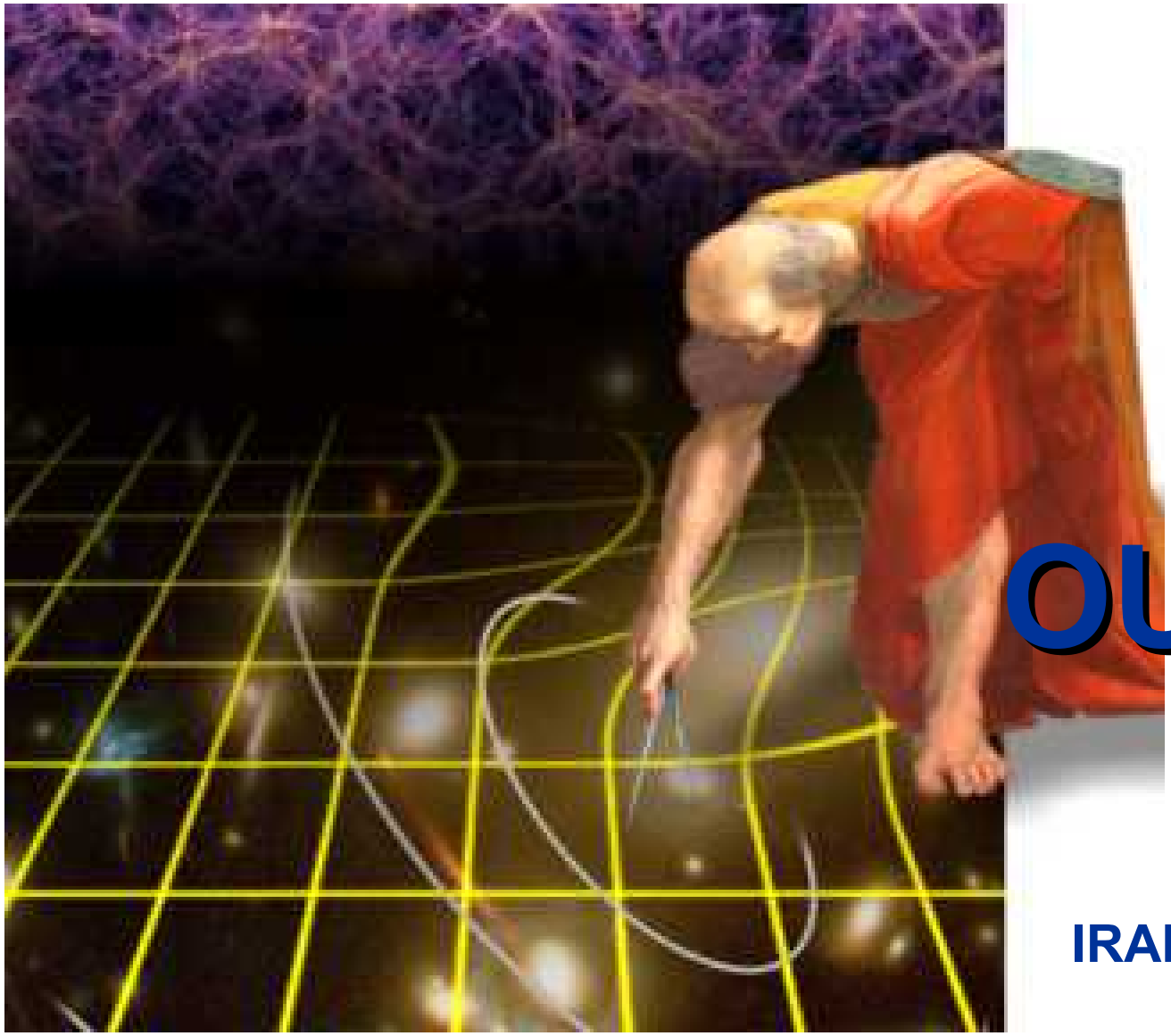


OU – PHZ

R. Pello
IRAP, OMP, Toulouse

Members / Organization

Organization Unit Leader: Stéphane Paltani, ISDC, Department of Astronomy, University of Geneva, CH

Organization Unit Deputy-Leader: Francisco Castander, Institut d'Estudis Espacials de Catalunya, E

39 members / 6 in France

Meetings :

- Kick-Off Meeting, November 23-24, 2011, ISDC
- 2nd Meeting, June 11-12, 2012, LAM
- 3rd Meeting, November 26-27, 2012, ISDC

OU-PHZ : computes photometric redshifts from the multi-wavelength imaging data.

Members

Name	Institute
Filipe Abdalla	University College London, UK
Pablo Arnalte-Mur	Durham University, UK
Stéphane Arnouts	Laboratoire d'Astrophysique de Mar
Micol Bolzonella	Observatory of Bologna, IT
David Bonfield	University of Hertfordshire, UK
Peter Capak	Caltech, USA
Francisco Castander	IEEC, Barcelona, E
Stéphane Charlot	IAP, Paris, FR
Ami Choi	University of Edinburgh, UK
David Clements	Imperial College, London, UK
Frédéric Courbin	EPFL, Lausanne, CH
Pierre Dubath	University of Geneva, CH
Samuel Farrens	IEEC, Barcelona, E
Nicolas Fourmanoit	University of Geneva, CH
Catherine Heymans	University of Edinburgh, UK
Hendrik Hildebrandt	University of Bonn, D
Henk Hoekstra	Leiden Observatory, NL
Rory Holmes	MPIA, Heidelberg, D
Olivier Ilbert	Laboratoire d'Astrophysique de Mar
Pascale Jablonka	EPFL, Lausanne, CH
Knud Jahnke	MPIA, Heidelberg, D
Matt Jarvis	University of Hertfordshire, UK
Stéphanie Jouvel	IEEC, Barcelona, E
Martin Kunz	University of Geneva, CH
Ofer Lahav	University College London, UK
Claudia Maraston	University of Portsmouth, UK
Henry McCracken	IAP, Paris, FR
Georges Meylan	EPFL, Lausanne, CH
Peder Norberg	Durham University, UK
Eliana Palazzi	IASF, Bologna, I
Stéphane Paltani	University of Geneva, CH
Roser Pellò	IRAP, Toulouse, F
Cristiano Porciani	University of Bonn, D
Lucia Pozzetti	Osservatorio Astronomico di Bologna, I
Roberto Saglia	MPE, Garching, D
Mara Salvato	MPE, Garching, D
Gregor Seidel	University of Heidelberg, D
Stella Seitz	University of Muenchen, D
Marc Sauvage	CEA, Saclay, F

