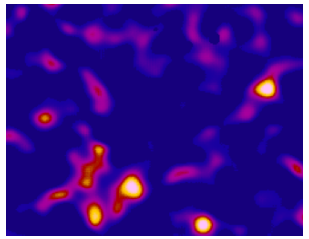
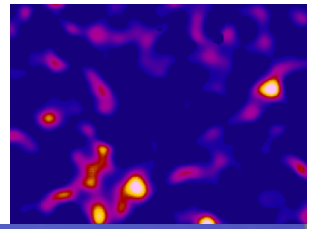


CFHTLenS

Tom Kitching (cosmology WG coord)

On behalf of the CFHTLenS Consortium
(PIs: Heymans, van Waerbeke)

The Survey



- The state-of-the-art cosmological survey with 155 sq degrees, ugriz to i<24.7 (7σ extended source)
- Uses 5 yrs of data from the Deep, Wide and Pre-survey components of the CFHT Legacy Survey

High resolution: 17 gals per sq arcmin

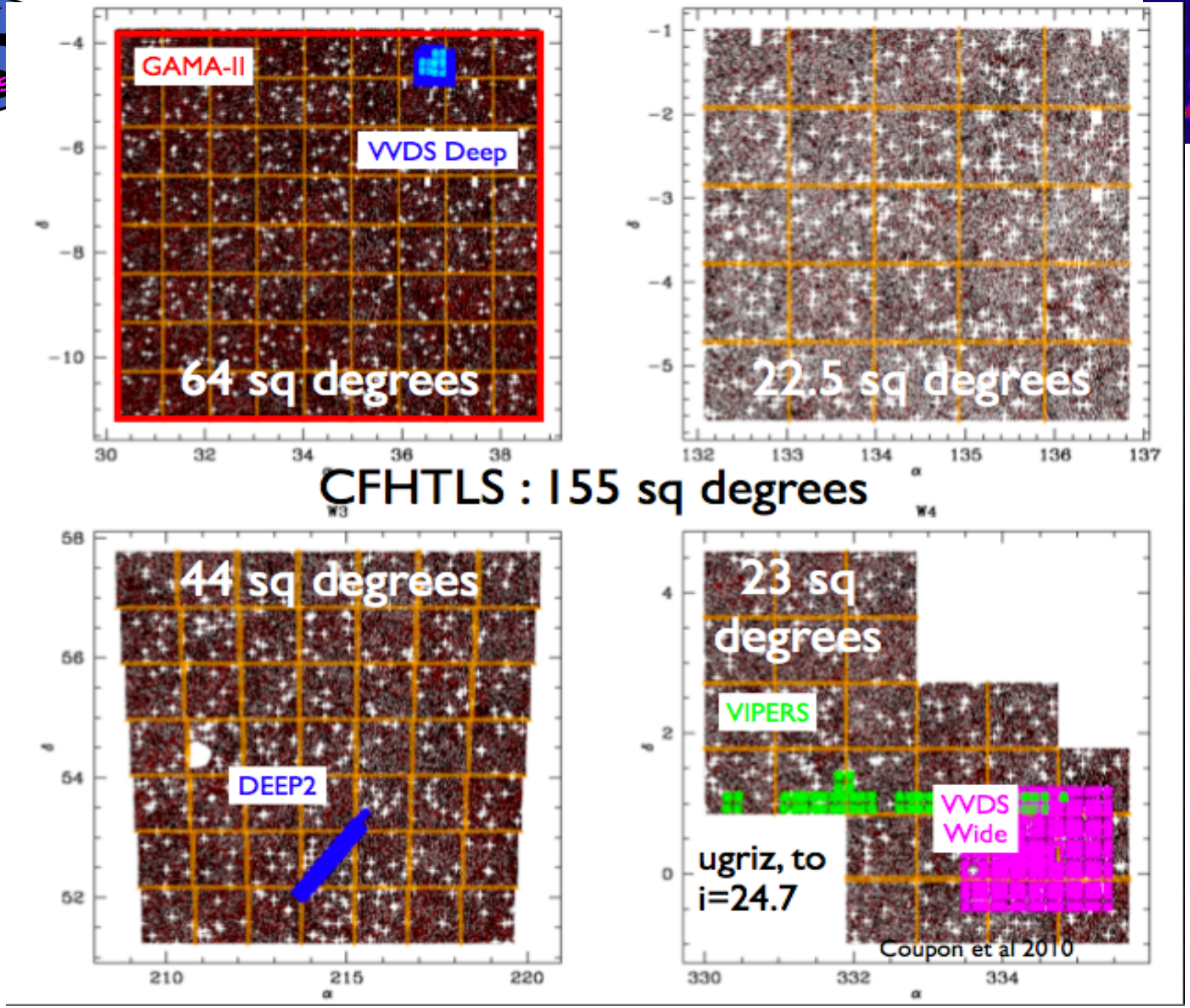
Deep imaging: $z_m = 0.75$

Accurate redshifts: $\sigma_z = 0.04(1+z)$ with 4% outliers

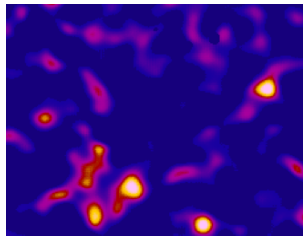
Accurate shear: calibration corrections

<m> = - 0.007 <c> = 0.001

Robust to systematic errors: 80% of the data used


GAMA-II
VVDS Deep
64 sq degrees
22.5 sq degrees
CFHTLS : 155 sq degrees
44 sq degrees
DEEP2
23 sq degrees
VIPERS
VVDS Wide
ugriz, to i=24.7
Coupon et al 2010

The CFHTLenS Team



A survey an order of magnitude larger than anything before requires an analysis an order of magnitude better than anything before

UBC
L. Van Waerbeke (PI) Clusters
J. Benjamin
M. Milkeraitis
S. Vafaei

Waterloo
M Hudson
B. Gillis

Oxford
L. Miller

Edinburgh
C. Heymans (PI)
T. Kitching Cosmo
E. Grocutt

Bonn
T. Erben
K. Holhjem
P. Simon

Naples
L. Fu

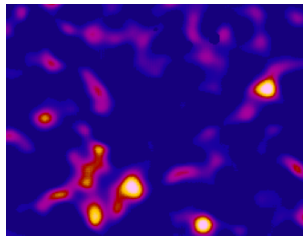
IAP
Y. Mellier
C. Bonnett G-G
R. Gavazzi

Munich
M. Kilbinger

Tohoku
J. Coupon

Leiden
H. Hildebrandt
H. Hoekstra
K. Kuijken
T. Schrabback
M. Velander
E. van Uitert
M. Smit

JPL/Caltech
B. Rowe



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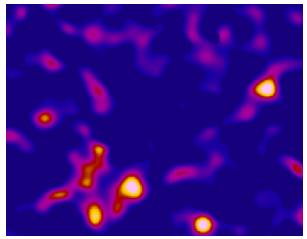
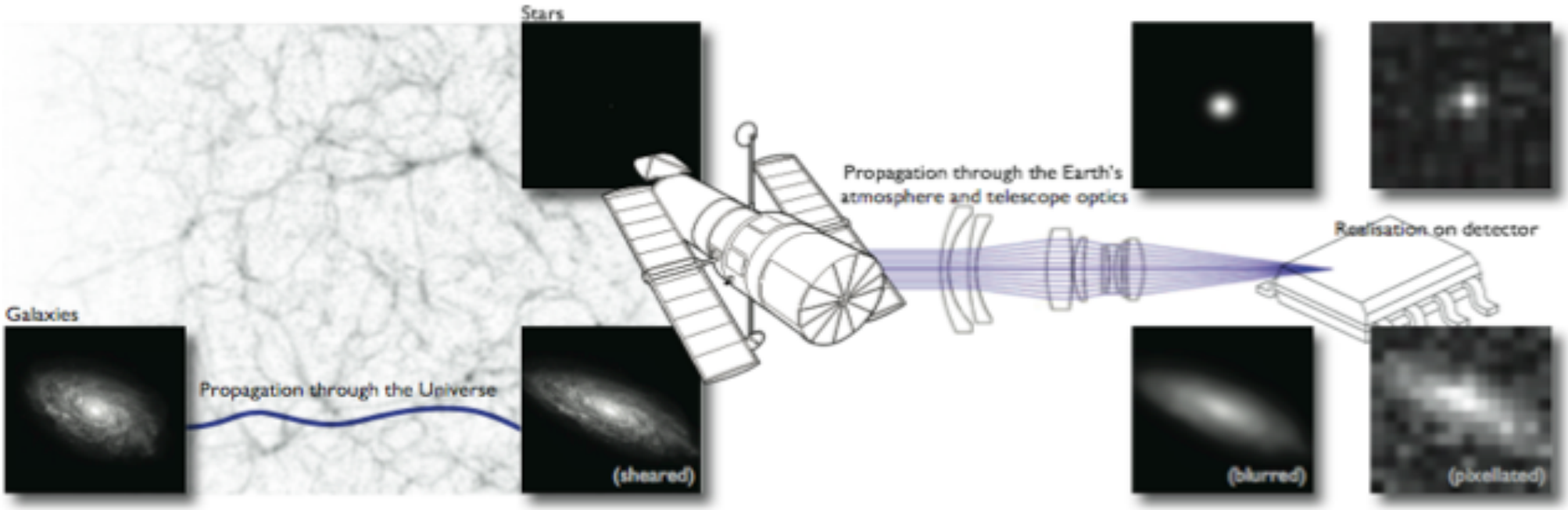
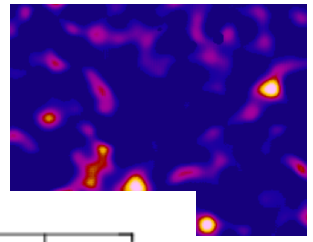


