Some thoughts on the PFS-SSP galaxy survey

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Caveat 1:

This is NOT a science talk!

Caveats 2:

I have not closely followed the PFS discussion recently...
Some of my points may be totally out of focus…

Comments/Suggestions/Updates in a random order...

- HSC-D/UD: where we stand now
- photometry on external data
- the PFS simulator
- target selections (flux-limited survey)
- scientific discontinuity at z=2

HSC-D/UD as of today

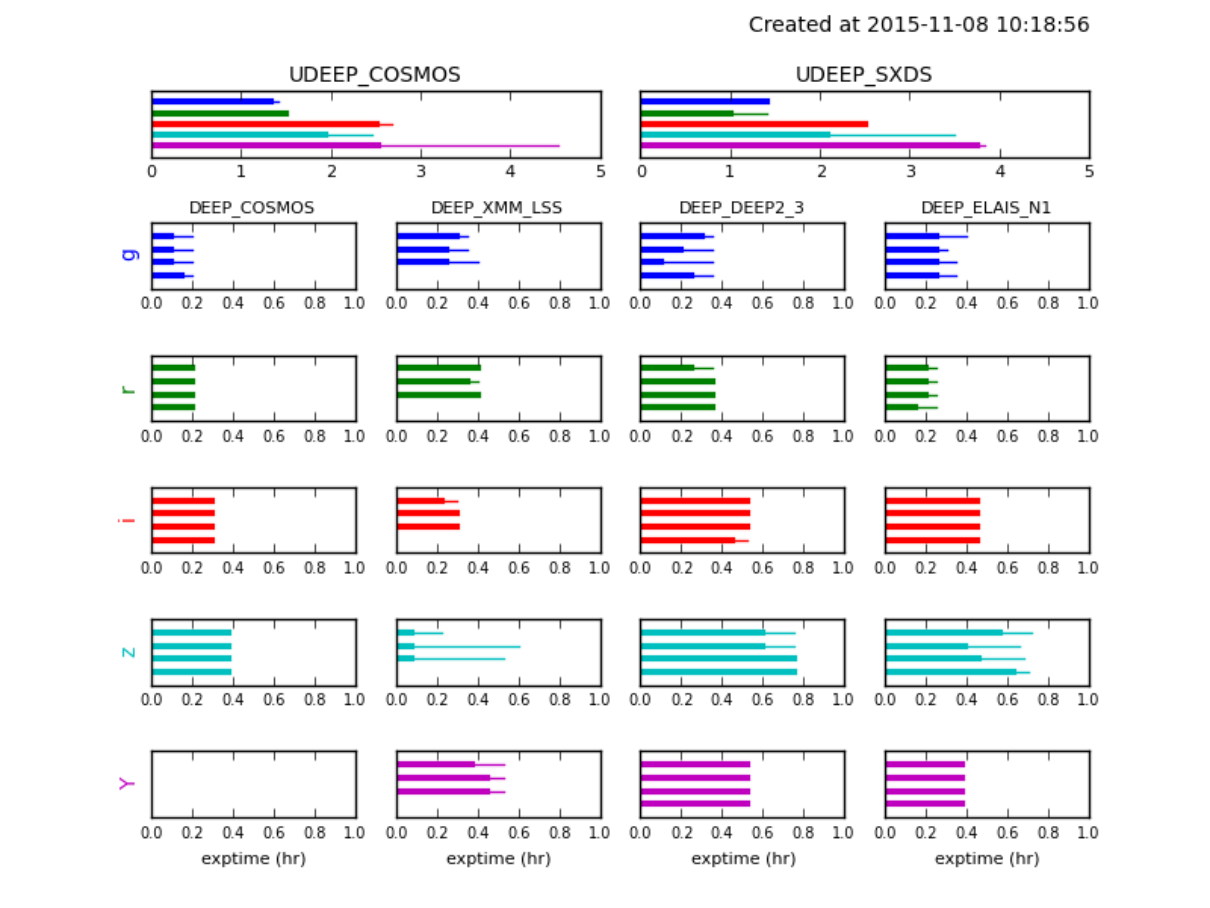


Figure courtesy: Yadusa-san

HSC-D/UD as of today

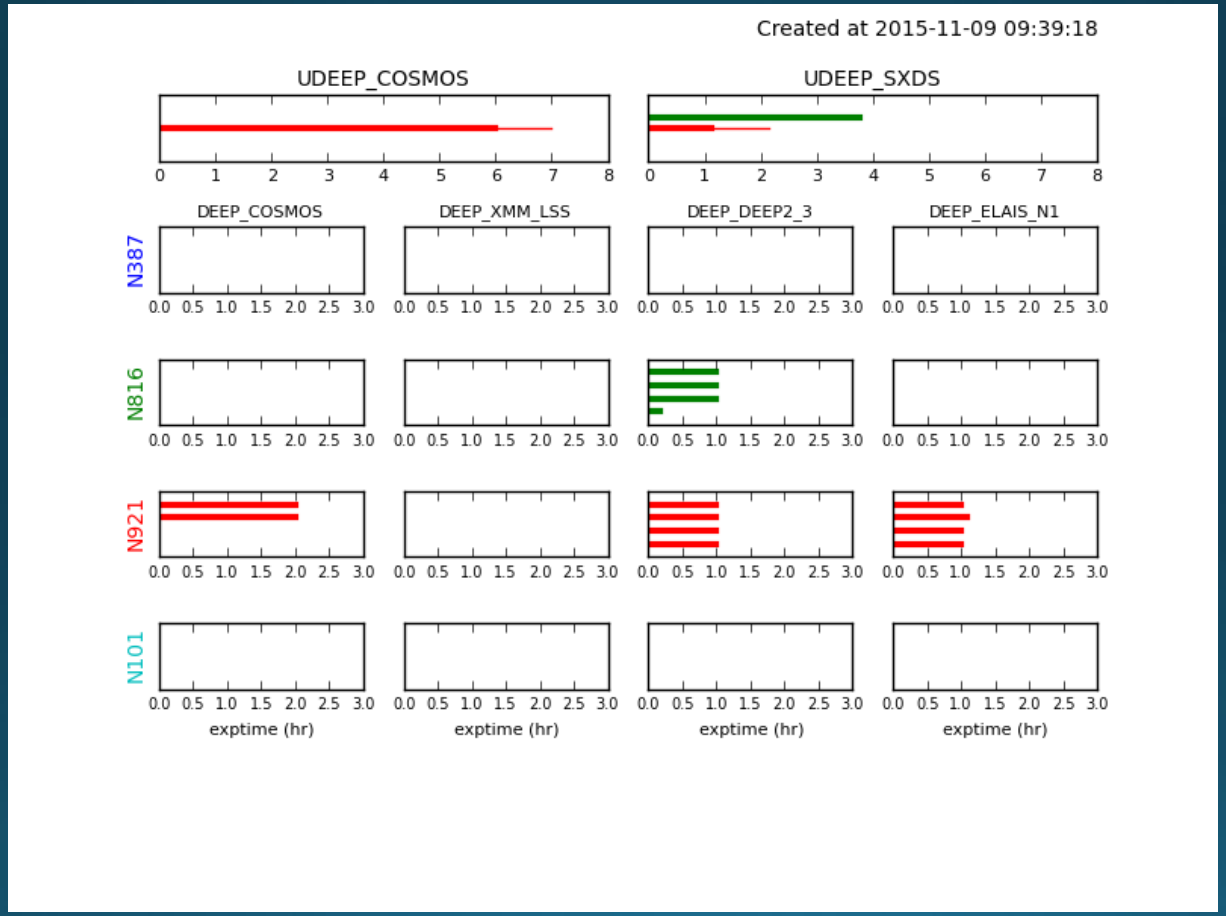
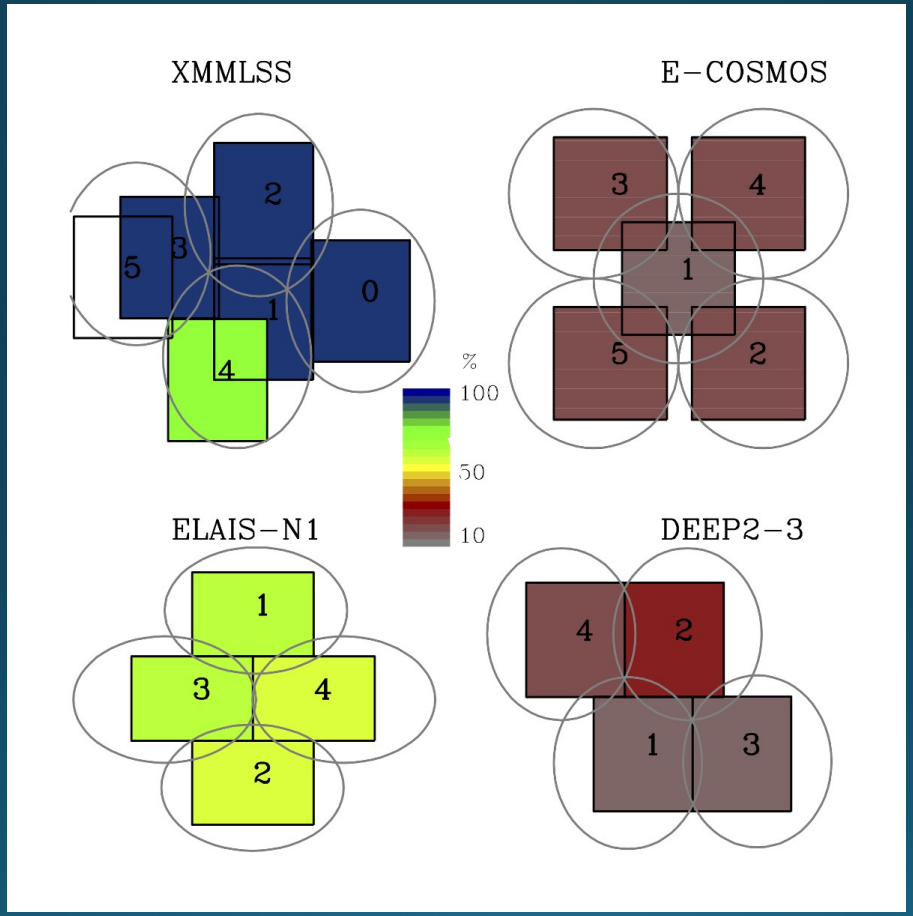


