Lucia Pozzetti & MF-WG

Methods to estimate the Stellar Mass

1-Using photometry + HyperZ (by Bolzonella & Pozzetti)
2-Using photometry+spectra (Franzetti,Scodeggio)
3-Using spectral features (Lamareille,Meneux,Charlot)

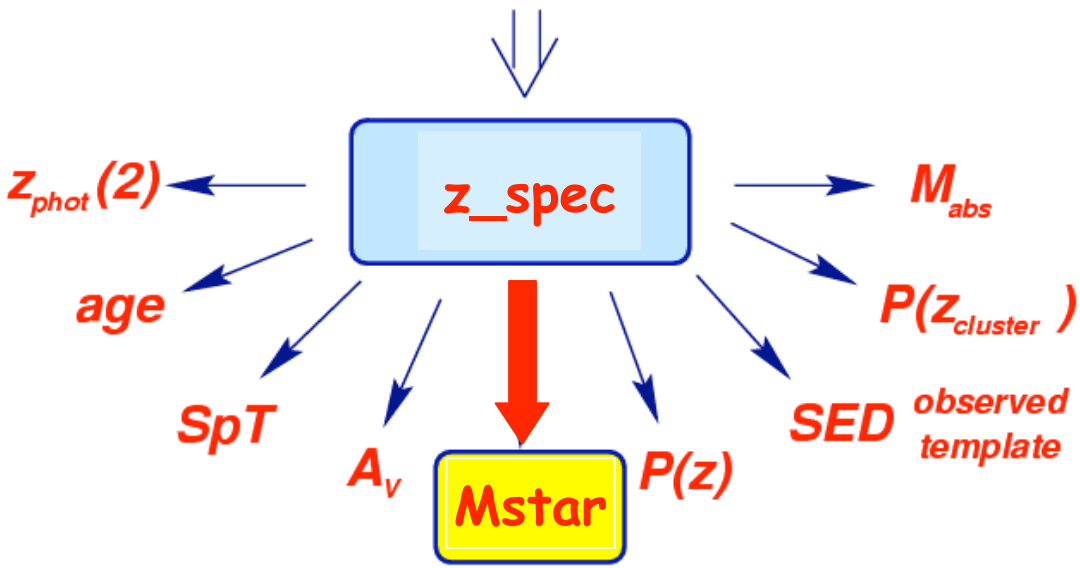
Comparison in progress: global good agreement 1&2

Methods to estimate the Mass Function

1- Vmax (by Pozzetti & Franzetti)
2- STY (by Pozzetti)

HyperZ Mass

$$\chi^2 = \sum_{filters} \left(\frac{F_{obs} - b\,F_{temp}(z)}{\sigma} \right)^2$$



Estimate of the stellar Mass content from multi-band photometry

$$SFR(t) = \frac{M_{gal}}{\tau}\, e^{-(t/\tau)}$$

$$Mass - processed(t) = \int SFR(t) * dt$$

$$Mass - star(t) = \int SFR(t) * dt * (1 - R(t))$$

GISSEL (Bruzual & Charlot 2003)

SFH➔tau=0.1,0.3,1,2,3,5,10,15,30,const SF

age=0.1 Gyrs to age of universe

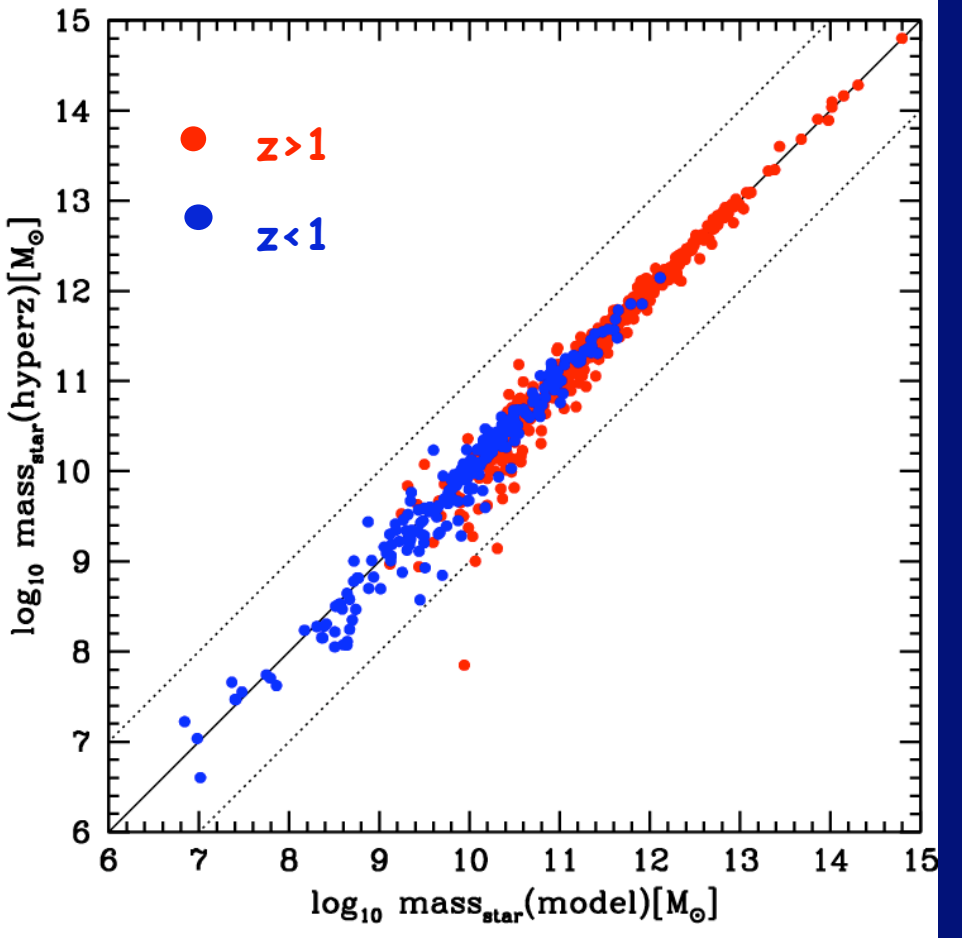
Zsolar, Salpeter IMF, dust=Calzetti: AV=0 to 2.4

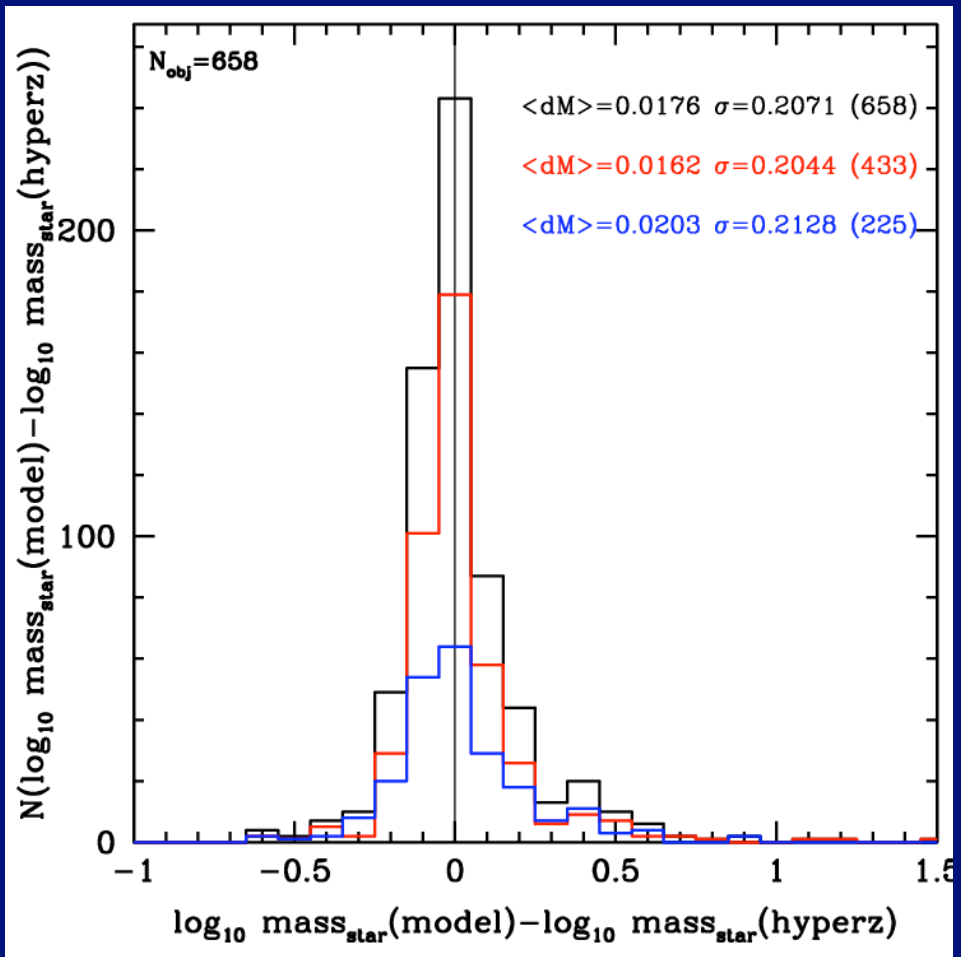
SIMULATIONS:

Hyper-Z using opt+NIR

Mass recovered within a factor 1.6

No redshift dependence





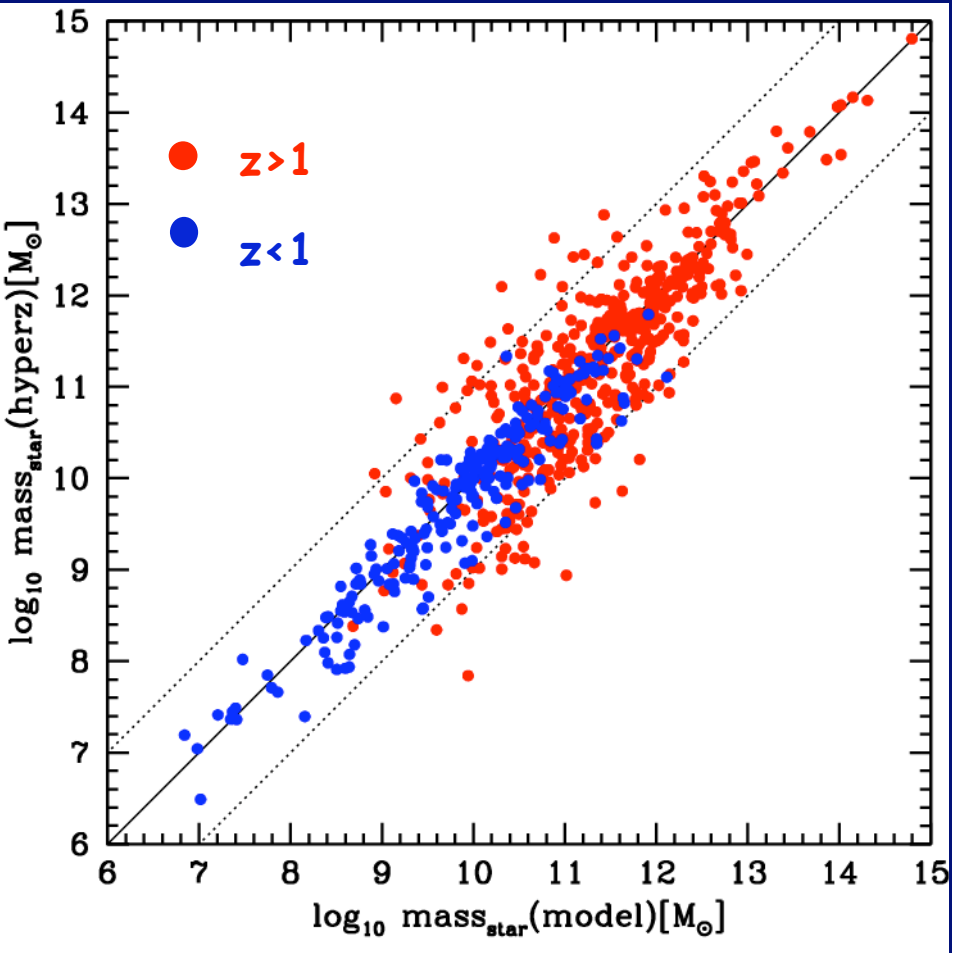
Simulations: PHOTOMETRY

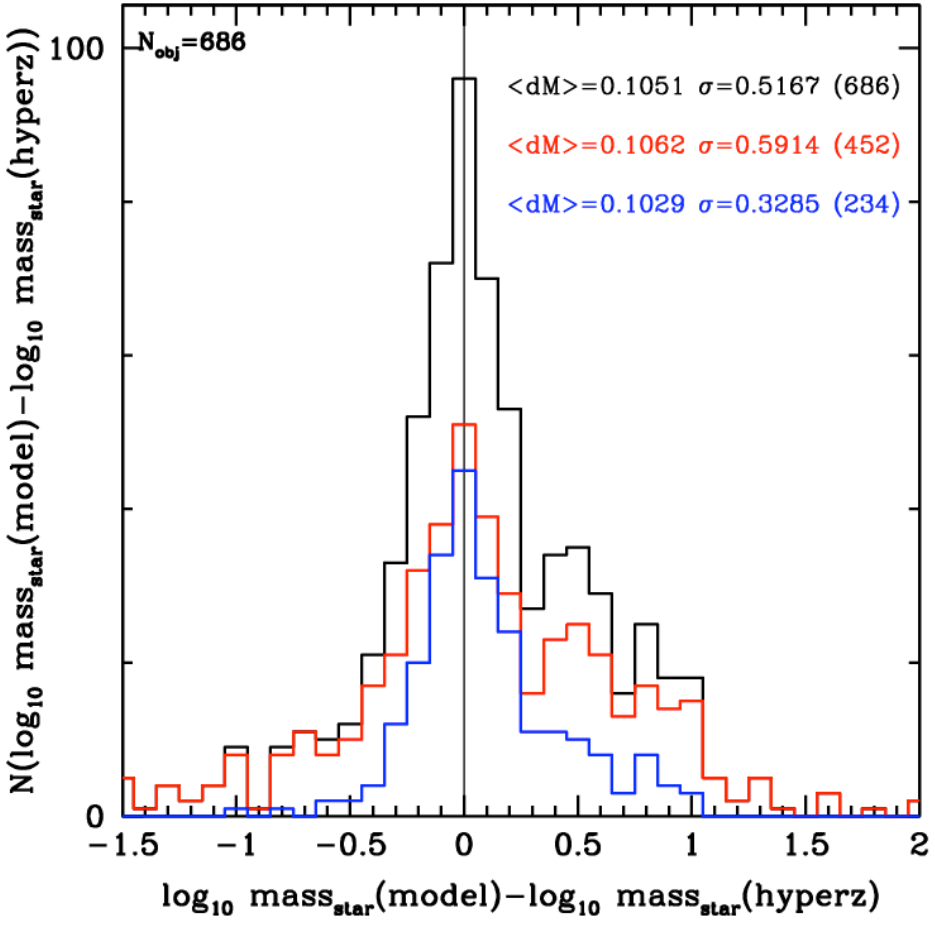
Only Optical (U_L,U_{ESO},B,V,R,I)+ photometric bands