Shear Measurement



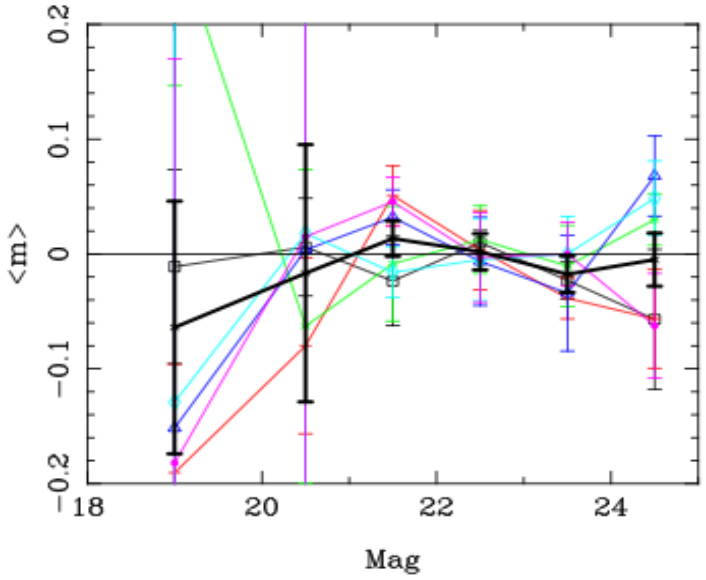
From GREAT10 Handbook, Kitching et al., 2011

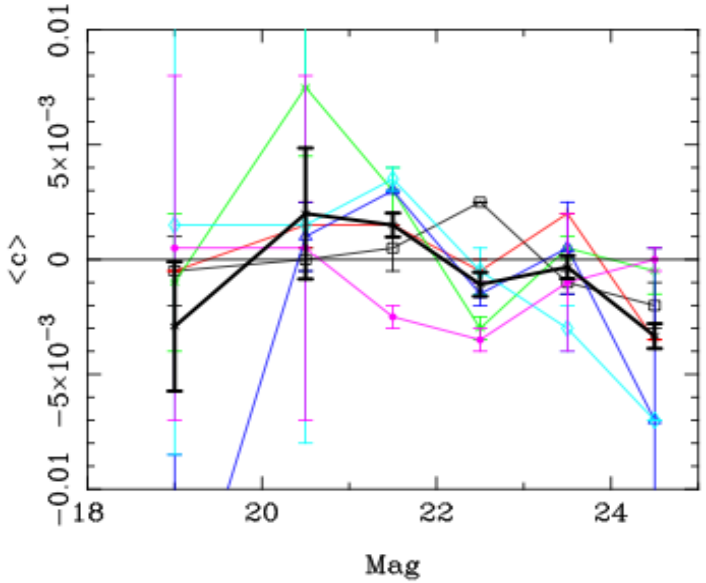
Shear Measurement

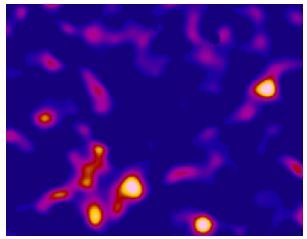


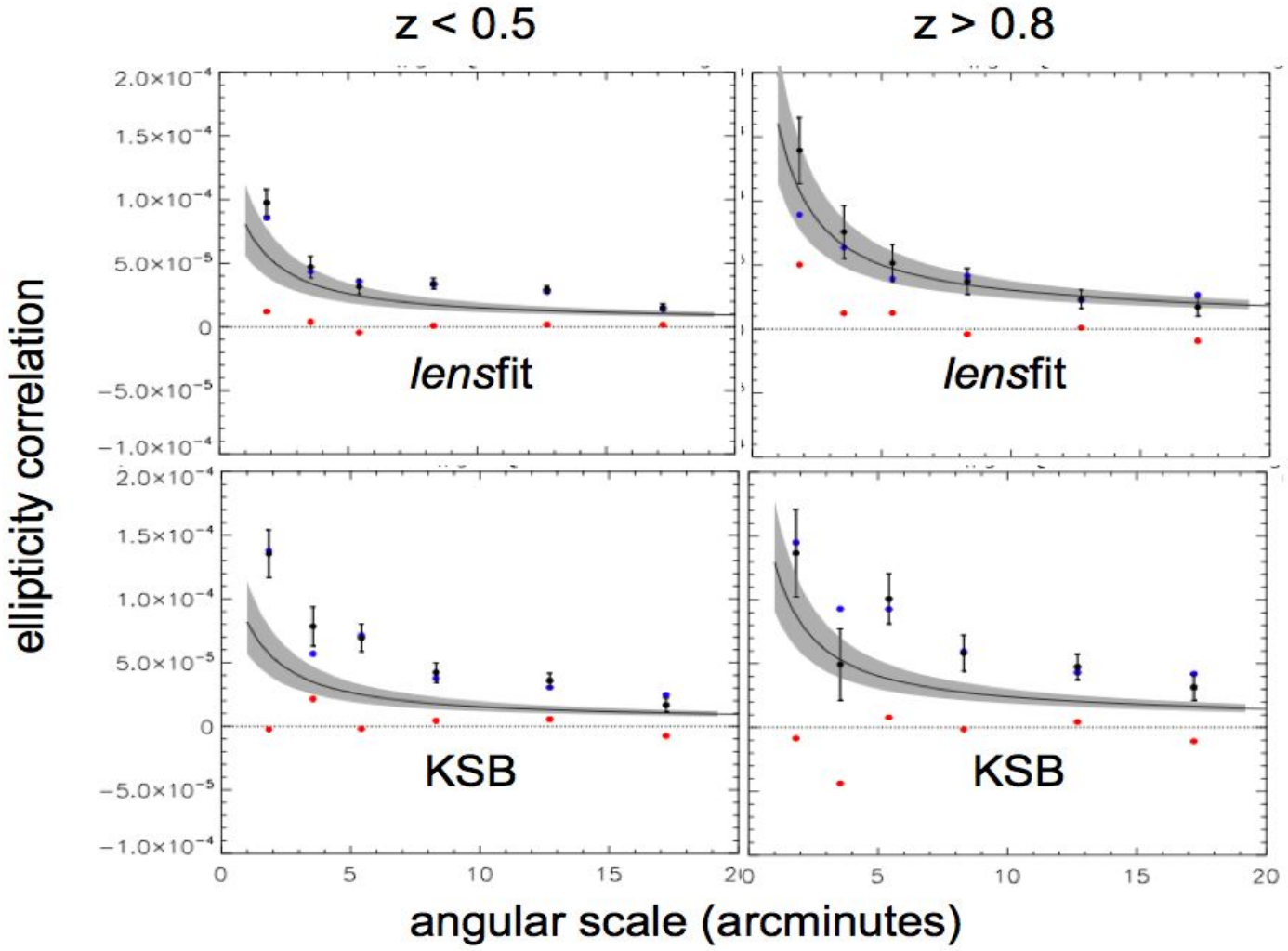
Reference: Miller et al 2007, Kitching et al 2008,

- Multiple shape measurement methods tested (KSB, Shapelets, Lensfit).
- Lensfit, a Bayesian model fitting method (LM/TK), was the only method to pass the redshift-scaling tests and systematics tests in more than 25% fields (currently >80% of fields pass tests)
- No significant systematics at level required for CFHTLenS
  - No magnitude dependence