SGS Scientist

Scientific requirements

Weak Lensing

- Galaxy redshifts are needed for the majority of sources entering WL analysis to :

→ split the Universe into redshift slices for lensing tomography,

→ characterize the redshift distribution within a given slice

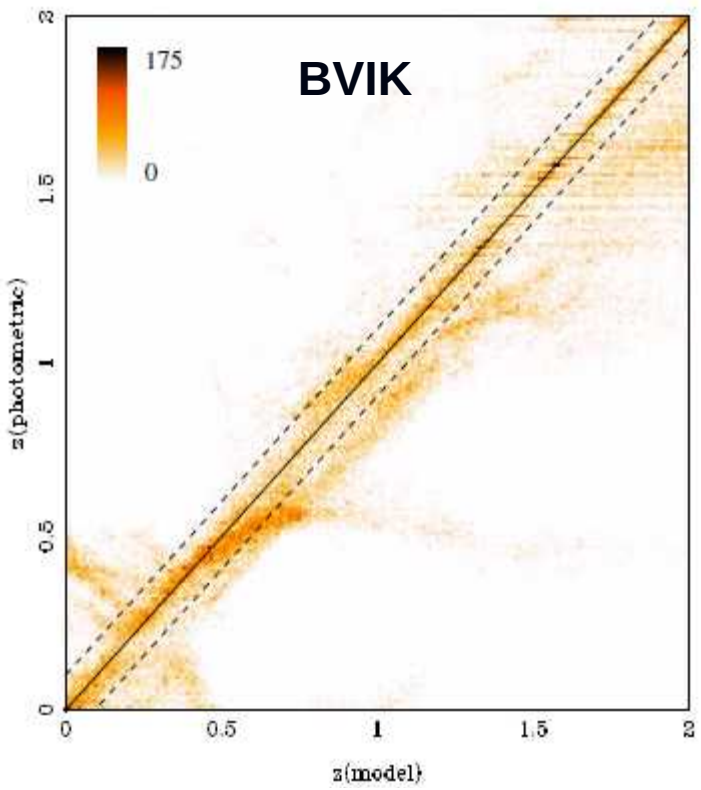
→ correct for contamination by intrinsic alignements.

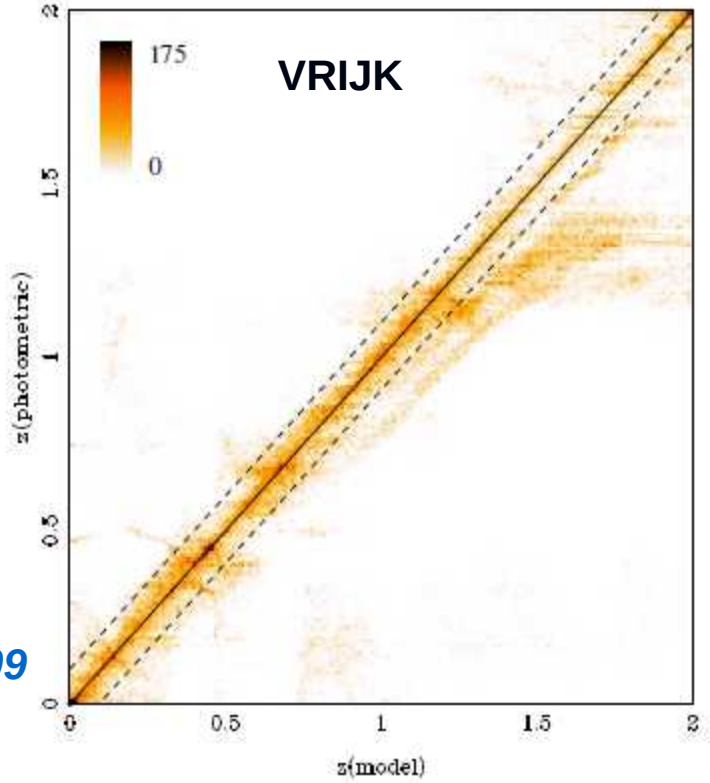
==> Obtaining photometric redshifts for a « substantial » sample of galaxies at 0.2 < z < 2 (all types).