Mass recovered within a factor ~2 at z<1

and within a factor ~4 at z>1

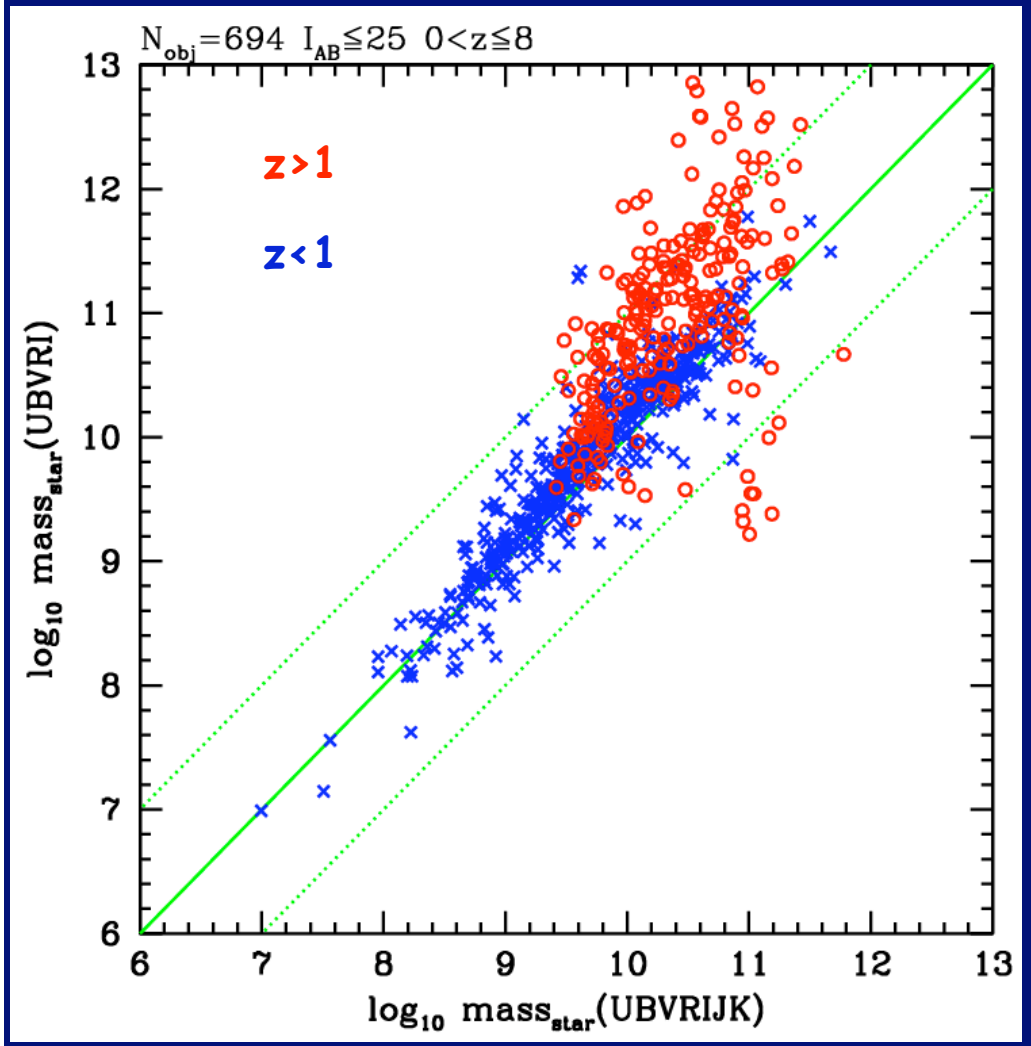
Tends to overestimate high-mass objs at high-z





Mstar: UBVRIJK vs. UBVRI

- VVDS: K-selected spectroscopic sub-sample:



➔For most of VVDS spectroscopic sample we have only optical photometry

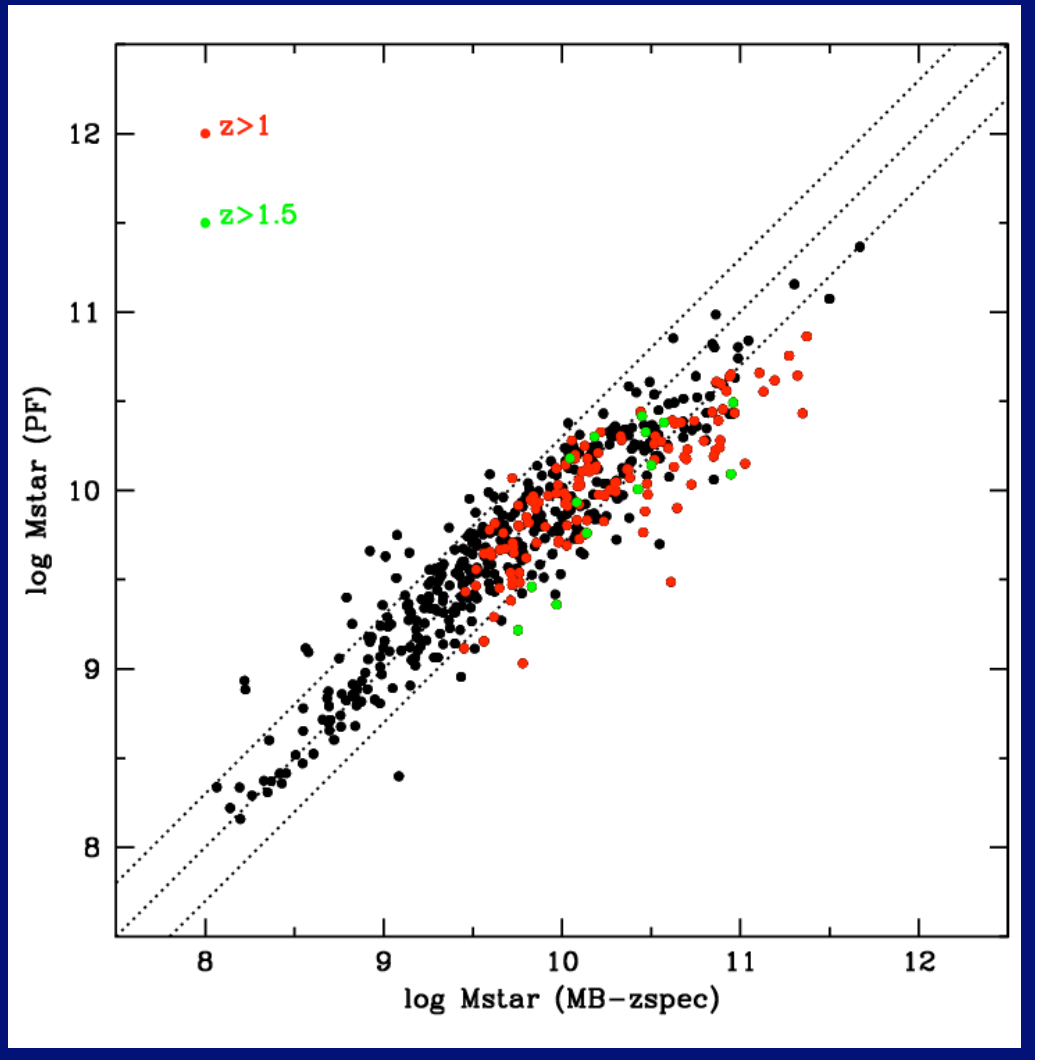
➔Overestimate masses at high-z when use only UBVRI photometry

Mstar: HyperZMass vs. Photo+spectra-Mass (byPF)

- VVDS: K-selected spectroscopic sample:

➔ The 2 methods are quite consistent

➔ Mass (Photo+spectra) are slightly lower than Mass (HyperZMass) at z>1



VVDS sample

I-selected spectroscopic sample

Using only optical photometry➔ Mstar to z<1

I_{AB}<24

N ~ 6400 gals (zflag=2,3,4,9)

Area~1750 arcmin^2

K-selected spectroscopic sample

Using only optical+NIR photometry➔ Mstar to z<1.5

K_{AB}<22.84 (+ I_{AB}<24) 90% complete

N=694 galaxies (520 zflag=2,3,4,9)