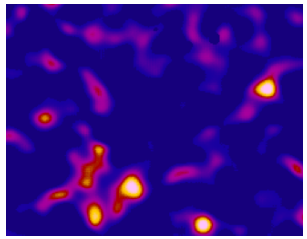




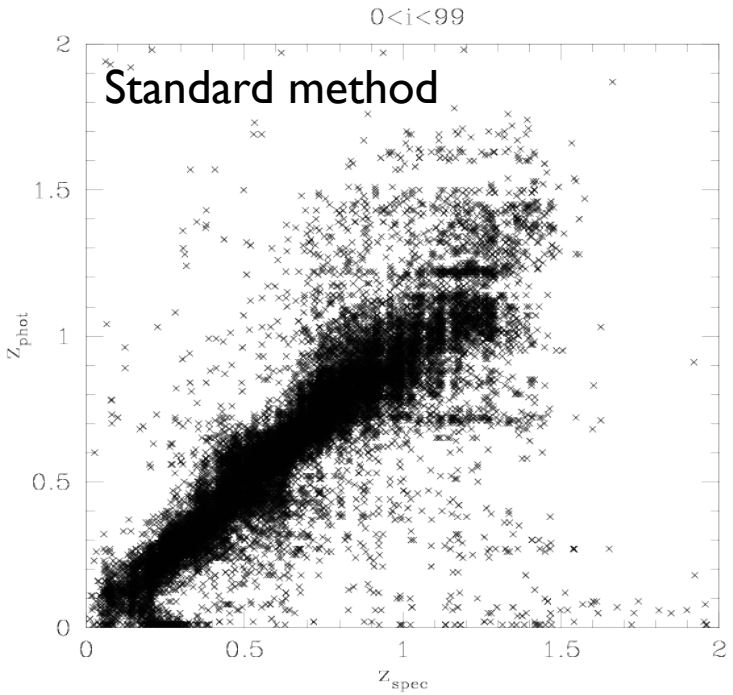


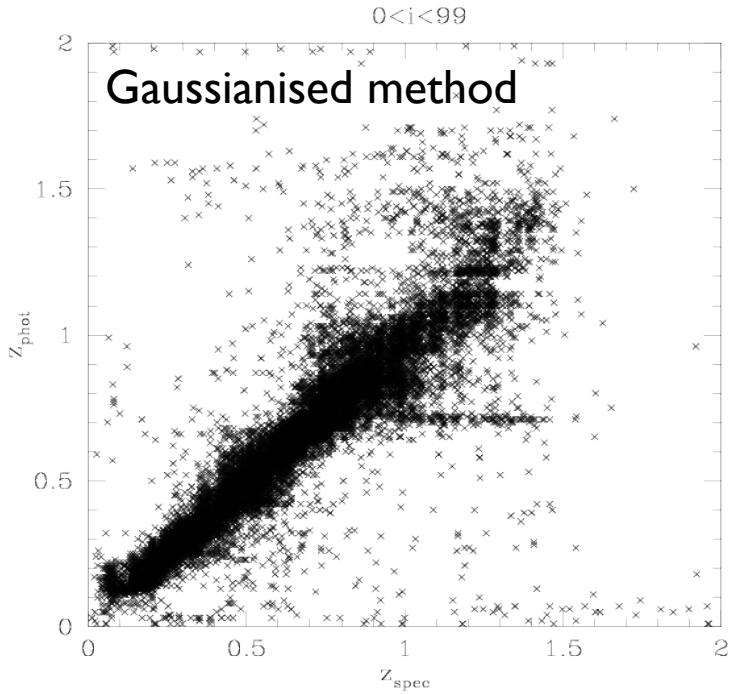

z < 0.5
z > 0.8
ellipticity correlation
lensfit
lensfit
KSB
KSB
angular scale (arcminutes)

Photometric Redshifts

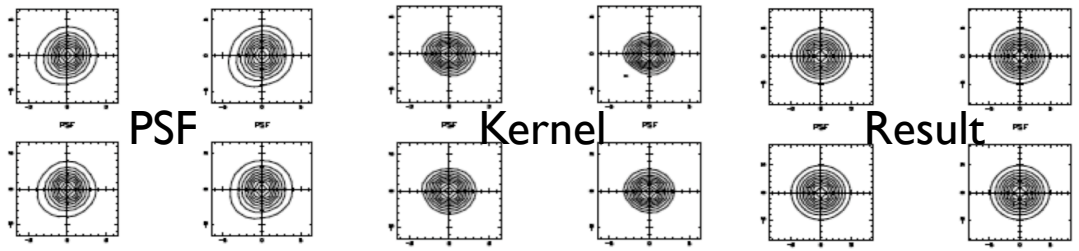


Bayesian Photometric Redshift Code BPZ with
Gaussianisation of individual exposures to measure photometry

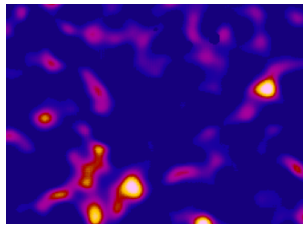


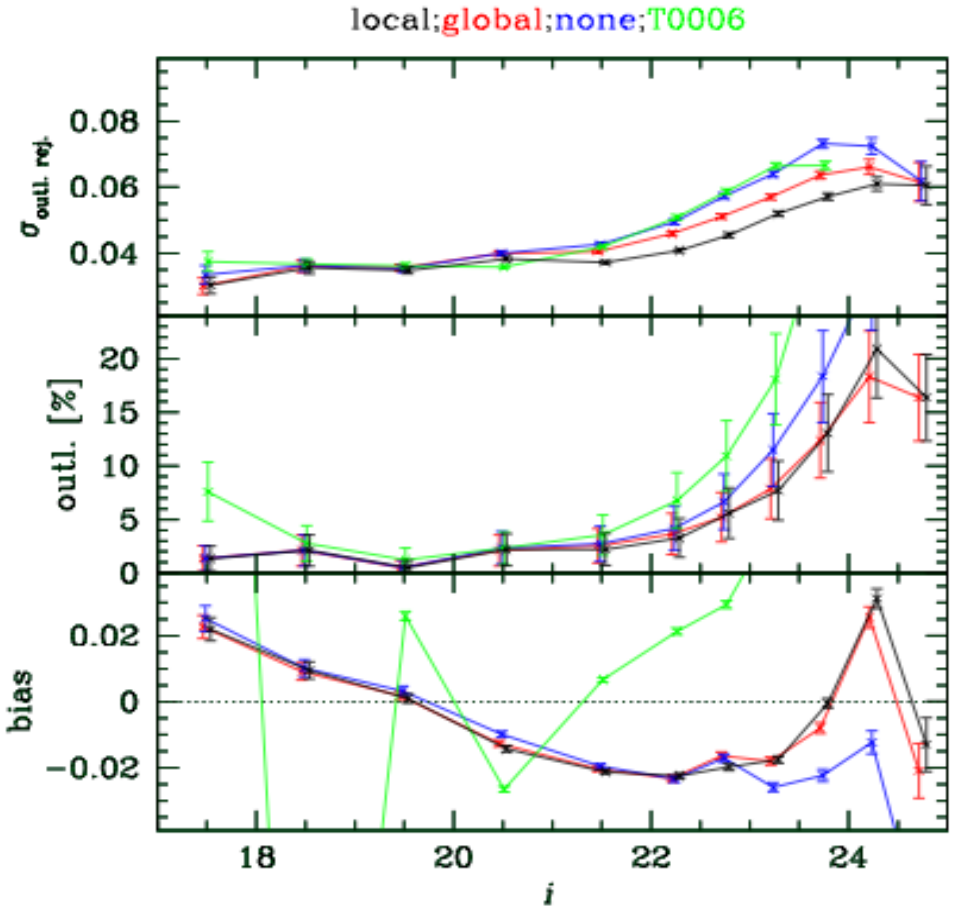


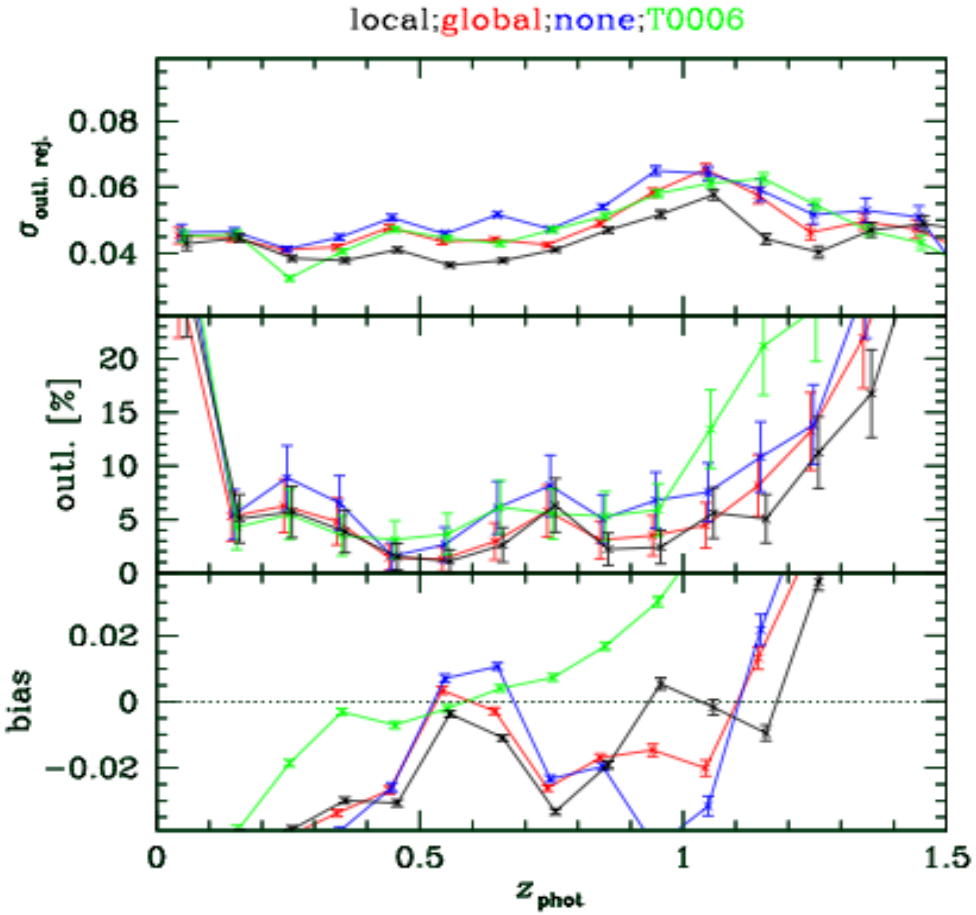
Reference: Kuijken 2008,
Hildebrandt et al 2009