Figure courtesy: Yadusa-san

HSC-D/UD as of today



From CLAUDS wiki (this figure is 2 months old)

HSC-D/UD as of today

Progress

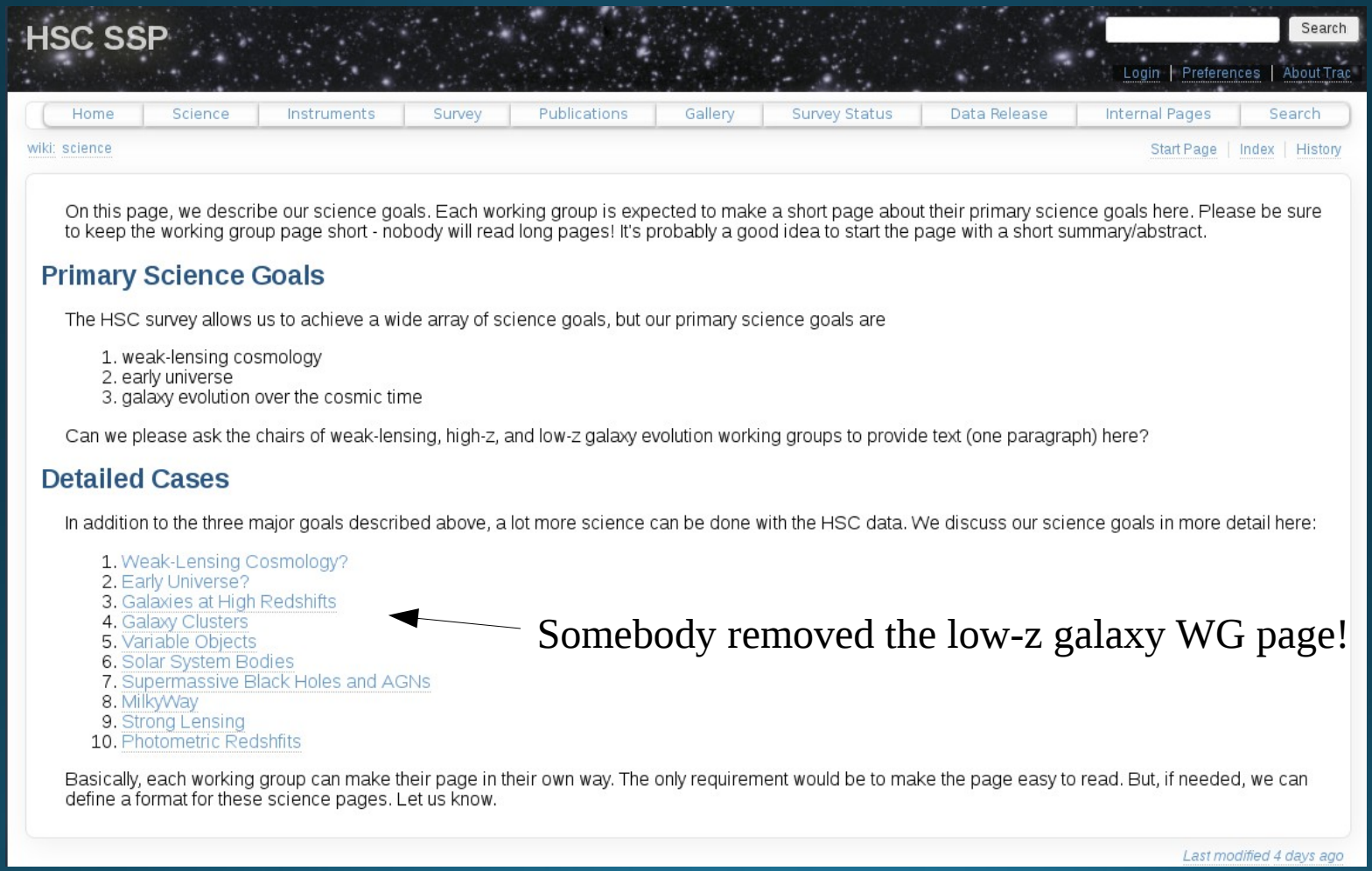
Period	Target	Allocated (hrs)	Executed (hrs)	Completion Rate (%)
2014B	DEEP2-3	140	32.7	23
2015A	E-COSMOS DEEP2-3	120	34.9 10.7	38
2015B	DEEP2-3	80 (Priority1) 90 (Priority 2)	TBD	TBD

Required : 300 hrs (240 hrs open-shutter + overheads)

Executed : 78.3 hrs (26%)