Photometric redshifts :

➔Accuracy : $\sigma_{z/(1+z)} < 0.05$ (required) → 0.03 (goal)

➔Mean redshift to better than $\sigma(<z>)<0.002(1+z)$ in each redshift bin





Pello et al. 2009

$$\sigma_z = \sqrt{\sum(\Delta_z - \langle\Delta_z\rangle)^2/(N-1)} \qquad \langle\Delta_z\rangle = \sum\Delta_z/N \qquad \Delta_z = z_{spec} - z_{phot}$$

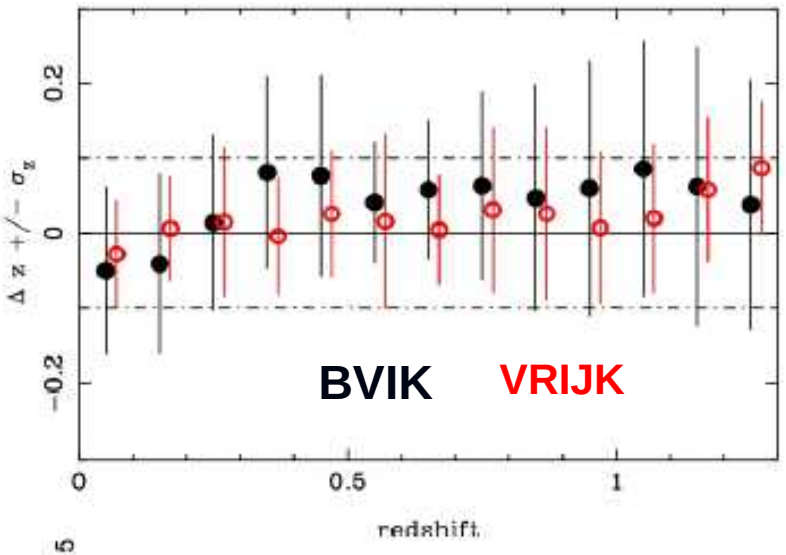
$$\sigma(\Delta z/(1+z)) = 1.48 \times median(|z_{spec} - z_{phot}|/(1+z_{spec}))$$ **NMAD (normalized median absolute deviation)**

$$|\Delta_z| = |z_{spec} - z_{phot}| \geq 0.3\times(1+z_{spec})$$ **Catastrophic failures**

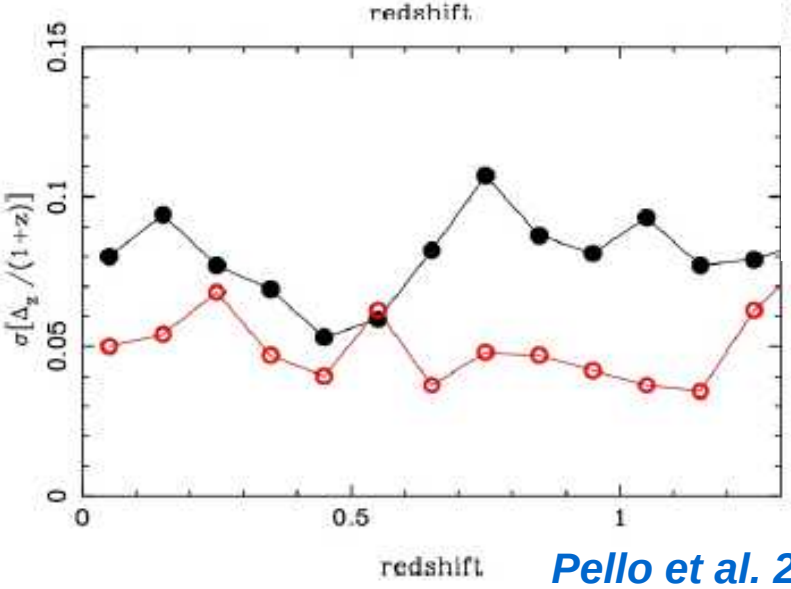
Table 3.3: The top level photometric requirements from weak lensing. The Level 1 requirements on the fidelity of photometric redshifts propagate into requirements on the NIR image quality and photometry.

Req. ID	Parameter	Requirement	Goal
WL.1-5	Redshifts error ($\sigma(z)/(1+z)$)	≤ 0.05	≤ 0.03
WL.1-6	Catastrophic failures	10%	5%
WL.1-7	Error in mean redshift in bin	<0.002	
WL.2.1-17	NIR wavelength range	920 to ≥1600nm	
WL.2.1-18	NIR number of filters:	≥3	
WL.2.1-19	NIR PSF size:	EE50 and EE80 Y: (<0.30", <0.62") J: (<0.30", <0.63") H: (<0.33", <0.70")	
WL.2.1-20	NIR Pixel scale:	0.3±0.03 arcsec	
WL.2.1-21	Relative Photometric Accuracy	<1.5%	