Area~172 arcmin^2

K-selected photometric sample

Using only optical +NIR photometry + zphoto➔ Mstar to z<2

N=3484 galaxies with z-photo (VVDS+LS+NIR)I_{AB}<26

Area~172 arcmin^2

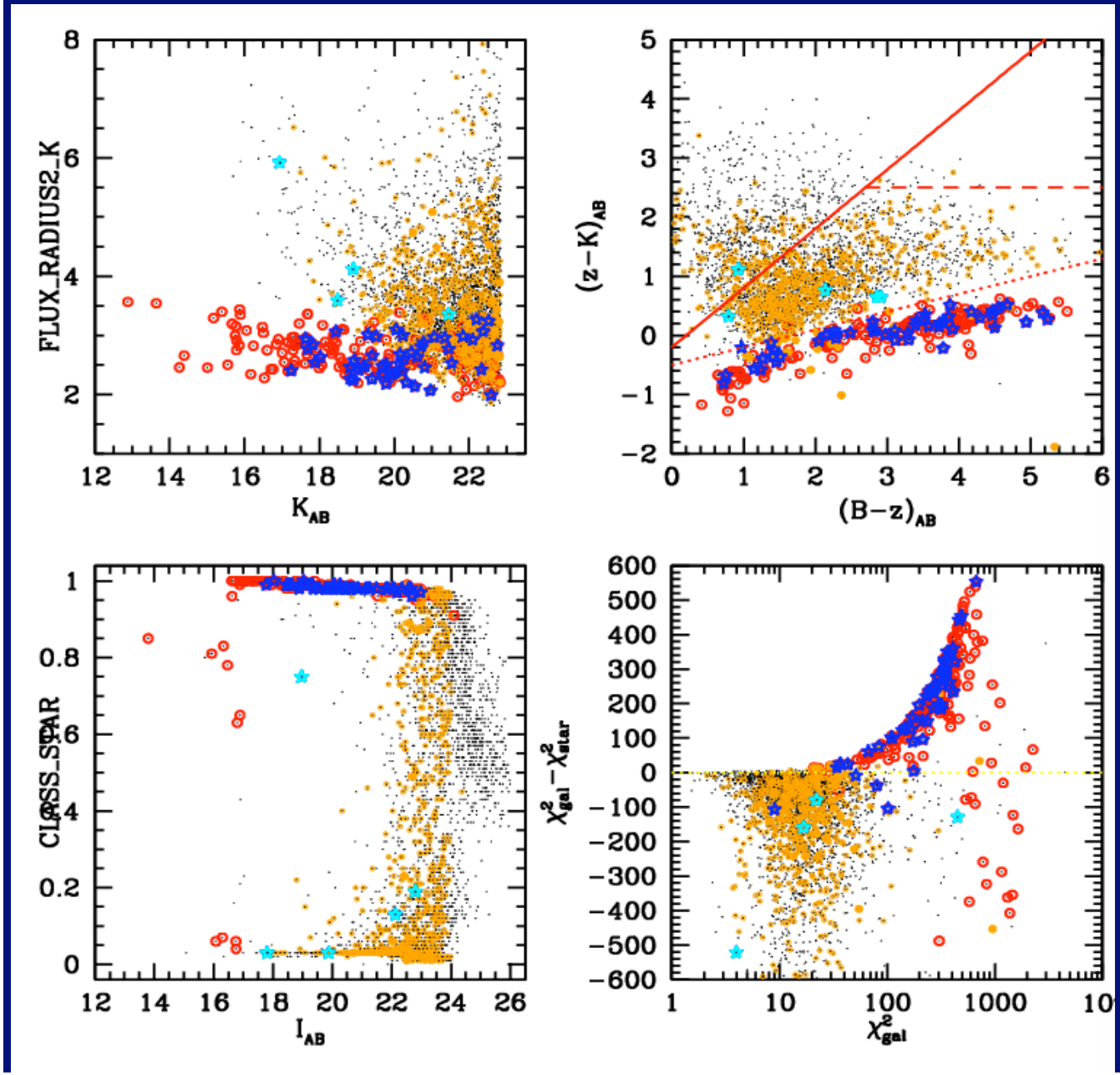
K-selected photometric sample:

K_{AB}<22.84 (90% complete)
N=3851 objects
3688 with z-photo I_{AB}<26
(VVDS+LS+NIR)
145 I_{AB}>26 no z-photo
17 not in DB

204 candidate stars
from different methods

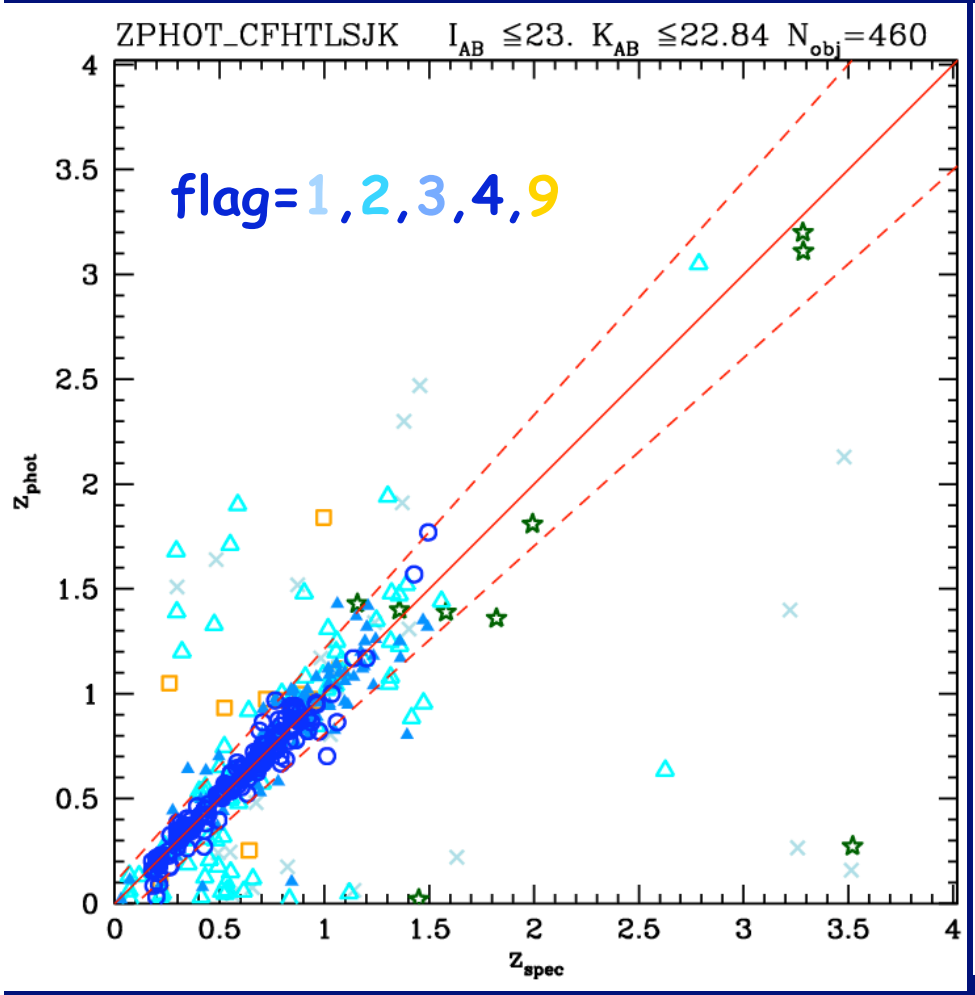
- 3484 galaxies
- Area=172.28 arcmin^2
- K_{AB}<22.84 & I_{AB}<26