Slide from Egami-san's talk at Princeton

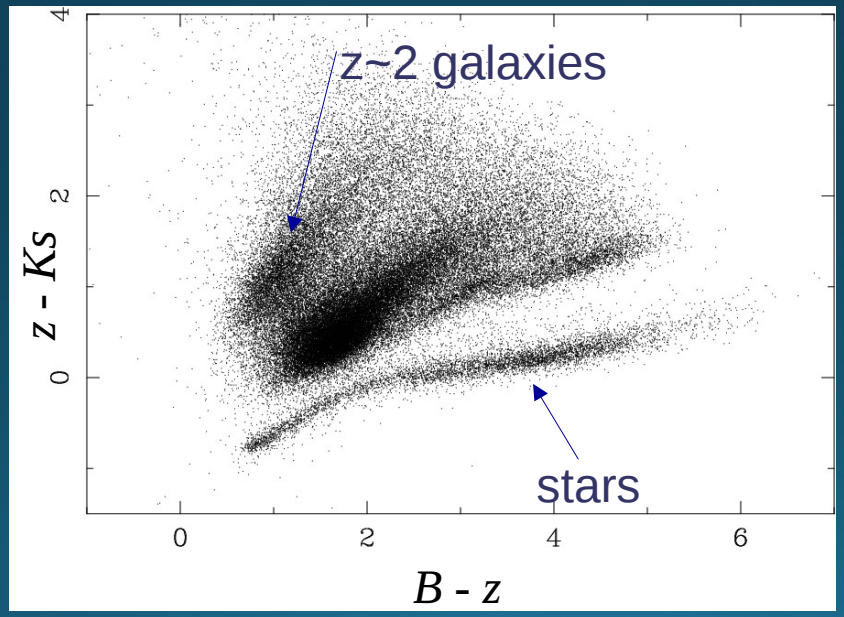
A friendly reminder...



Photometry on external images

First, we aim to prove our concept – make a gzKs diagram using the HSC (g and z) and UltraVISTA (Ks) data in COSMOS and see if it looks reasonable.

For now, we work on a single patch (5,5 on COSMOS).

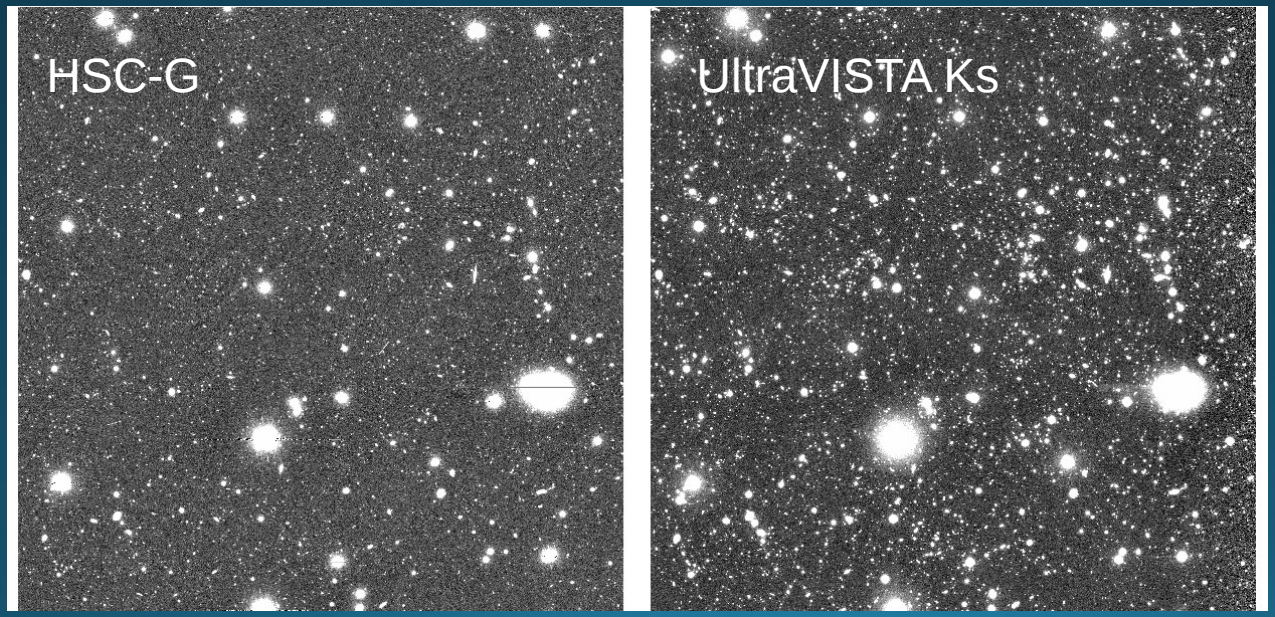


■ Step 1: convert the UltraVISTA image to the HSC exposure format

Straightforward. An HSC exposure has binary tables attached to it, but at this point the tables are all empty. Also, the mask layer is all empty, too.

■ Step 2: warp the external image onto an HSC patch

Koike-san and Furusawa-san made a warping code using the pipeline tasks. For now, we assume that the WCS of the external image is good.



- Step 3: add PSF

We select point sources and measure the PSF on the external image using the pipeline tasks.