Photometric Redshifts

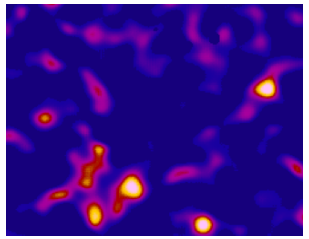




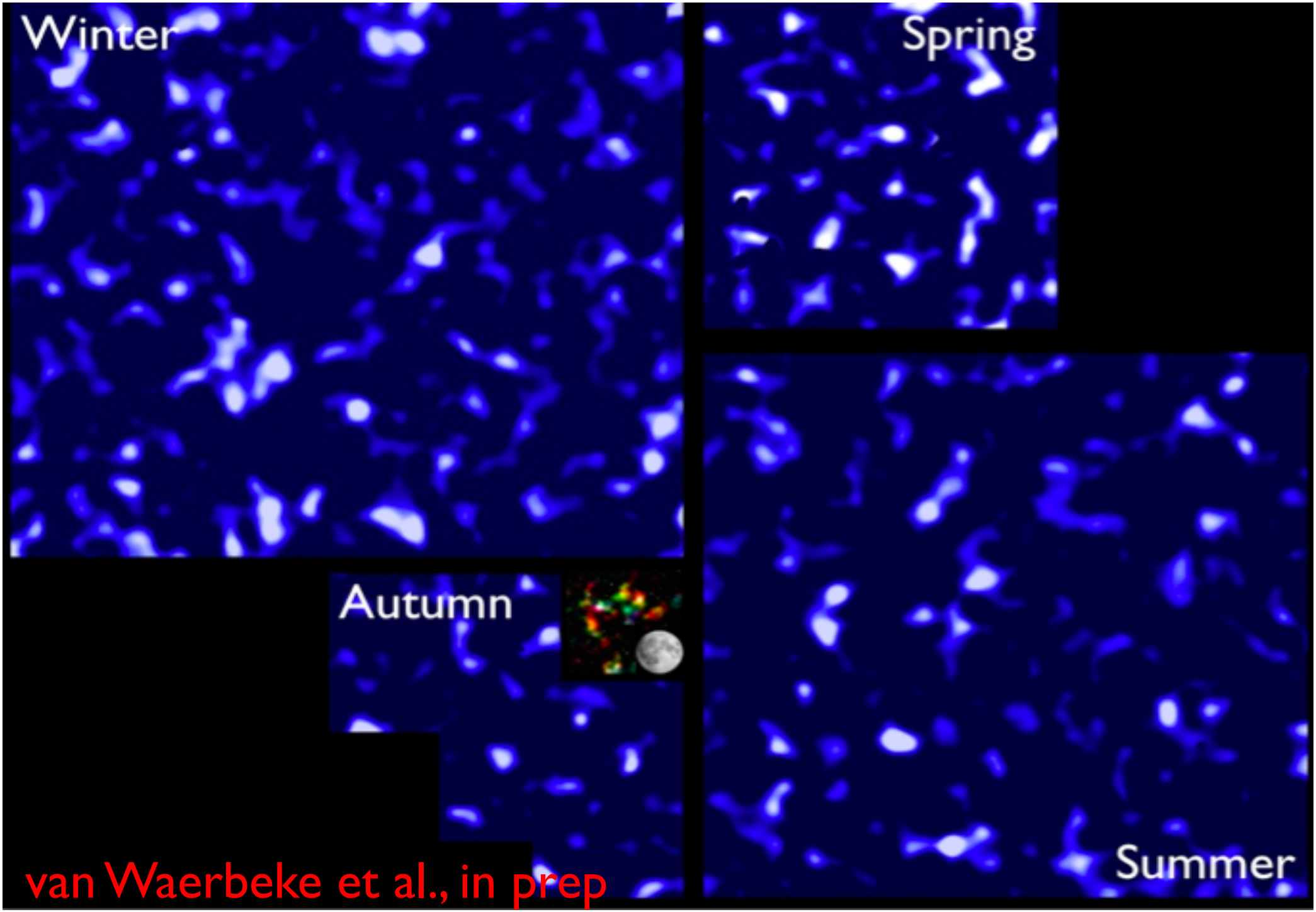


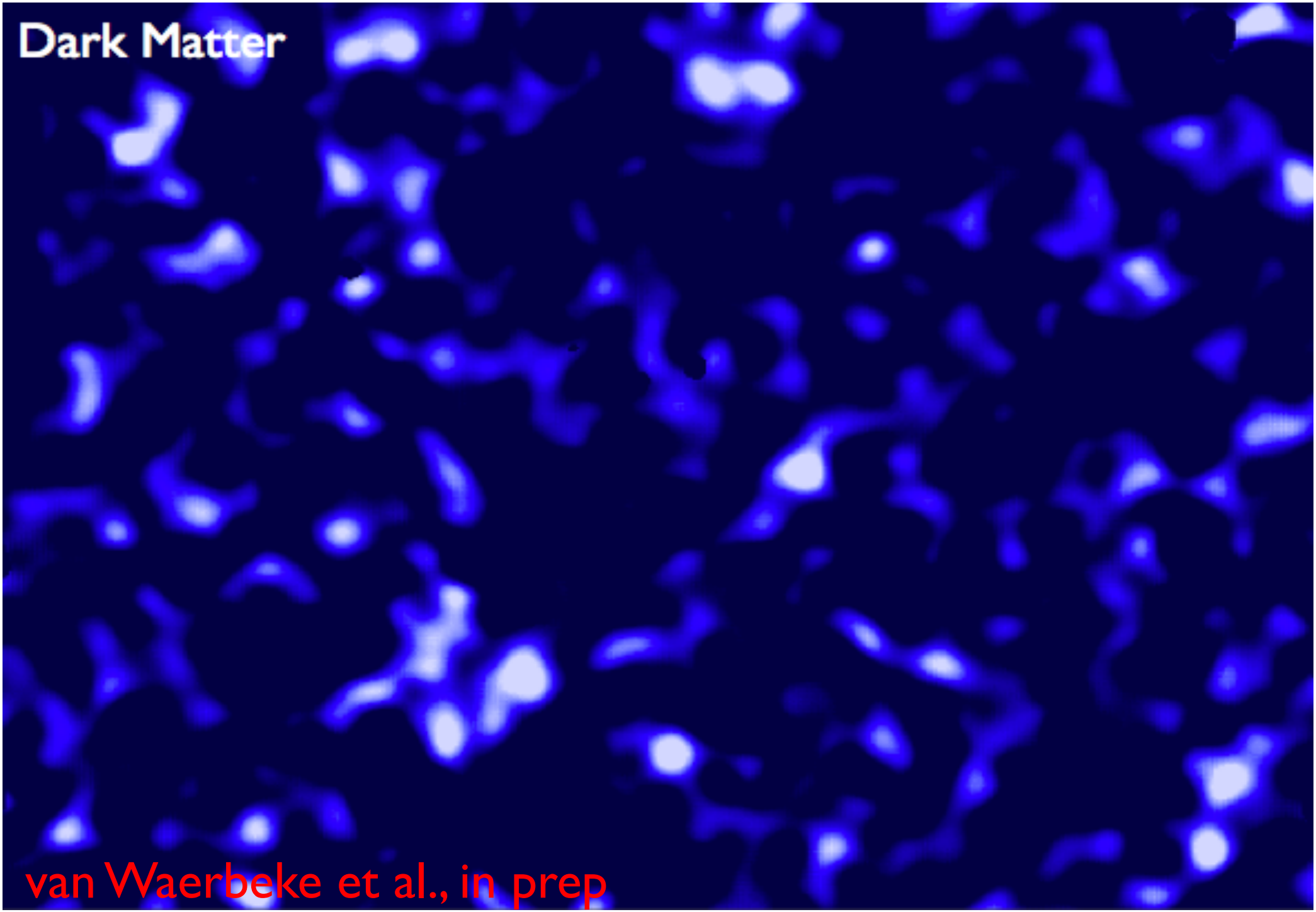
- Individual posterior p(z) used for science analysis