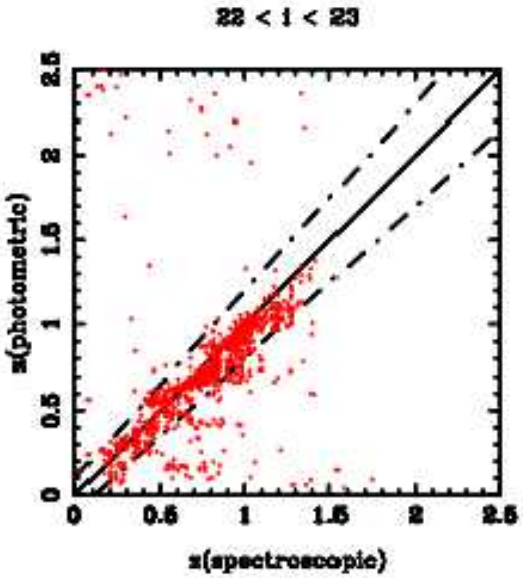
Laureijs et al. 2011

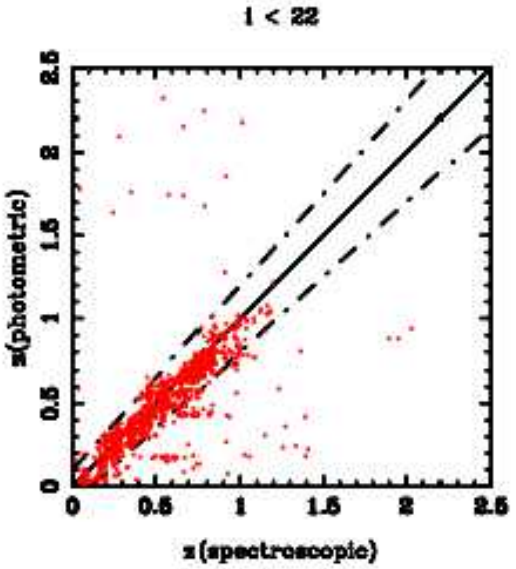


BVIK VRIJK

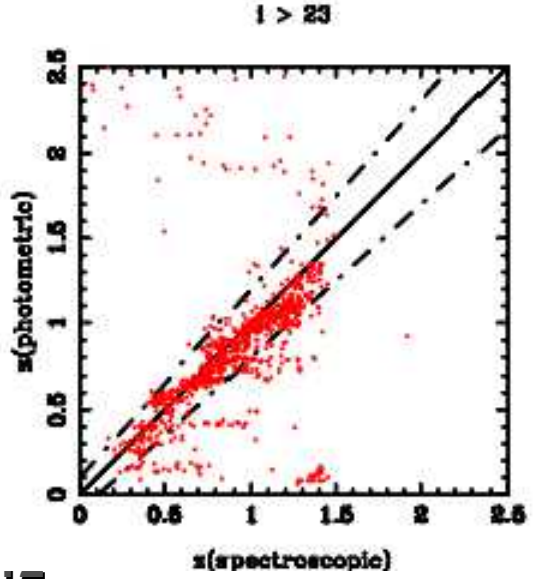


Pello et al. 2009





WUDS
ugriz+YJHK
+ Deep Spectroscopy
Pello et al. In preparation



Summary Photometric Data

Wide Survey (15,000 deg2) + Deep Survey (2x20 deg2)

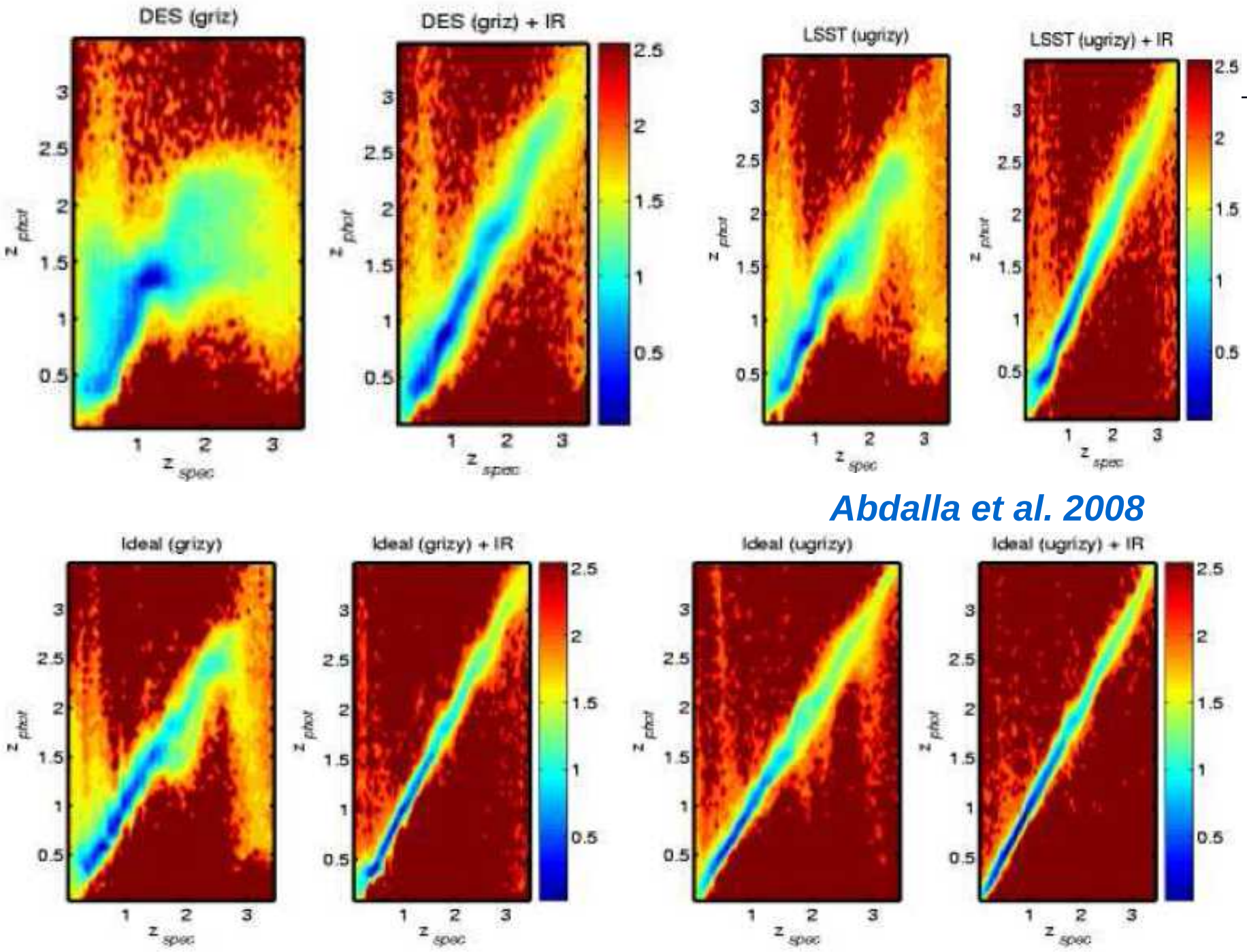
WL : Euclid measures the shapes of 30 resolved galaxies per arcmin2 in one broad visible R+I+Z band (550-920 nm) down to AB mag 24.5 (10 sigma).