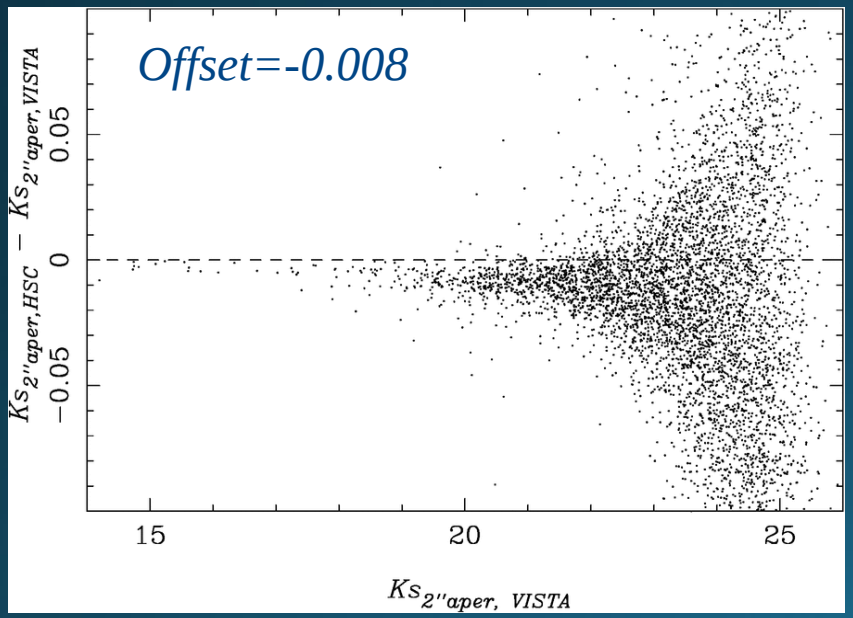
- Step 4: do photometry

With help from the software team, we are able to run multiBand.py on the g, z, Ks-band images. We use v3.8.5.

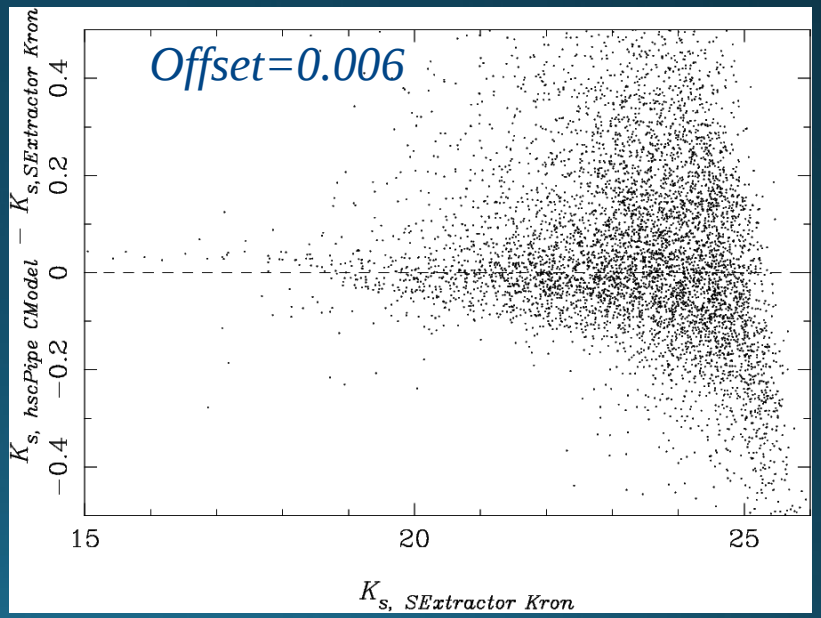
Object-by-object comparisons

We applied flag cuts here to select objects with clean photometry..
There is a small offset of ~0.5-1%.