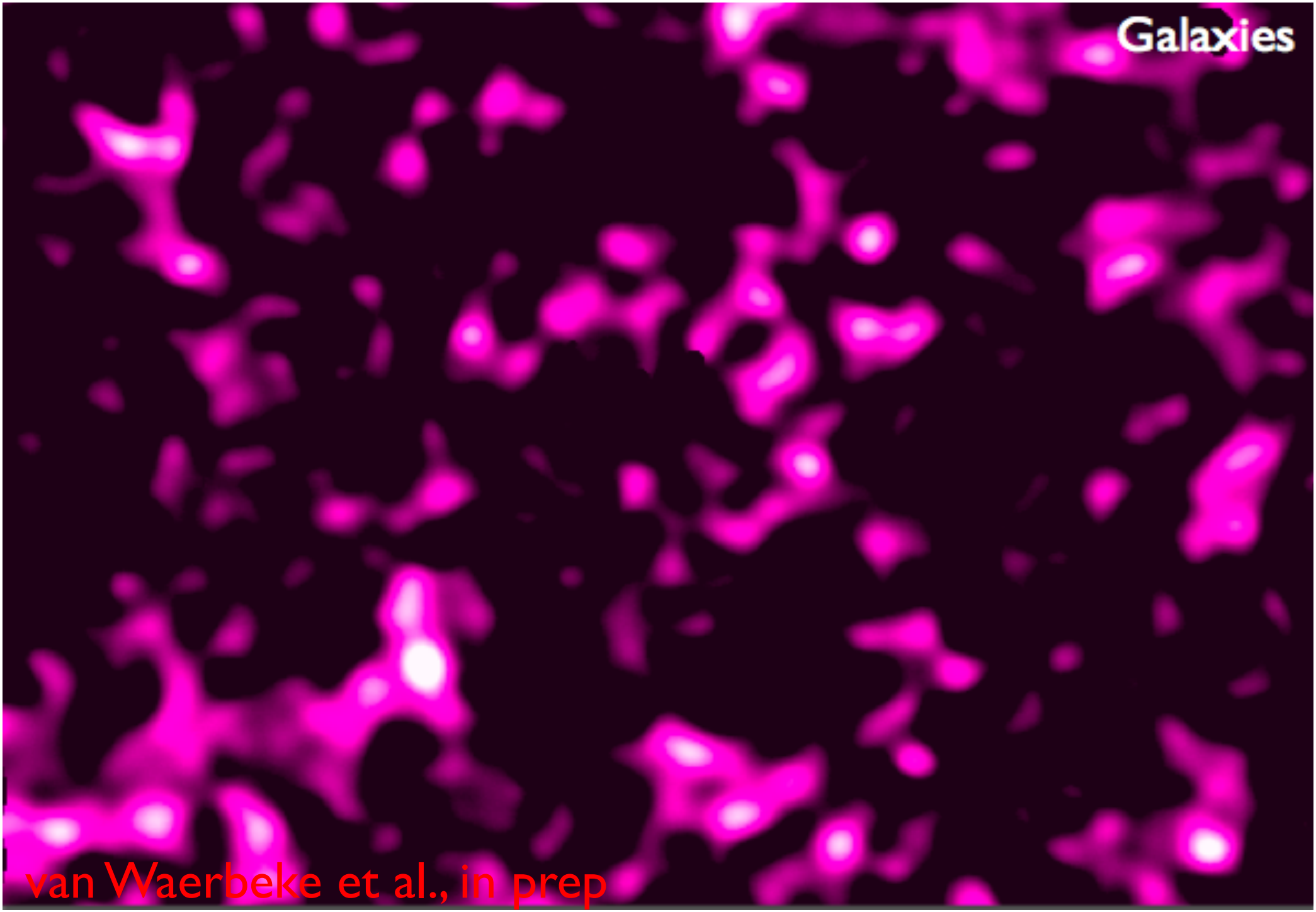
Science!

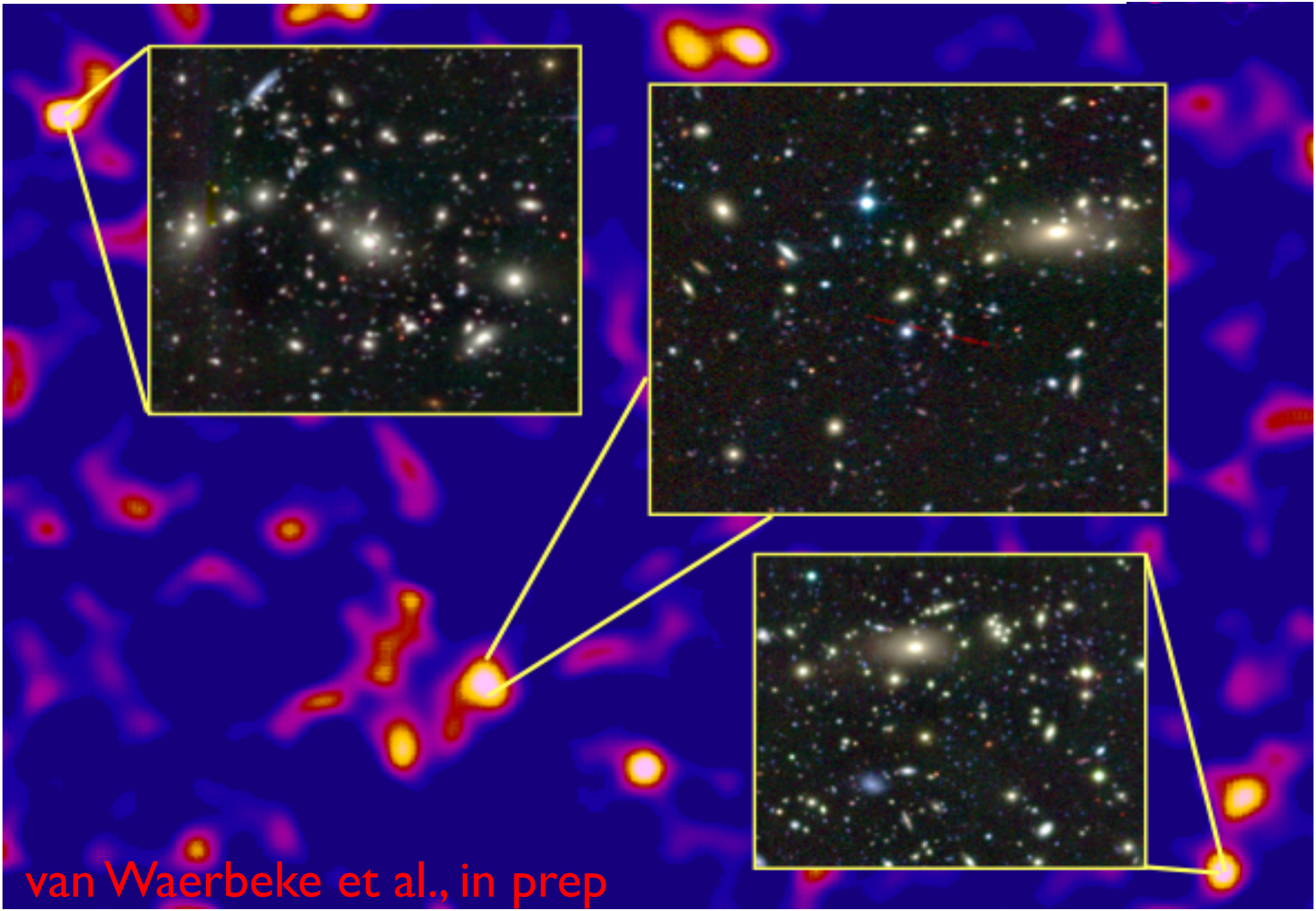


- Mass Maps van Waerbeke et al., in prep
- Testing Gravity Simpson et al., in prep

