveys + spatial coverage



DAWN

LAM
LABORATOIRE D'ASTROPHYSIQUE DE MARSEILLE

the catalog

A new dawn awaits...

1. ~1,000,000 **galaxies** measured in **39 bands** detected with ultra-deep near-infrared photometry over **2 deg²**

2. **Two independent photometric approaches**

   `Classic` — fluxes as sums within apertures (`SExtractor`)

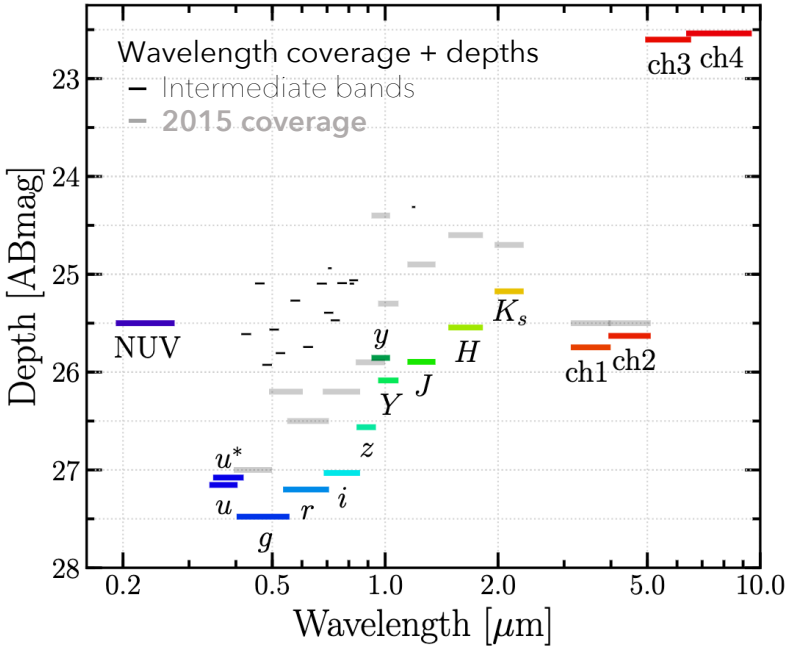
   `The Farmer` — fluxes as model parameters to be fit (`The Tractor`)

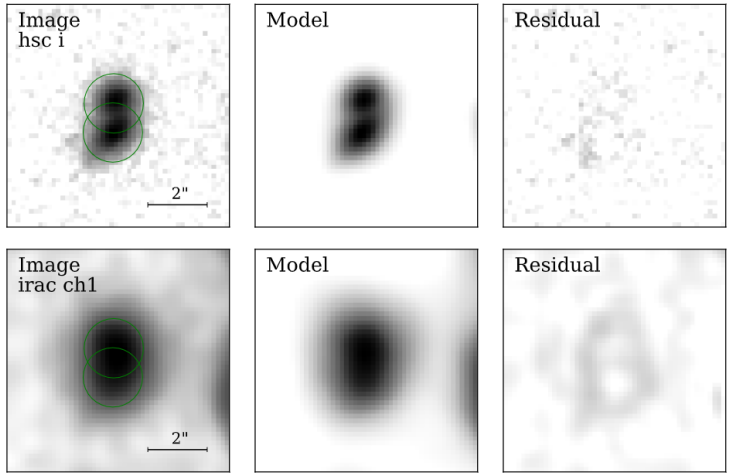
3. **Two independent photometric redshift estimates**

   `Le Phare` (Illbert et al. 2006) & `EAZY` (Brammer et al. 2008).

   Unprecedented redshift accuracy: <1% at 22.5 mag and <5% at 26 mag

4. **Sets a new standard for deep studies of galaxy evolution at z>1, with significant improvements at z>4.**





Example of model fitting technique for two nearby sources in optical (i) and infrared (IRAC 3.5um).
2" apertures shown in green