2” diameter aperture



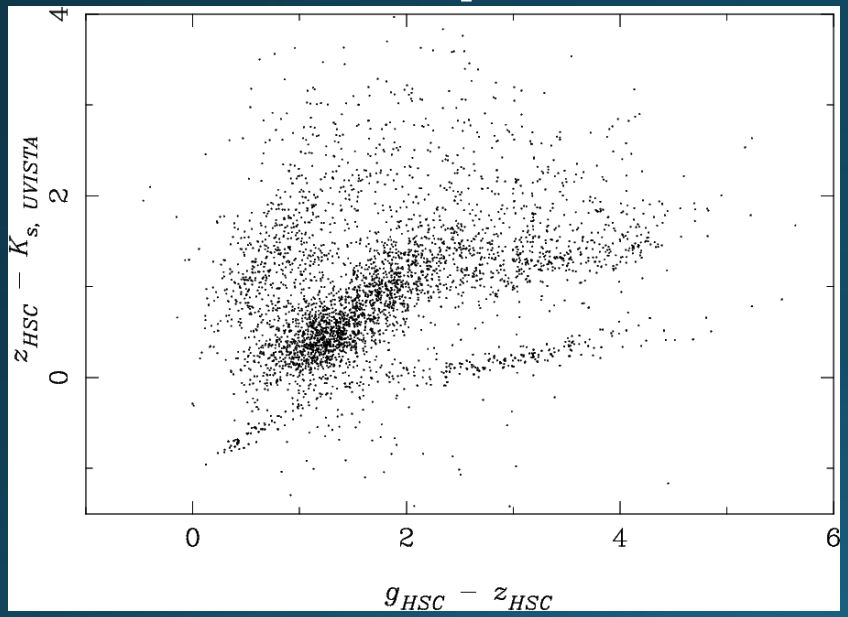
HSC CModel vs VISTA Kron



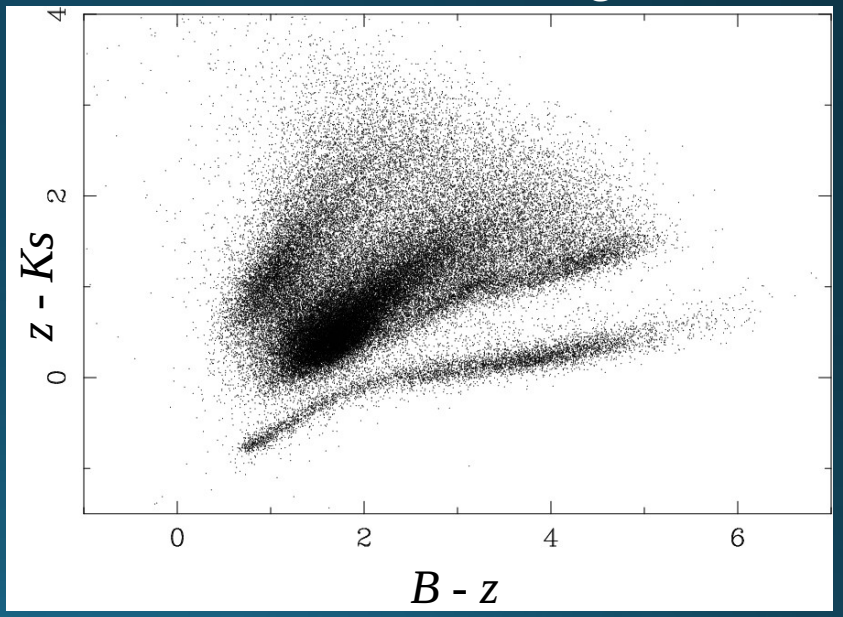
gzKs diagram

We applied the flag cuts to ensure clean photometry and used CModel fluxes here.

hscPipe



COSMOS catlaog

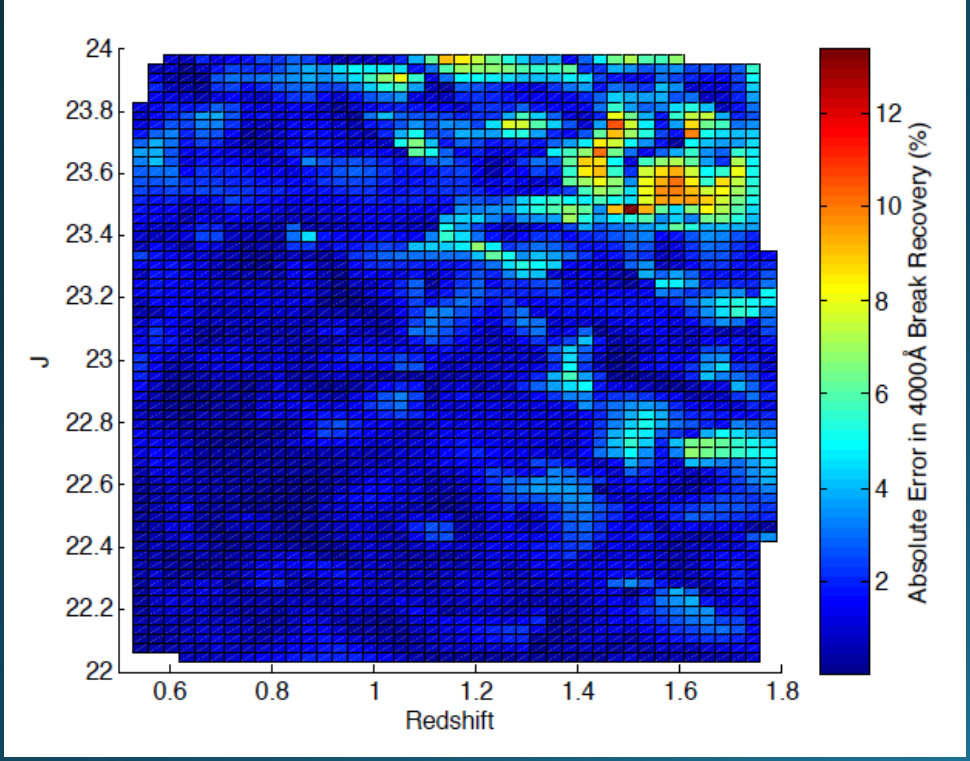


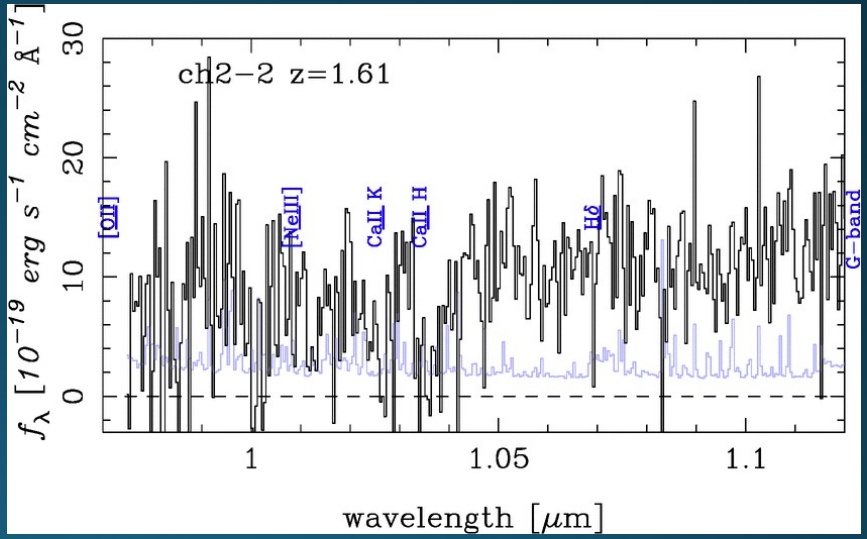
Looks good! We plan to include the Ultra-VISTA photometry to the COSMOS UD table in the NAOJ database for testing.