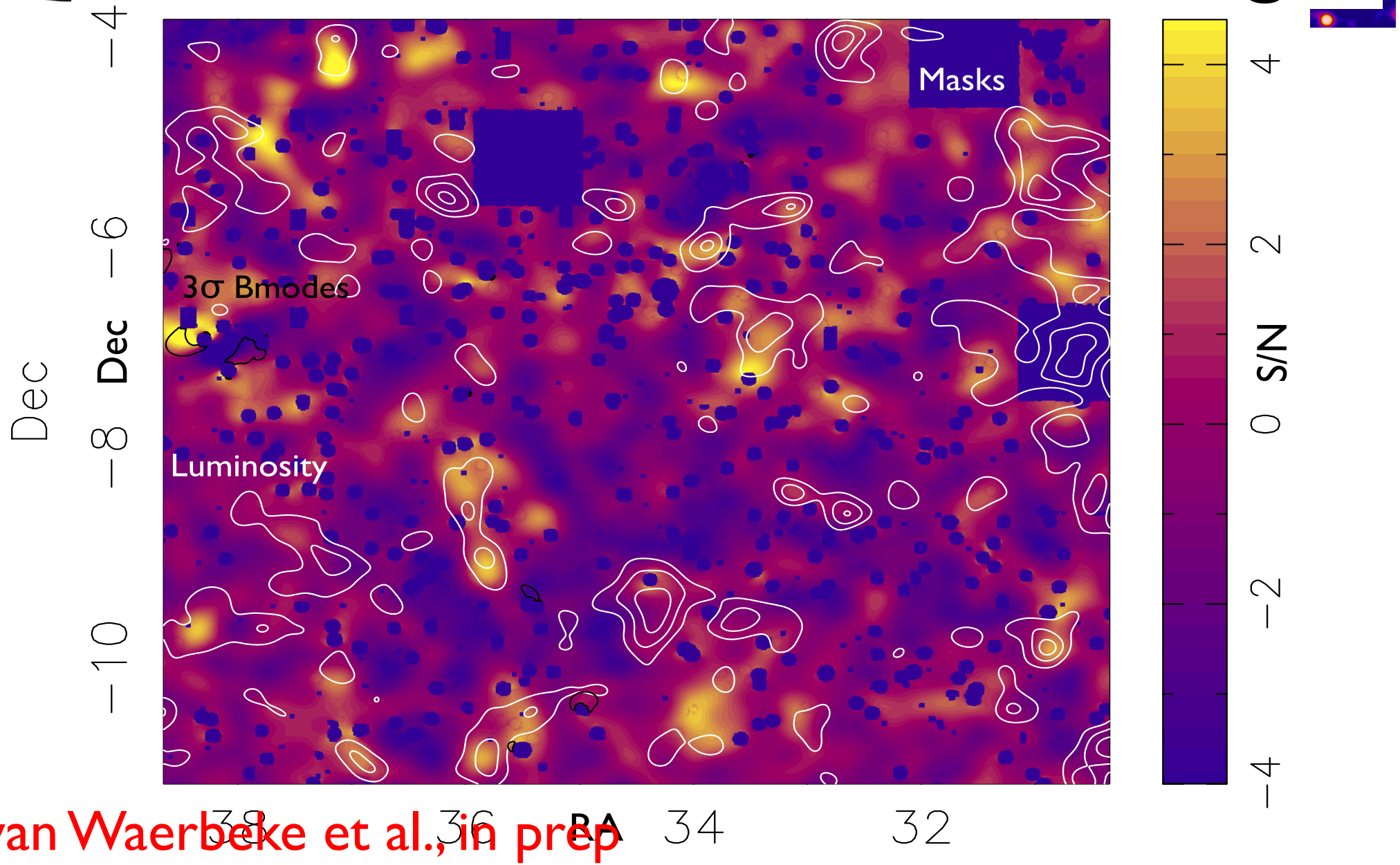

Winter
Spring
Autumn
Summer
van Waerbeke et al., in prep


Dark Matter
van Waerbeke et al., in prep


Galaxies
van Waerbeke et al., in prep

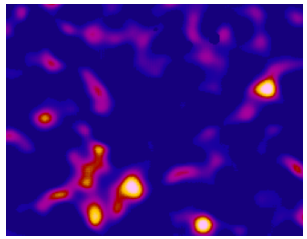

van Waerbeke et al., in prep

W1 Mass and Light

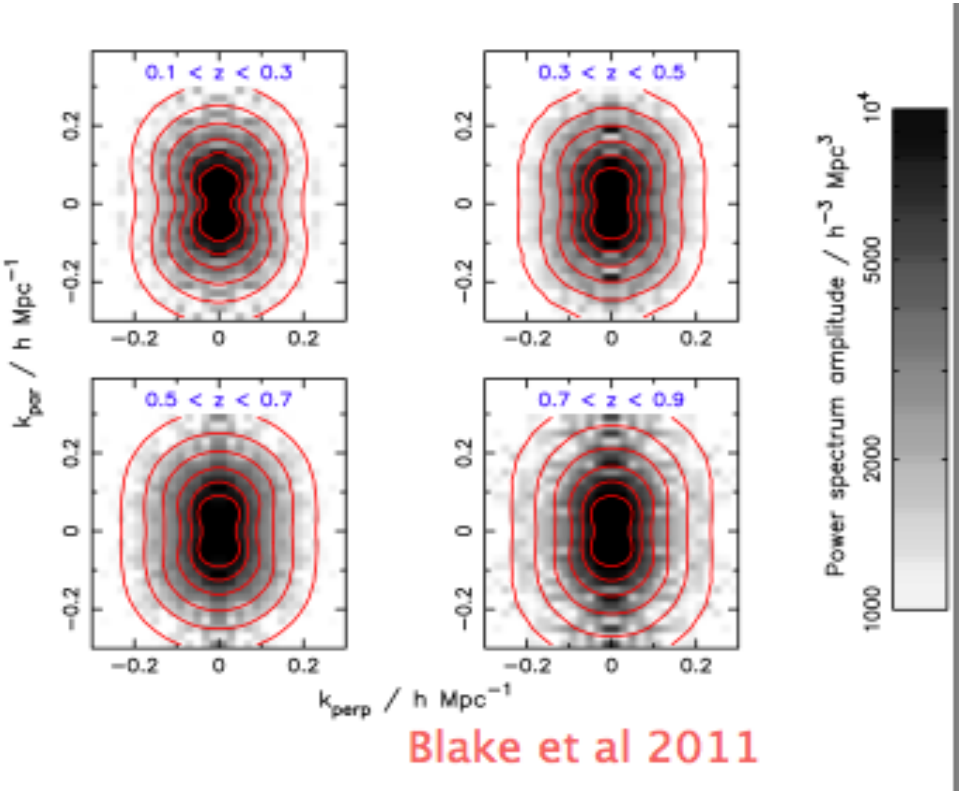


van Waerbeke et al., in prep

Testing Gravity

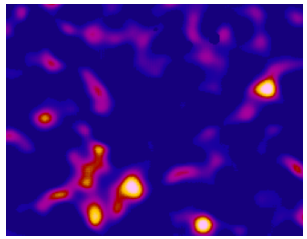


- CFHTLenS **Cosmic Shear**
  - Two-point correlation function o the shear field
  - Two redshift bins; $1 < \theta < 100$ arcmin
- WiggleZ Redshift Space Distortions (Blake et al. 2011)
  - WMAP7 (l >100) (no ISW)
  - H_0=73.8 ± 0.024 kms^{-1} Mpc^{-1} (Riess et al. 2011)
- Utilise CosmoPMC, MGCAMB, WMAP Likelihood, CosmoloGUI



Simpson et al. in prep

Testing Gravity



$$ds^2 = -(1+2\varphi)dt^2 + (1-2\phi)a^2 d\vec{x}^2$$

- Potential experienced by galaxies :

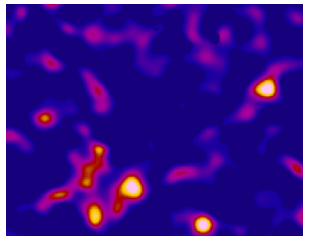
$$\nabla^2\varphi = 4\pi G a^2 \bar{\rho}\delta\left[1+\mu\right] \qquad \mu(a) \propto \Omega_\Lambda(a)$$

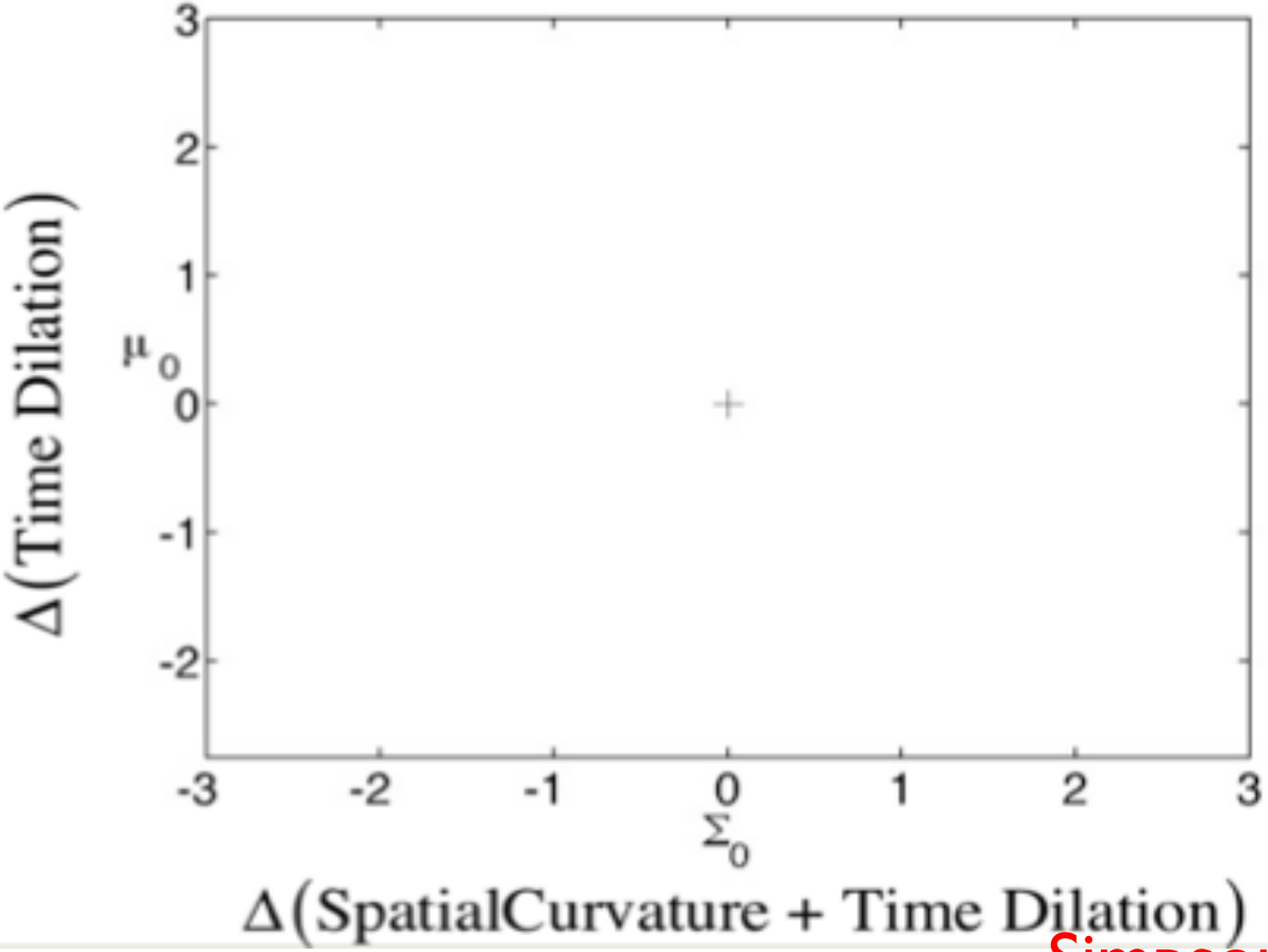
- Potential experienced by photons (lensing)

$$\nabla^2(\varphi+\phi) = 8\pi G a^2 \bar{\rho}\delta\left[1+\Sigma\right] \quad \Sigma(a) \propto \Omega_\Lambda(a)$$