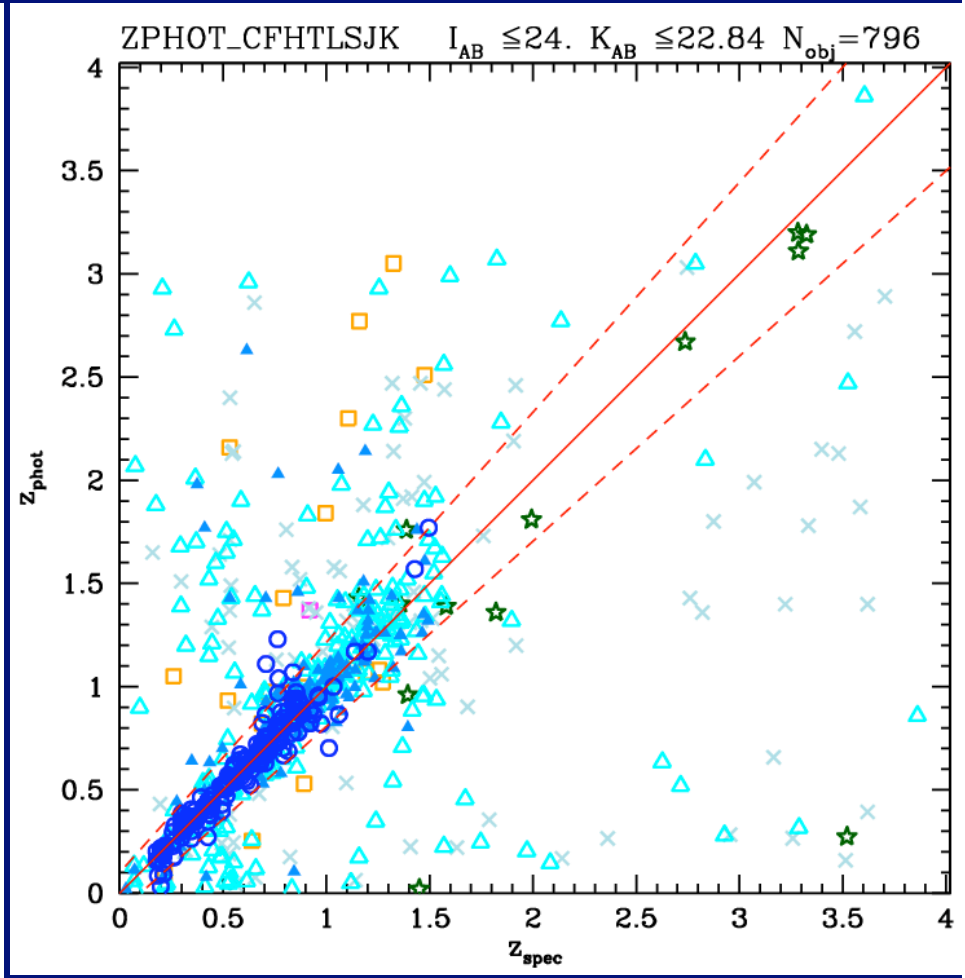
K-selected photometric sample:



204 candidate stars from different methods

K-sample: zspec vs. zphot

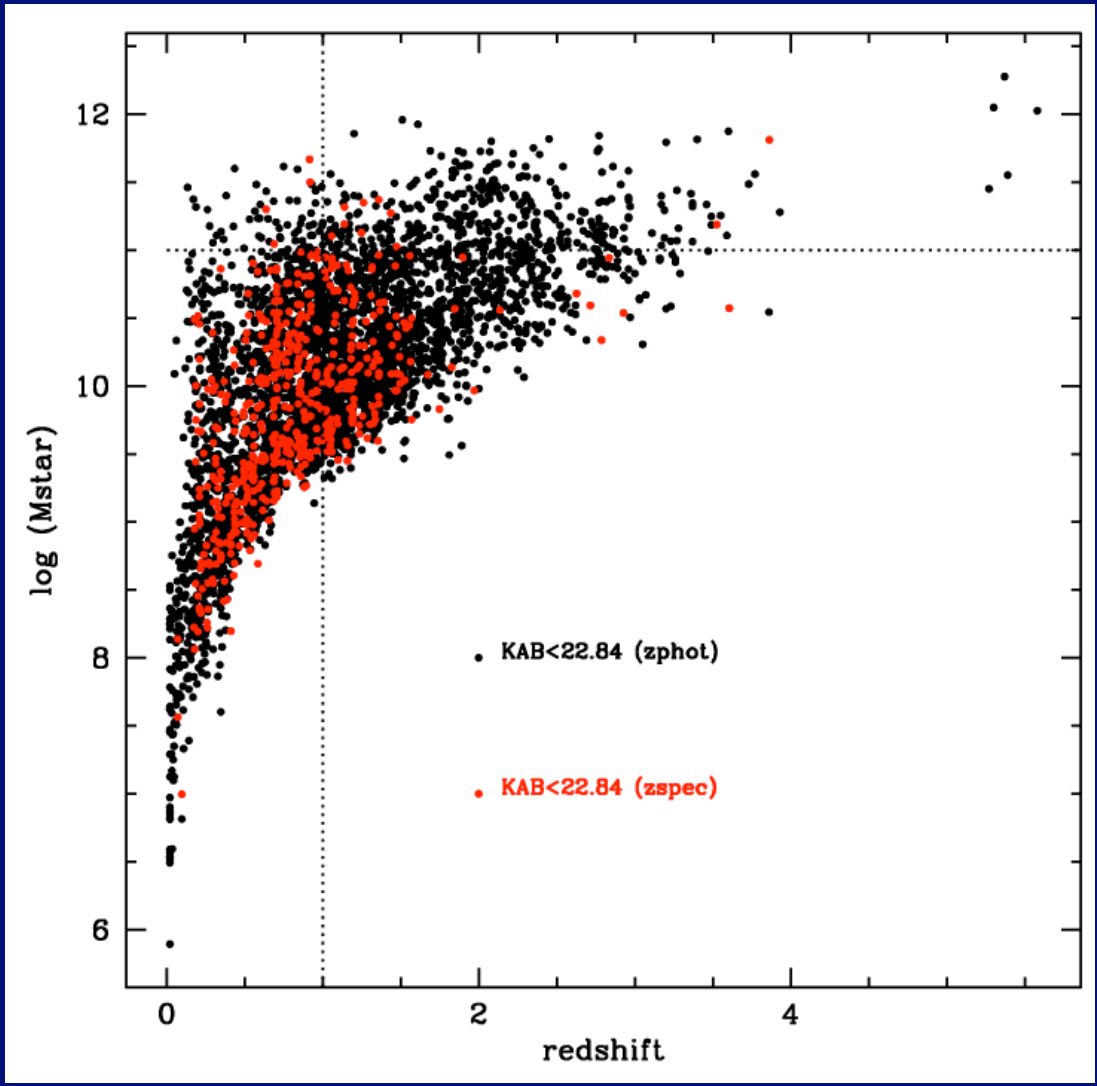




➔ Very good z-photo up to I_{AB}<23

VVDS K-sample: Mstar vs. z

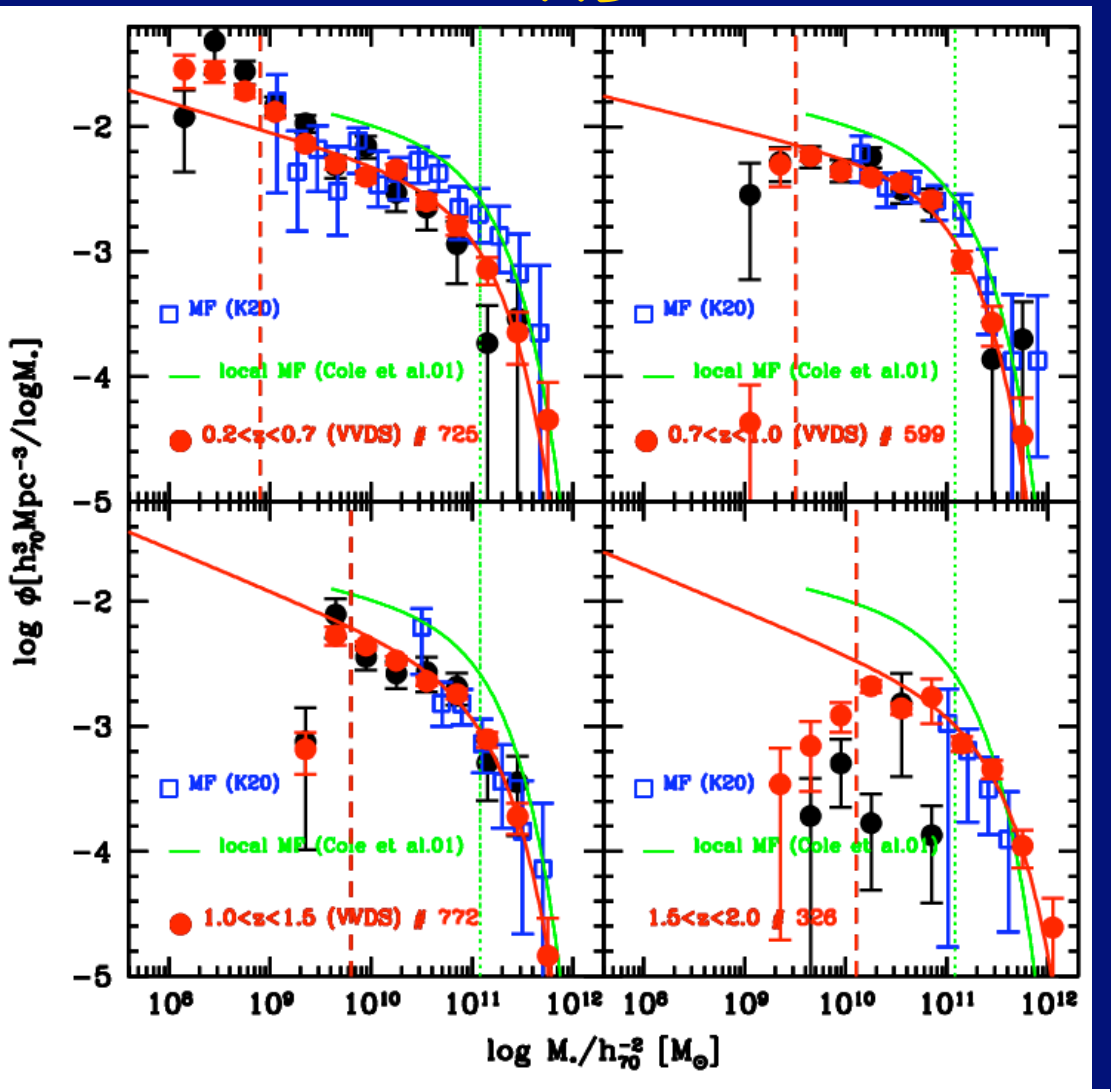
- K-selected photometric sample: 3484 galaxies



➔ Massive (>10^{11} solar masses) galaxies at z>1 !!

VVDS: Mass Function: $K_{AB}<22.84$

- Good agreement between **photometric** and **spectroscopic** sample, except at z>1.5
- Good agreement with K20 results BUT extended 1 mag. fainter, i.e. to lower Masses limit



- **Small decrease of massive gal. at high-z**
- **Faster evolution of less massive galaxies**

I-selected spectroscopic sample:

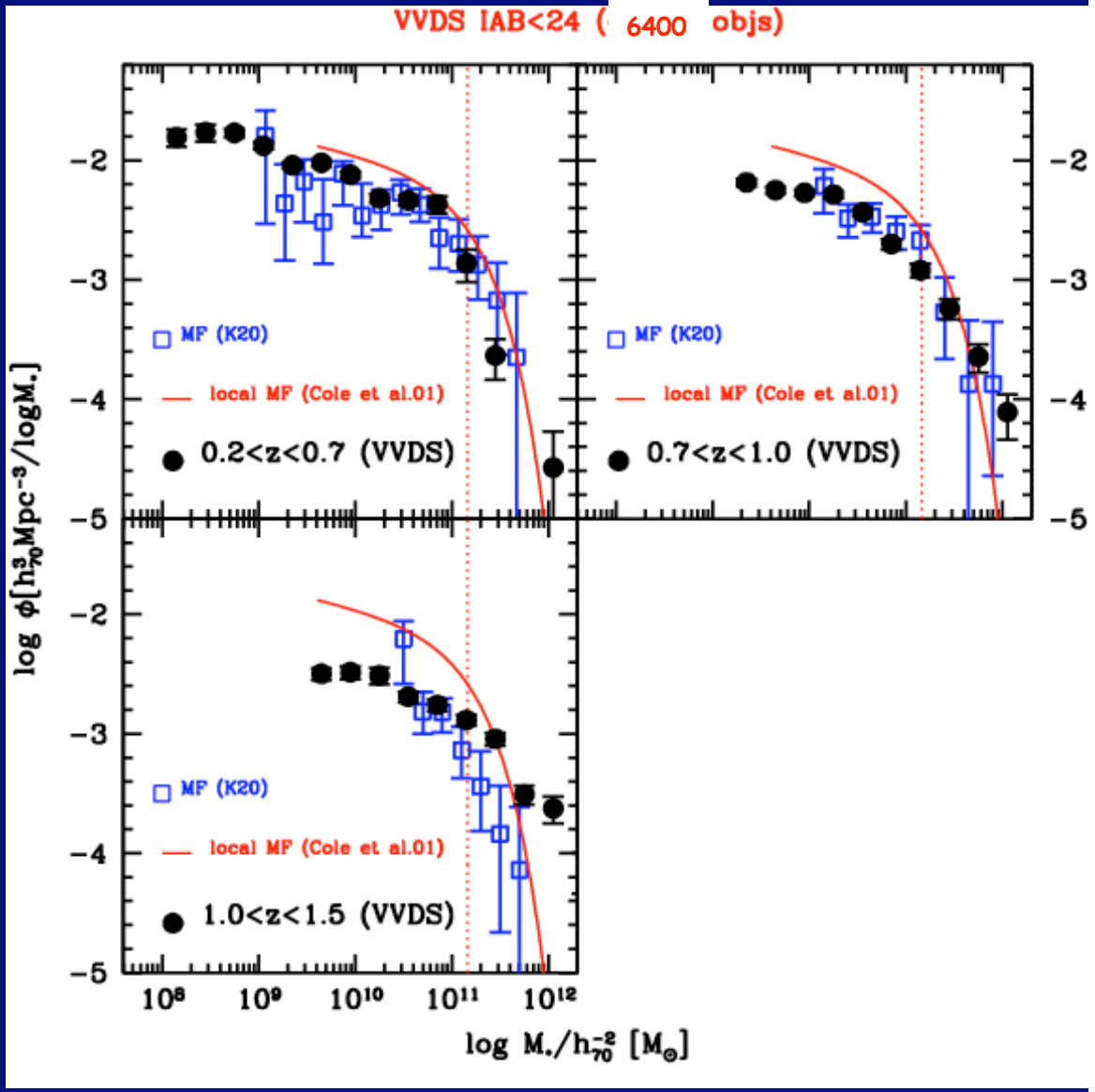
$I_{AB}<24$

N ~ 6400 gals

(flag=2,3,4,9)