That is it for HSC, now let's move on to PFS...

PFS simulator

I keep making this point, but the PSF simulator still looks optimistic to me…
I would like to see if the simulator could reproduce, e.g., observed SDSS (optical) or MOSFIRE (nearIR) spectra.

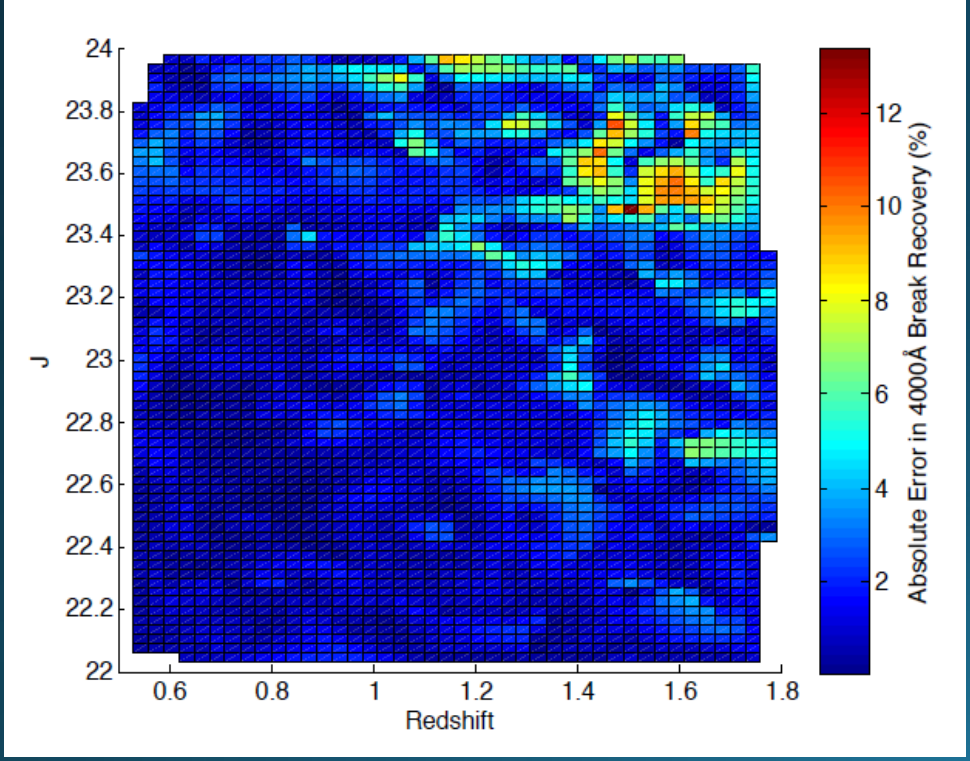


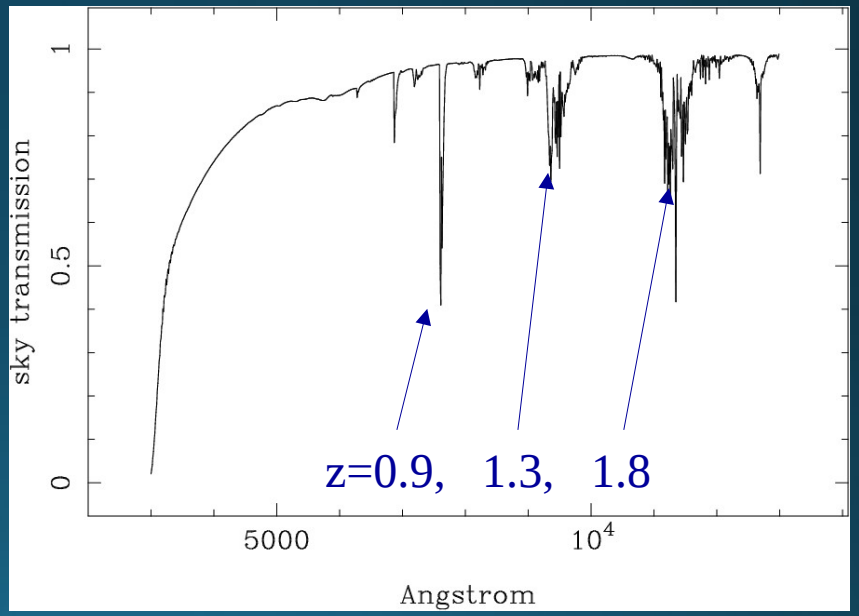


Quiescent galaxy at z=1.61 with J_AB=21.6. 2 hours integration with MOSFIRE.

Systematics in the PFS ETC – 1

There are no redshift slices with slightly worse S/N… why?
I hope I am wrong, but I am a bit worried.





Systematics in the PFS ETC – 2

- *Systematic sky subtraction residuals* – These are modeled by adding a "noise" term corresponding to some percentage of the sky counts in each spectral pixel. We currently set this to 2% of the brightest of the pixel and its neighbor on either side (equivalent to 1% sky subtraction accuracy on a 4-pixel resolution element).