Simpson et al. in prep

Testing Gravity





Simpson et al. in prep

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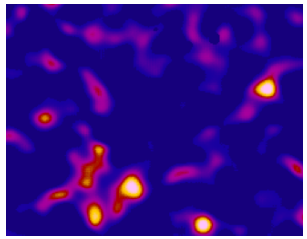
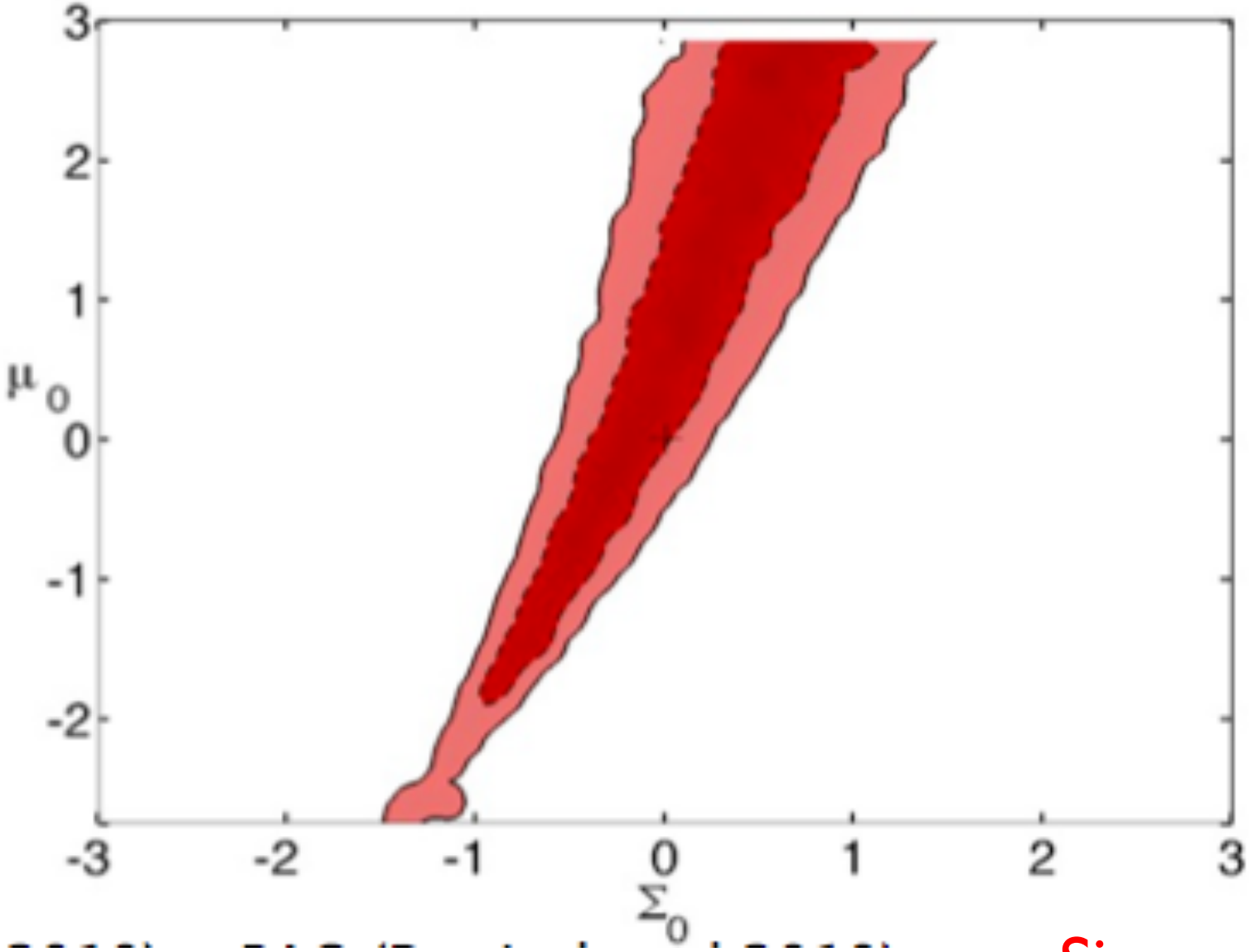
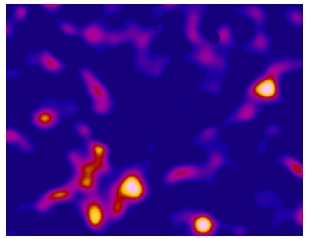