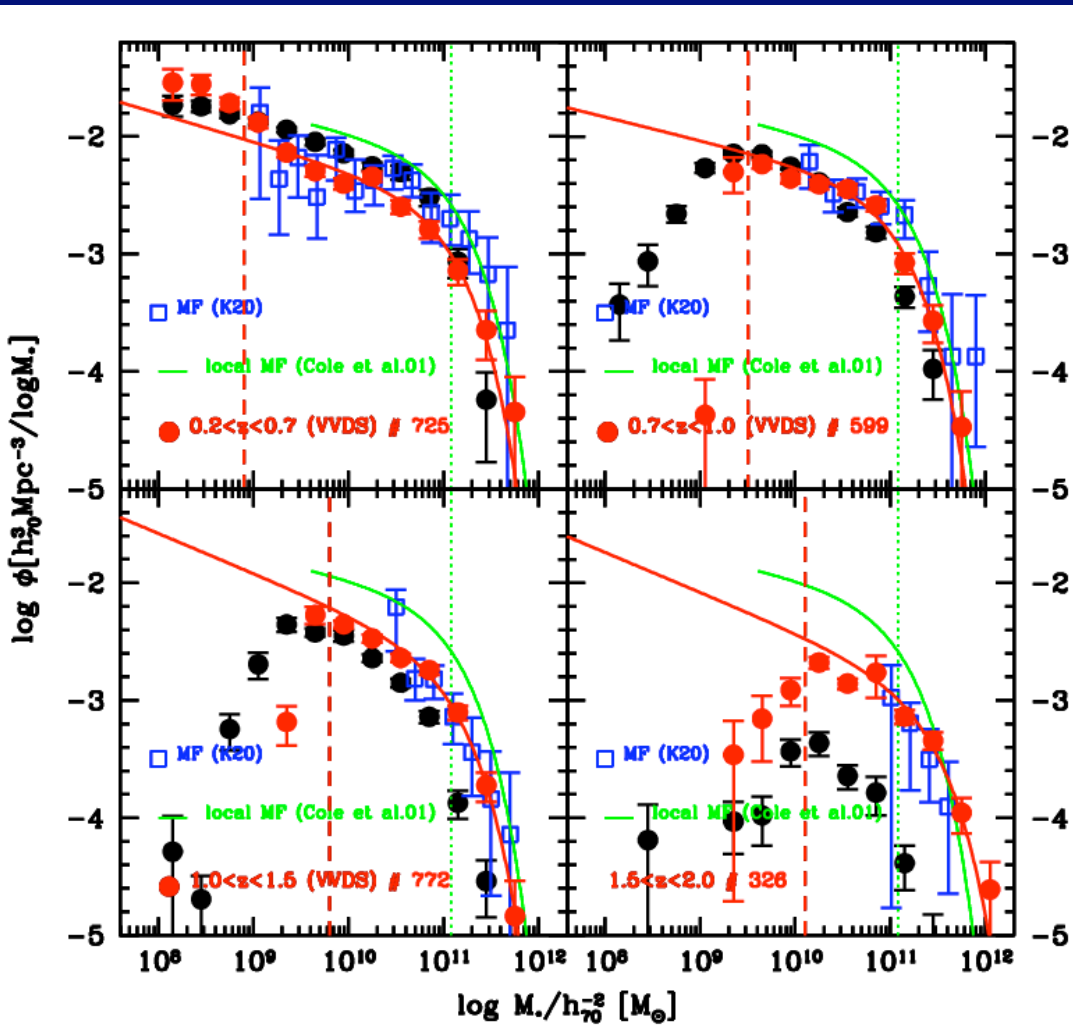
Area~1750 arcmin^2

- Good agreement up to redshift~1
- Overestimate MF at high-z and high-masses



Mass Function: $I_{AB}<24$

- Masses from UBVRIJK+spectrum (by PF)
- Good agreement between **photometric** and **spectrophotometric** MF up to z<1
- Underestimate massive-end of MF at z>1

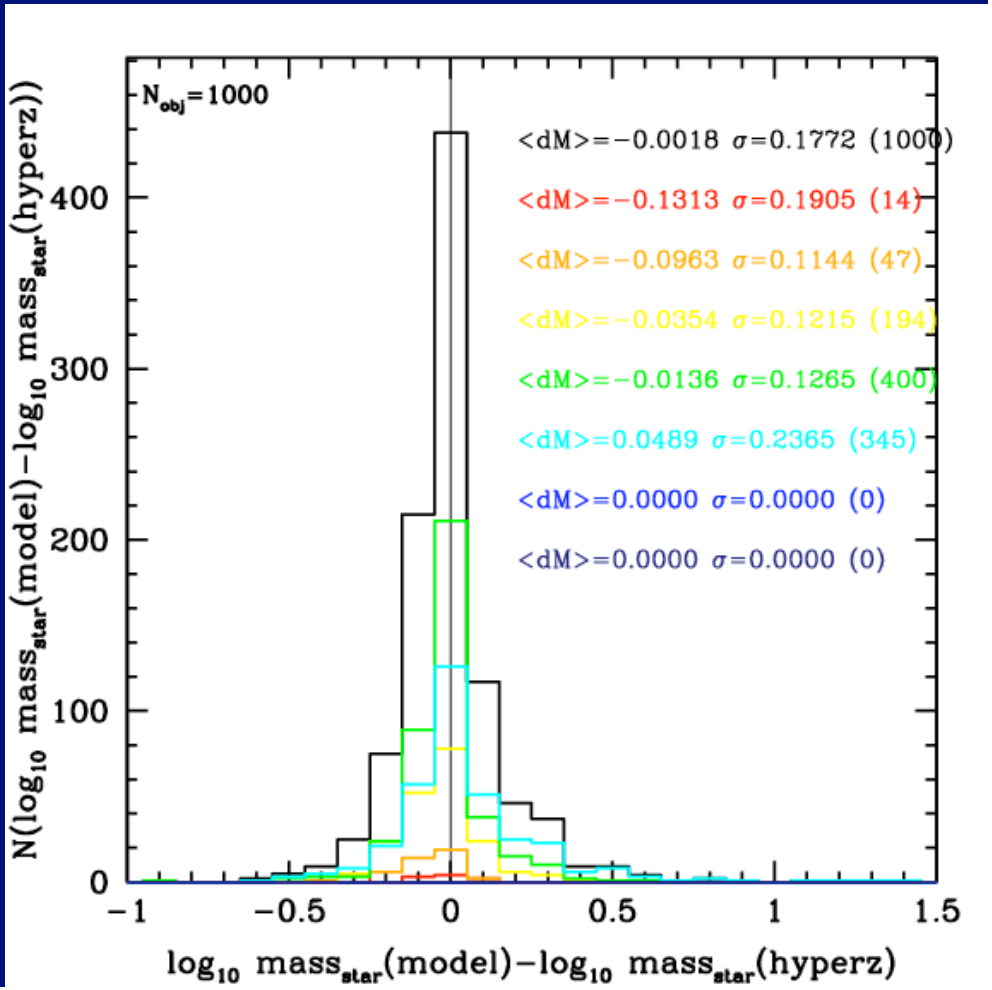


Simulations: VVDS+SWIRE

Adding SPITZER-IRAC bands (3.6,4.5,5.8, 8 micron) when (1+z)>IRAC/(2.2micron) (now 4 micron)

i.e. z > 0.55,0.96,1.47,2.46 add 3.6,4.5, 5.8, 8 micron

- ➔No systematic shift
- ➔Dispersion decreases
- ➔Uncertanties decrease (within less than a factor 1.5)
- ➔Can be used up to high-z



VVDS spectroscopic sample

I-selected spectroscopic sample

Using only optical photometry➔ Mstar to z<1

I_{AB}<24 N ~ 6400 gals (zflag=2,3,4,9)