Additional photometry :

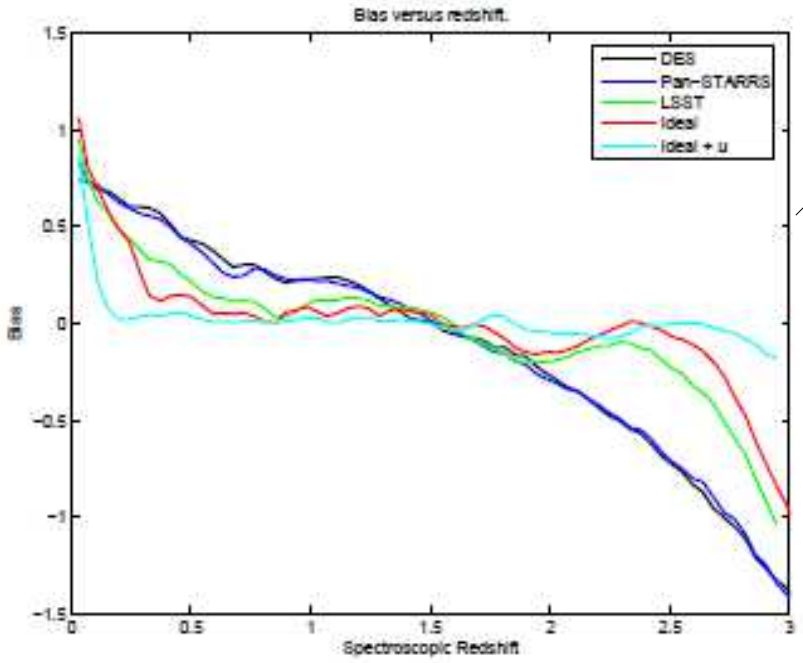
Euclid NIR bands (Y, J, H in the range 0.92-2.0 micron) reaching AB mag 24 (5 sigma)

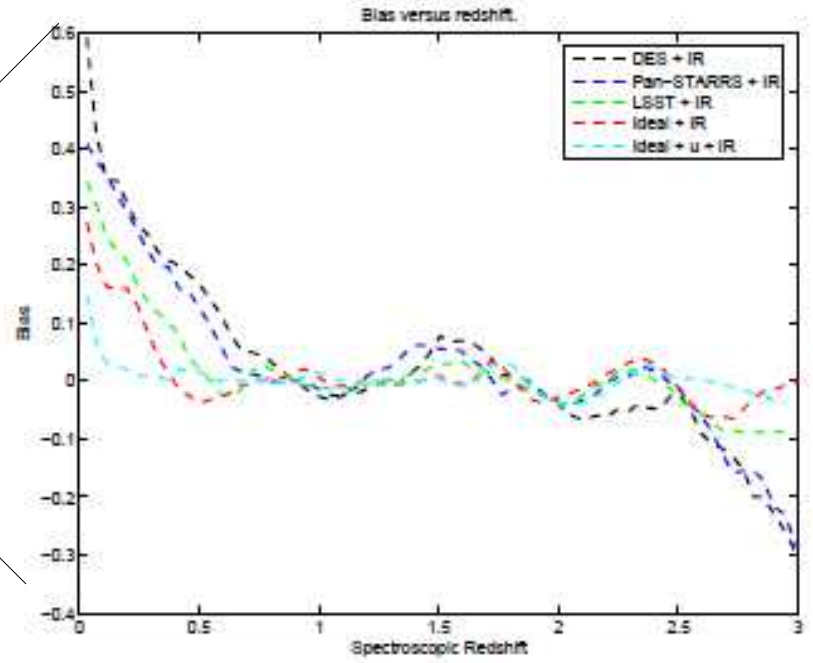
+

ground based photometry in visible bands from public data or collaborations (DES, KiDS, and Pan-STARRS)