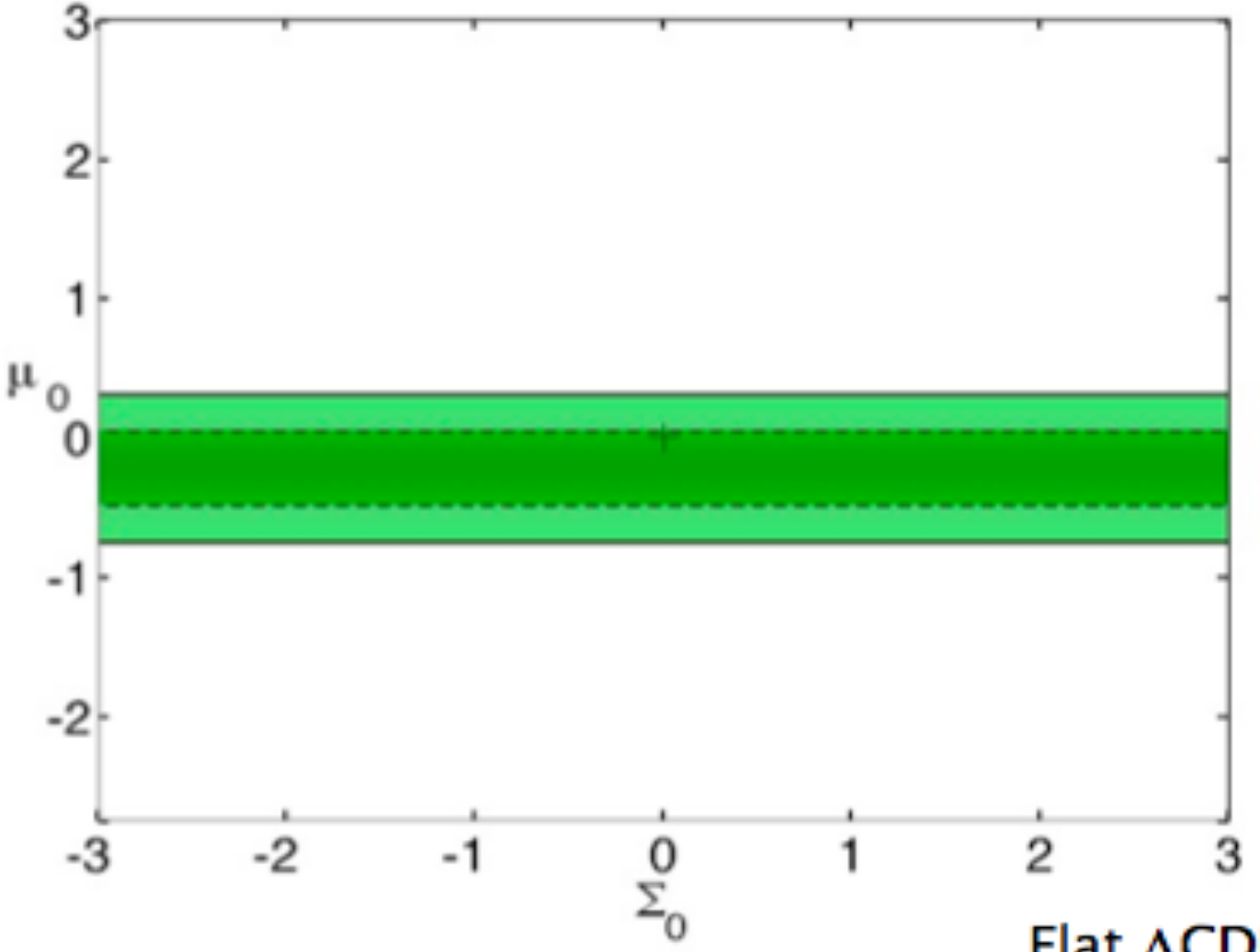


E_G (Reyes et al 2010) + BAO (Percival et al 2010) Flat ΛCDM

Simpson et al. in prep

Testing Gravity

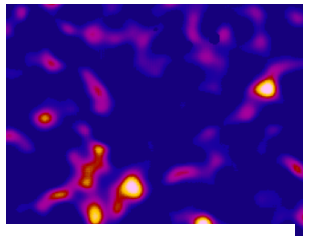


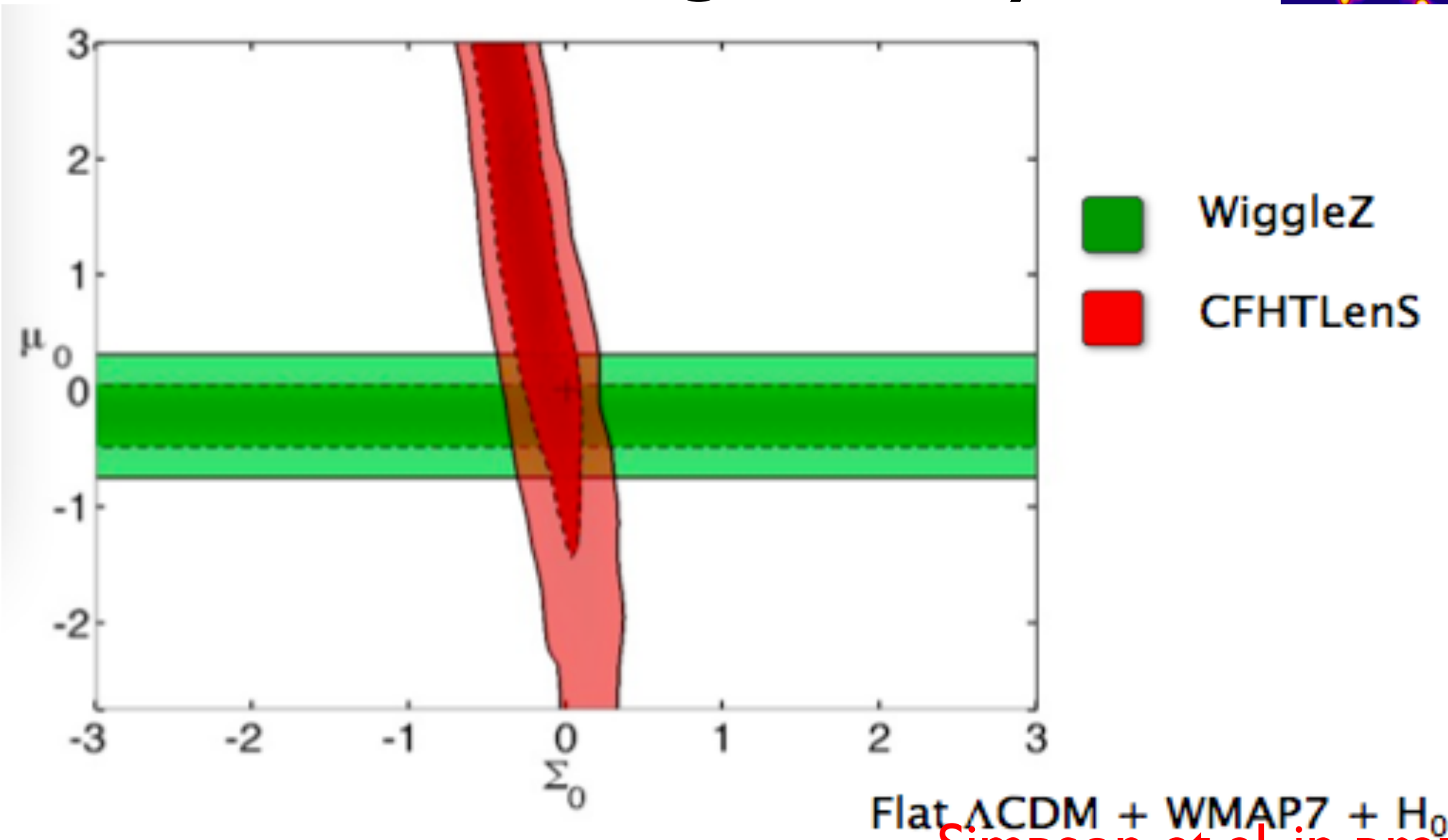


Flat ΛCDM + WMAP7 + H_0

Simpson et al. in prep

Testing Gravity





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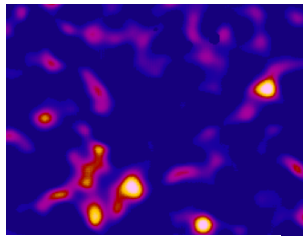
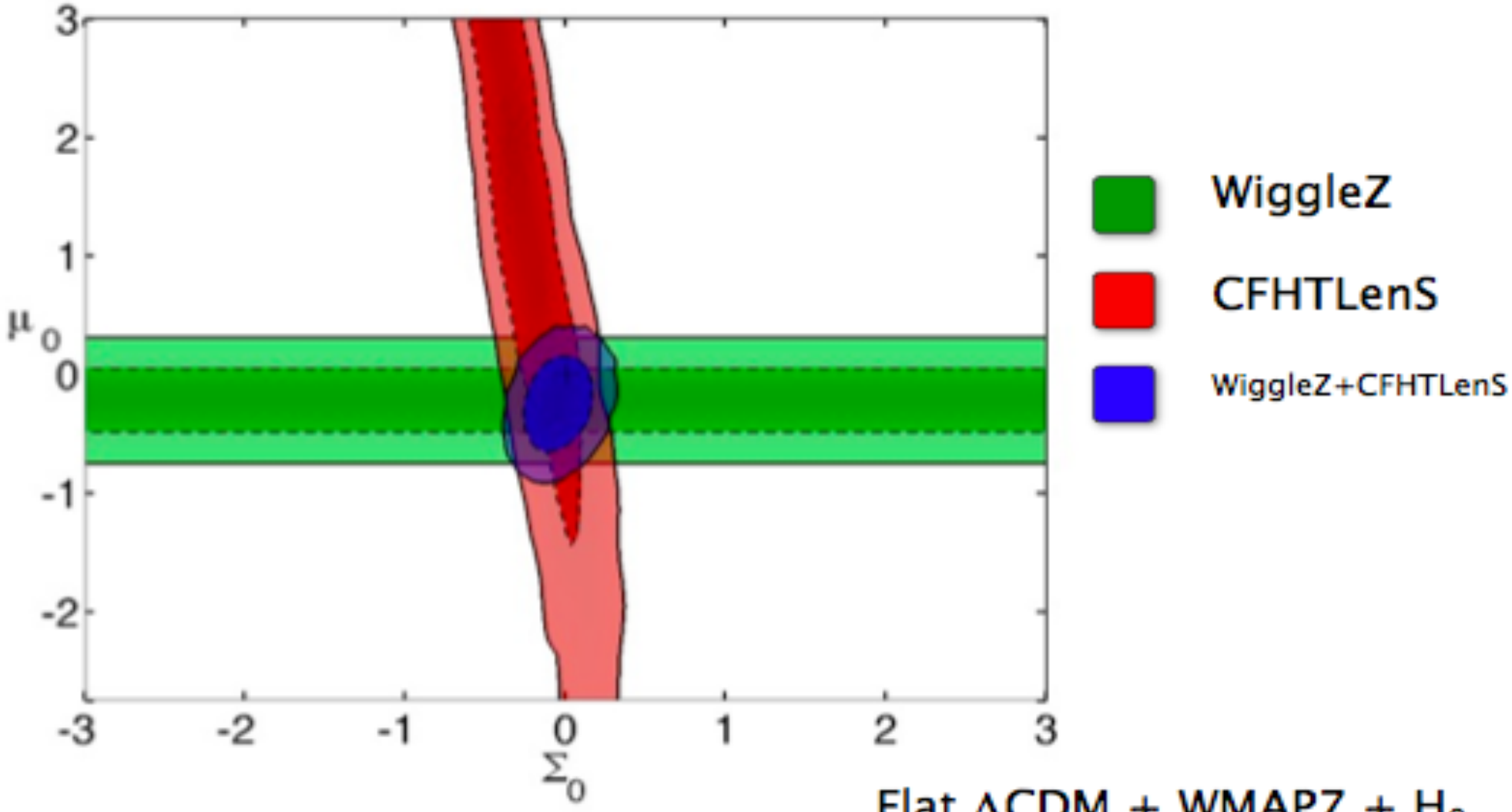
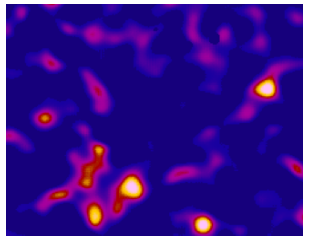




Flat ΛCDM + WMAP7 + H_0

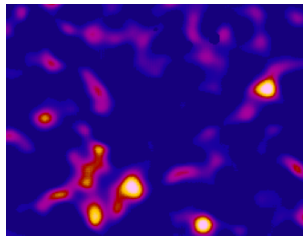
Simpson et al. in prep

Conclusions



- Largest/Deepest Weak lensing survey to date
- State of the art lensing analysis
  - Lensfit, individual exposures, posterior ellipticity
- State of the art redshifts
  - Bayesian photo-zs, Gaussianised photometry
- Largest Mass Maps
- Testing Gravity

CFHTLenS Papers In Prep



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http://www.cfhtlens.org