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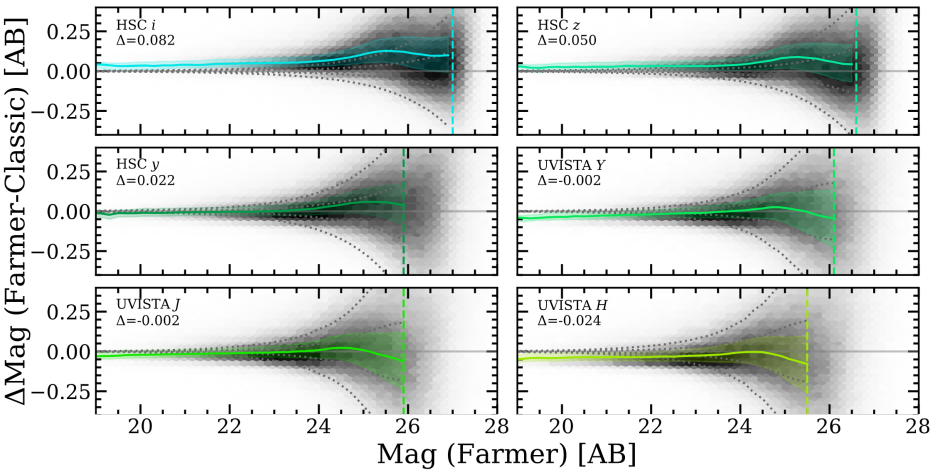
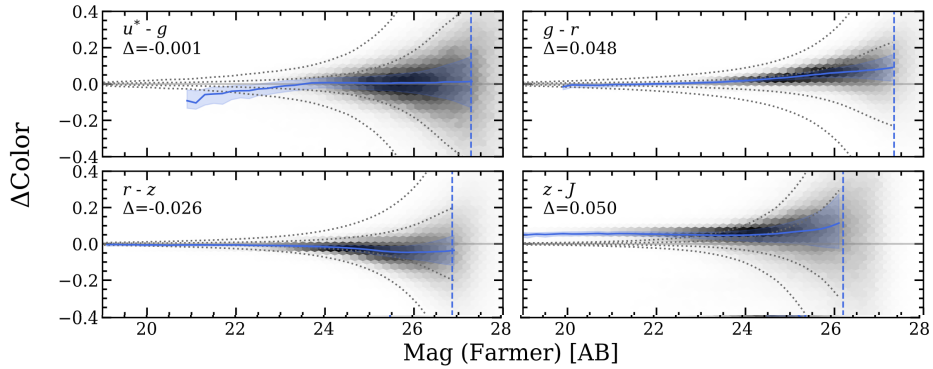
the results

Photometry

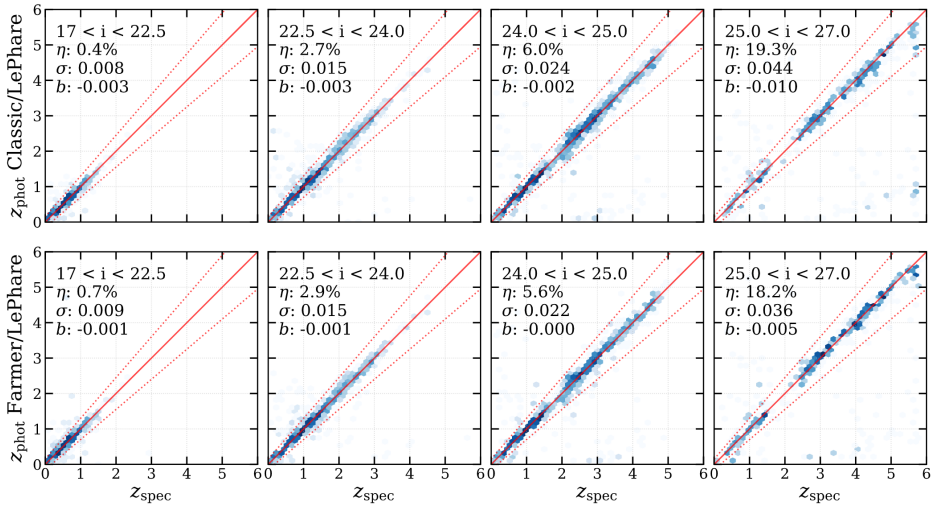
both approaches yield consistent results



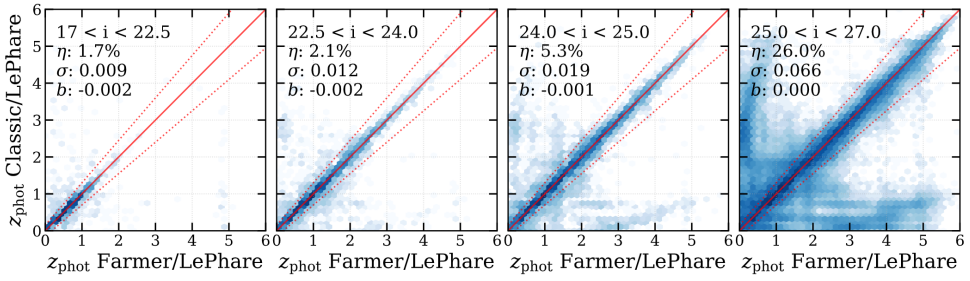


Photometric Redshifts

derived redshifts are accurate & robust



catalogs produce remarkably similar results



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Classic – fluxes summed in apertures
Farmer – fluxes as model parameters
LePhare/EAZY – photometric fitting codes