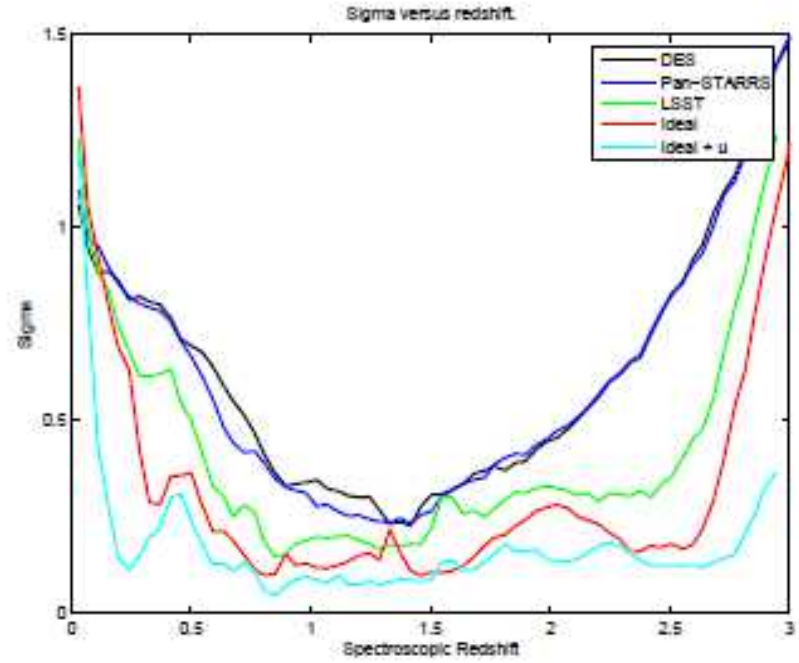


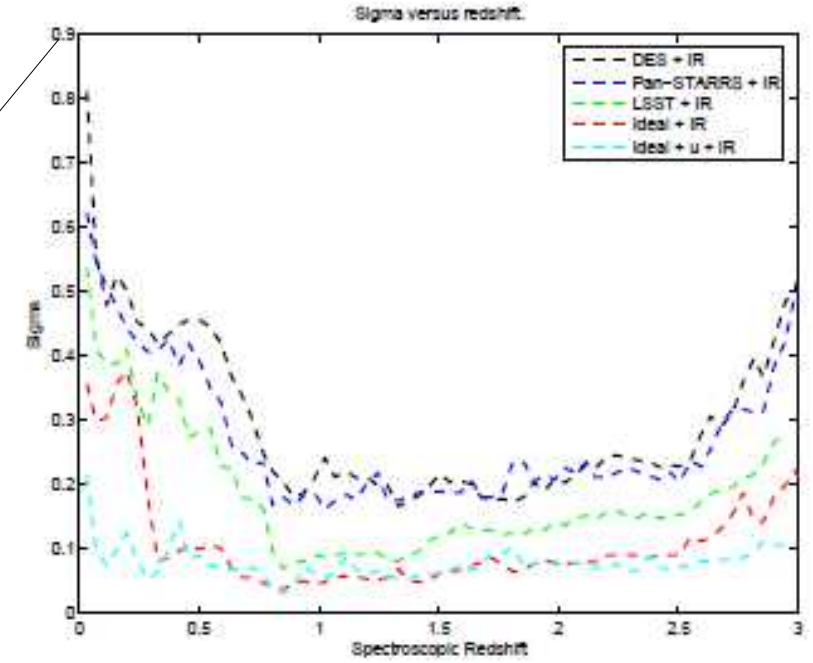
Abdalla et al. 2008



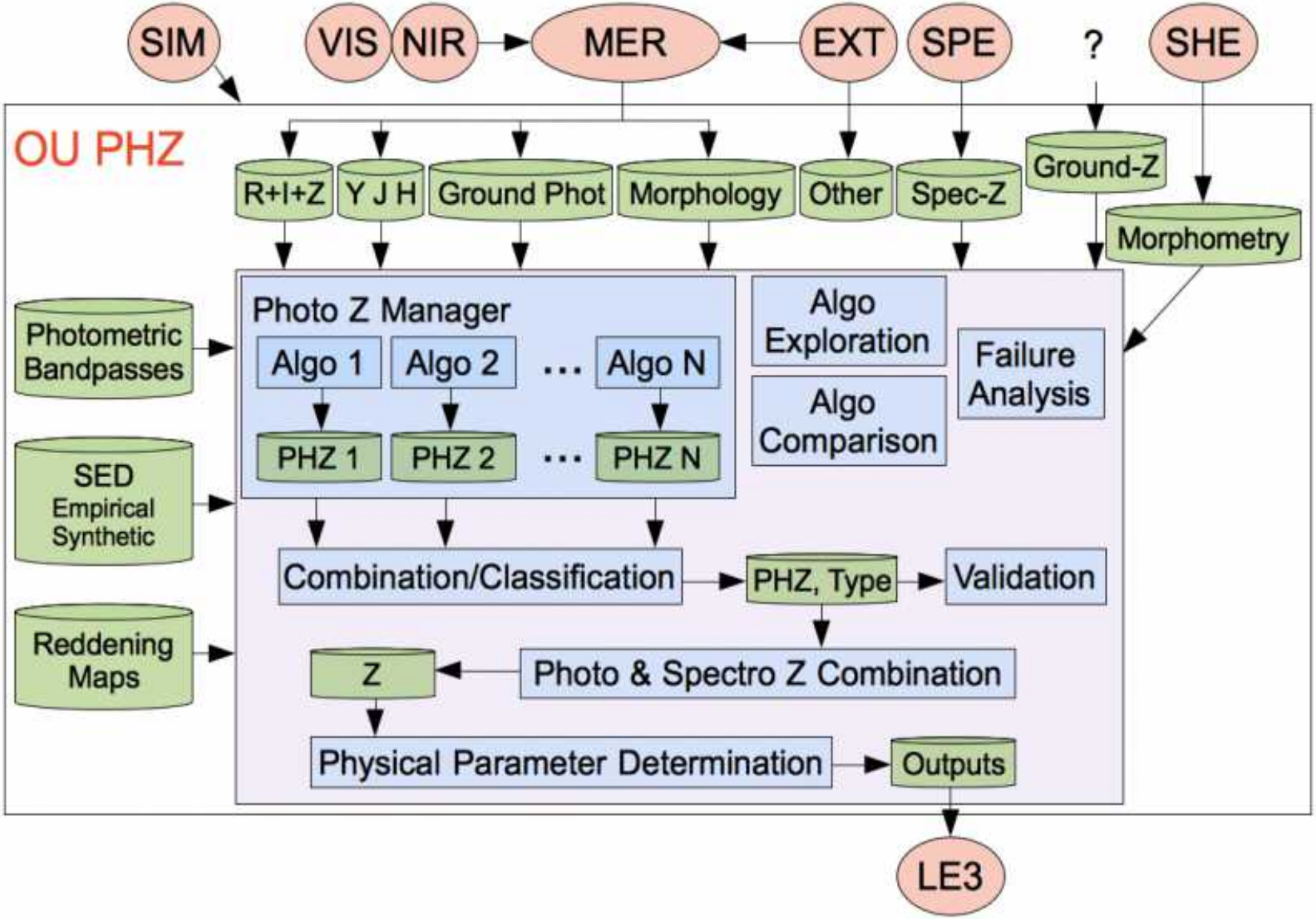


Abdalla et al. 2008

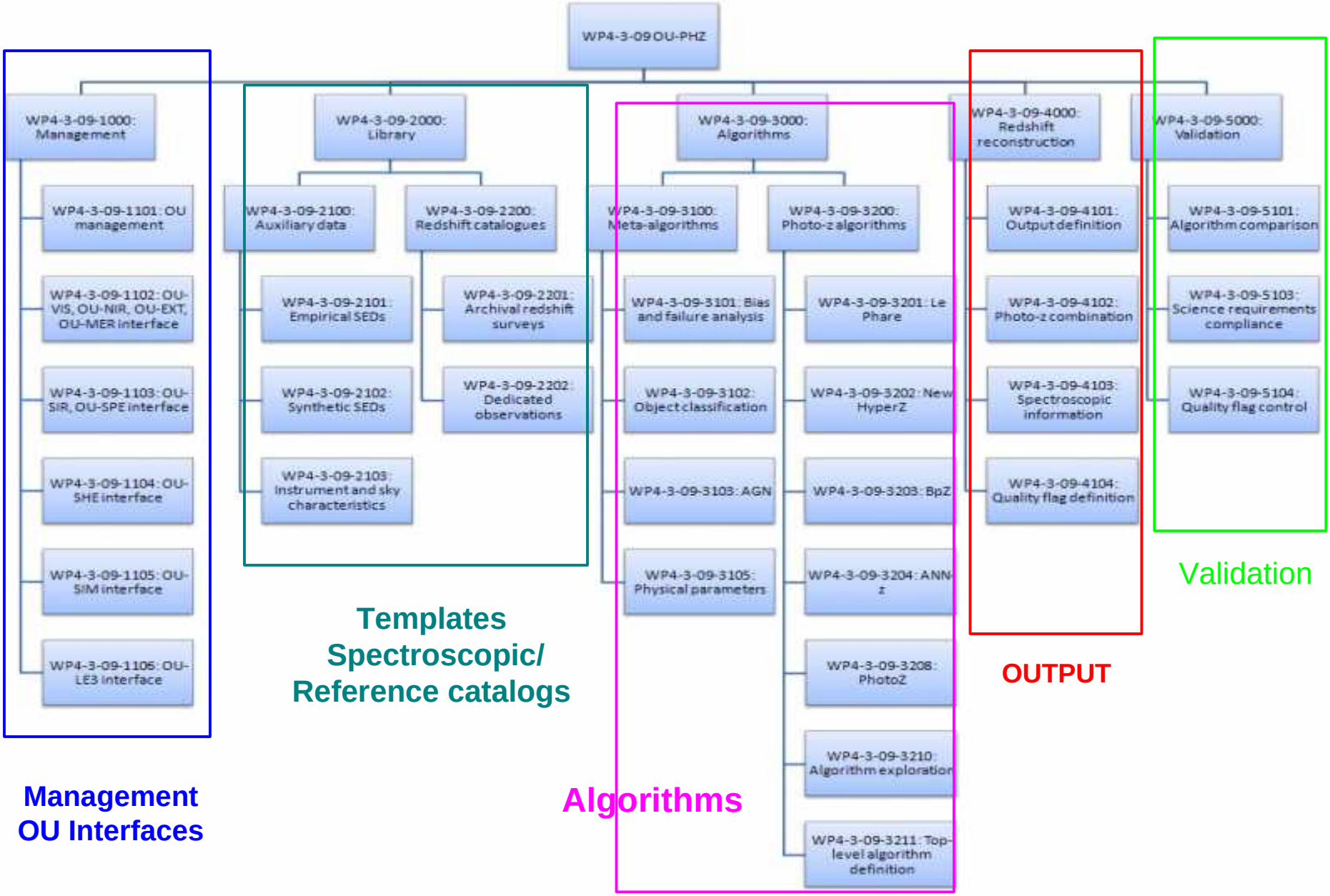




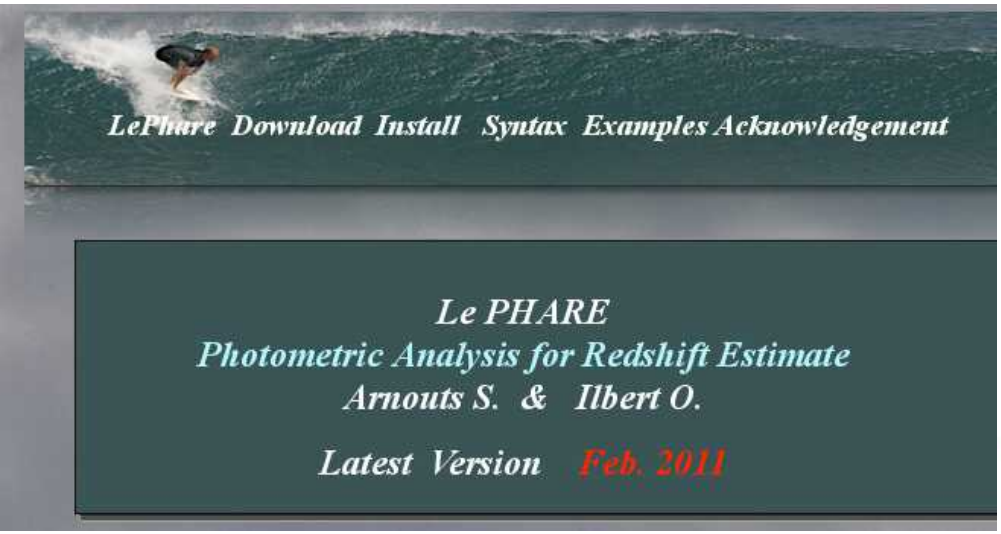
Data Flow

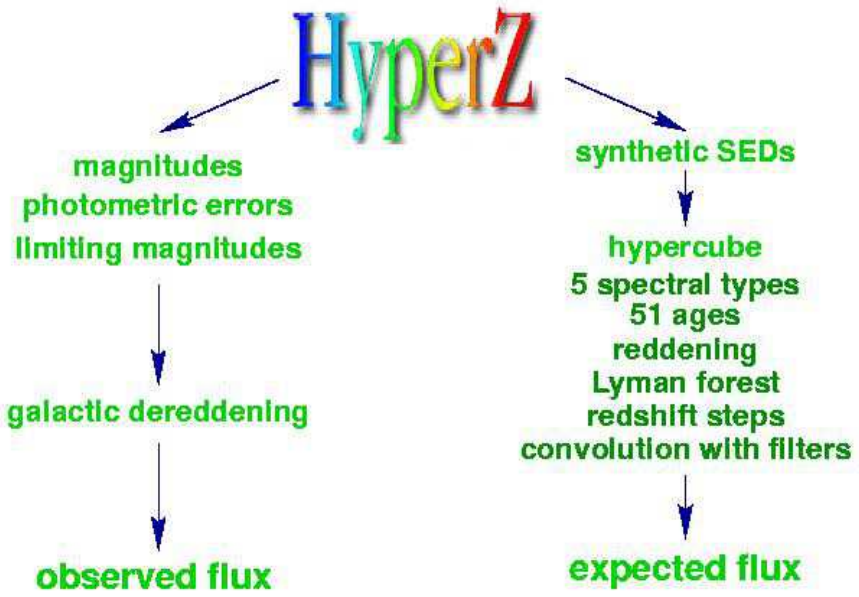

SIM
VIS
NIR
MER
EXT
SPE
?
SHE
OU PHZ
R+I+Z
Y J H
Ground Phot
Morphology
Other
Spec-Z
Ground-Z
Morphometry
Photometric Bandpasses