Simply the random noise is increased? ...well, perhaps that is not a good way to include systematic uncertainties, which by definition cannot be accounted for by the random noise.

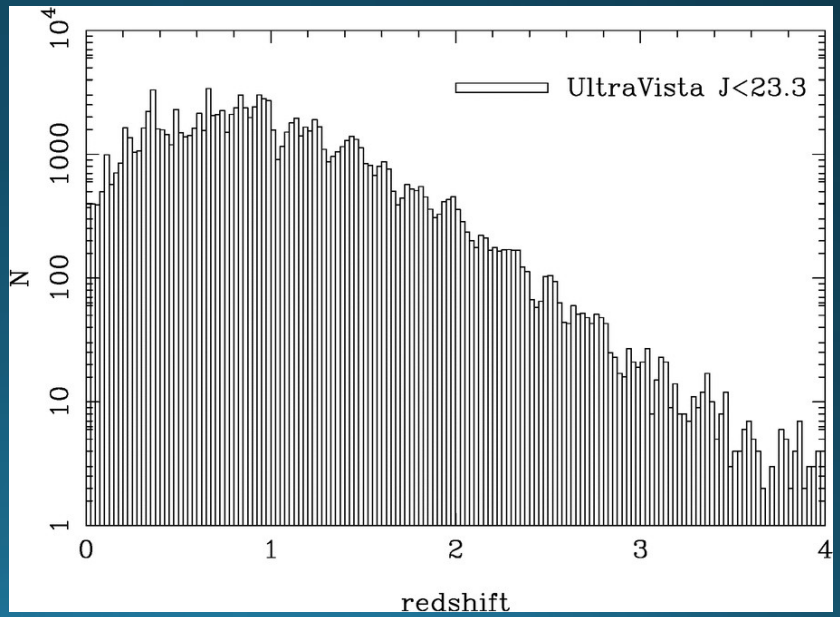
2D simulations will be helpful.

Flux-limited survey

It has a huge legacy value and least selection effects.

- Have our color selections been spectroscopically tested to J=23.3?
- Are we sure we are not missing rate, but interesting population?

We should probably apply color selections (idealy with HSC phtometry because external images have a range of quality and depth) for our primary survey, but a flux-limited survey is critically important to understand what sort of galaxies we actually pick or miss with the color cuts. I think we should do a flux-limited survey early on in the survey.



~50% objects are at z>0.7

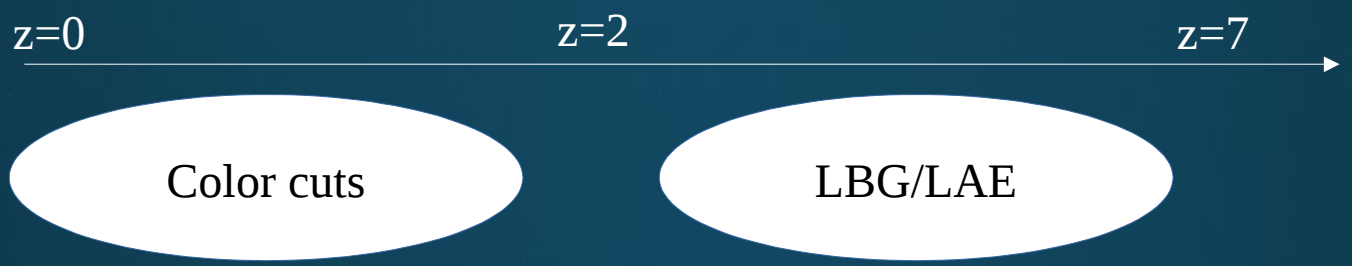
Flux-limited survey

Observing time:
I would suggest that we give a good fraction of the observing time (e.g., 20%) to such a survey. It will be a golden photo-z calibration sample for future imaging surveys like Euclid and WFIRST.

Where to observe:
Two fields: COSMOS and SXDS. Sampling rate is not important for understanding our target selections, redshift success rate is important.
We should integrate until we get redshifts.

Photo-z selection:
Personally, I'm kind of negative about photo-z selection because data are not completely uniform (e.g., ELAIS-N1 does not have the H-band, Ultra-VISTA, VISTA-VIDEO, and UKIDSS-DXS have very different depths, etc.) and it is not easy to understand what we select/miss in each field.

Scientific discontinuity at z=2



z<2 objects and higher redshift objects are selected in different ways. How do we make a coherent proposal?

Yes, we share the fibers, but that does not sound like a very good reason to combine high and lowz, at least to me. We want to be coherent scientifically. And, we do not want leave room for the referees to say “why don't you split your proposal into two?”

Very difficult question...

Summary

- **HSC-D/UD: where we stand now**
  UD is 1-2 hours in BB and 4-6 hours in NB
  D is around the wide-depth

- **photometry on external data**
  We are making good progress and we plan to have UVISTA photometry in DB for testing.

- **the PFS simulator**
  Still looks somewhat optimistic to me.. 2D sims will hopefully be more realistic…?

- **target selections (flux-limited survey)**
  I think we should do flux-limited observations early on in the survey.

- **scientific discontinuity at z=2**
  Hmm….