η – outlier fraction
σ – standard deviation
b – median bias

the takeaway

The Catalog { Weaver, Kauffmann et al. 2020, *in prep.* }

- 2 different photometry approaches + 2 redshift estimations codes
- Extraordinarily similar performances means robust measurements
- Incredible photometric accuracy: <1% at 22.5 mag and <5% at 26 mag
- Public release is expected by end of this year

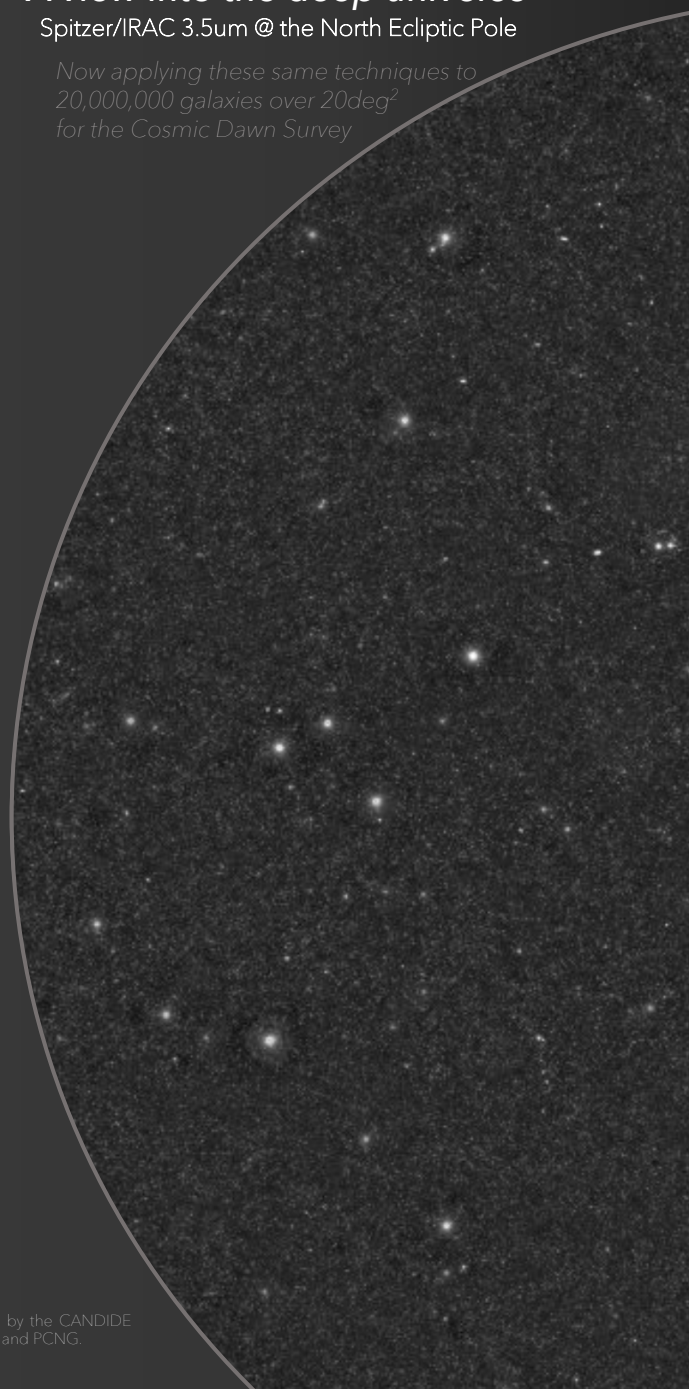
The Science { uniquely enabled by ultra-deep photometry }

- **Galaxy stellar mass function**: growth of galaxies over 12 billion years
- **Ultra-massive "dead" galaxies**: sites of the first cessation of star-formation
- **UV Luminosity Function**: galaxy formation in the first 1 billion years
- **Galaxy-galaxy magnification**: direct probe of dark matter

A view into the deep universe

Spitzer/IRAC 3.5um @ the North Ecliptic Pole

Now applying these same techniques to 20,000,000 galaxies over 20deg^2 for the Cosmic Dawn Survey



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