Area~1750 arcmin^2

VVDS+SWIRE spectroscopic sample

I-selected spectroscopic sample

Using optical+Swire photometry➔ Mstar to z<1.5

I_{AB}<24

N ~ 6400 gals (zflag=2,3,4,9) ~3000 with swire

Area~1750 arcmin^2

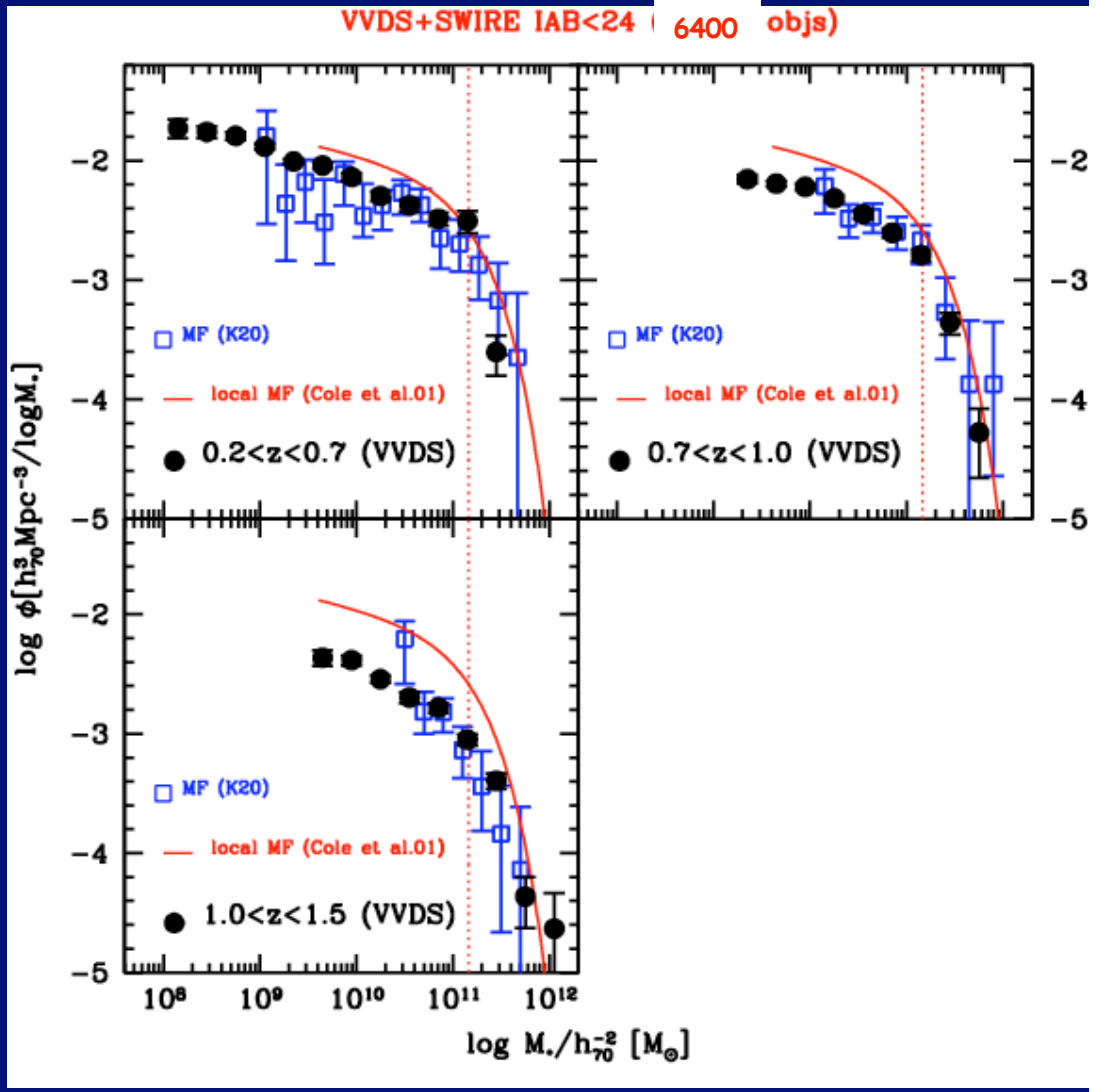
VVDS+SWIRE I_{AB} spectroscopic sample: Preliminary Mass Function

Using I-selected spectroscopic catalog (flags 2,3,4,9):

I_{AB}<24

(VVDS+LS+SWIRE)

N ~ 6400 gal.



VVDS+SWIRE sample

Next step:

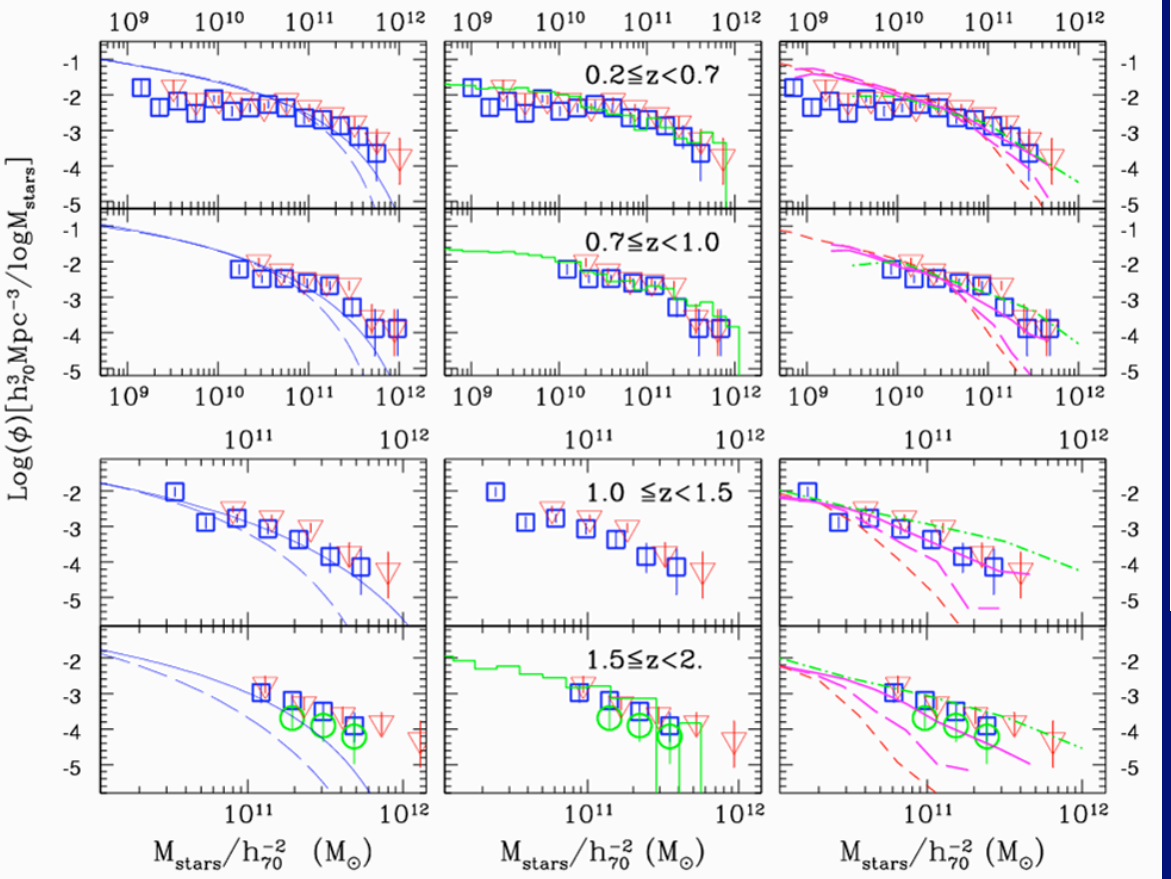
Extend to higher redshifts (z>1.5) using a SWIRE selected sample and photometric redshifts

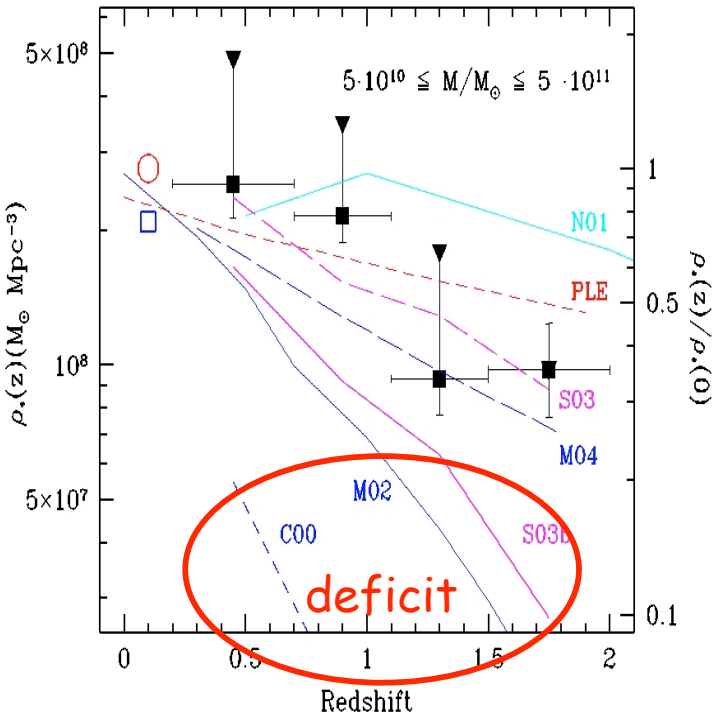
(define a swire complete sample, well tested zphoto, star/QSO contamination)

K20 MASS FUNCTION

Stellar Mass Function up to z~2

(Fontana, Pozzetti, al. 04) :





Most of current hierarchical merging models do not match the above results BUT Hydrodinamical simulations match !!