Photo Z Manager
Algo 1
Algo 2
...
Algo N
PHZ 1
PHZ 2
...
PHZ N
Algo Exploration
Algo Comparison
Failure Analysis
SED Empirical Synthetic
Combination/Classification
PHZ, Type
Validation
Reddening Maps
Z
Photo & Spectro Z Combination
Physical Parameter Determination
Outputs
LE3

WPs / Organization



SED-fitting Algorithms



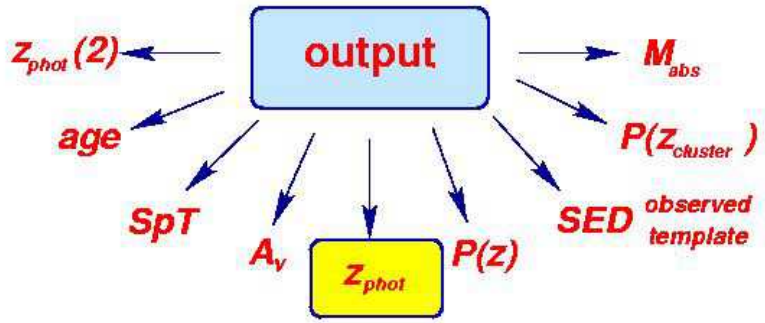


HyperZ

photometric redshift code

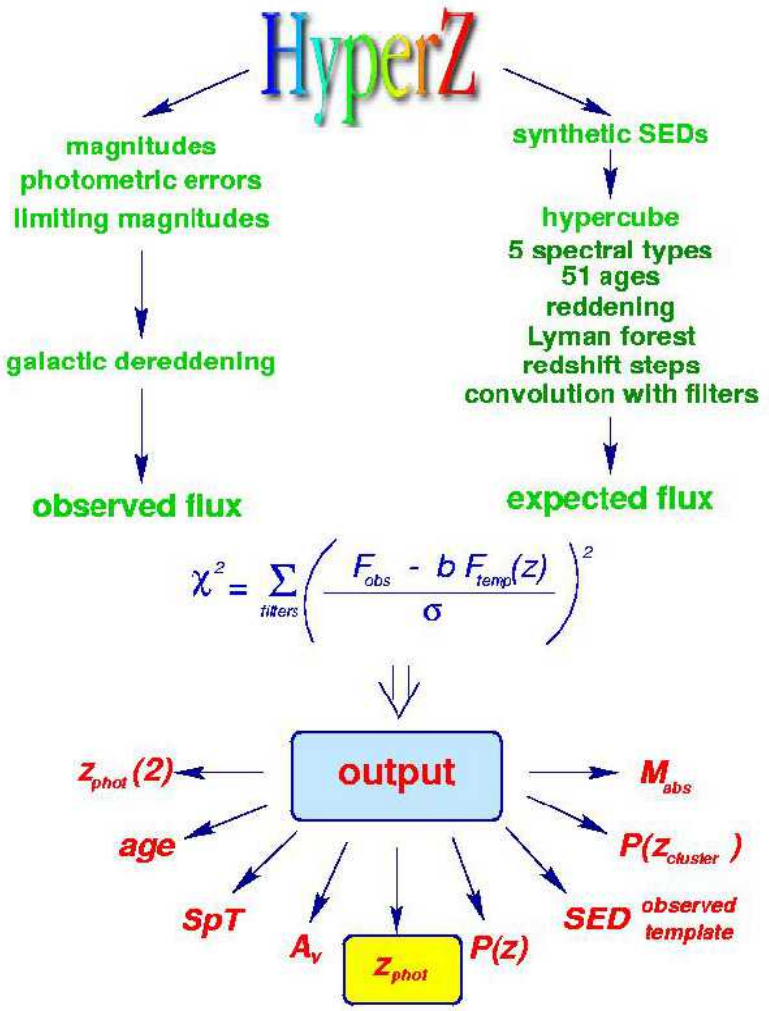
by Micol Bolzonella, Roser Pelló & Joan-Marc Miralles

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



v12.0 to be released
Including luminosity prior as an option

OUTPUT / Final Pipeline



- According to SWG needs
- PDF
- Best-fit z(phot) : for different priors, depending on SWG needs, …
- Characterization of sources based on SED-fit

- Final pipeline SDC – CH
- Test bench to test the different codes
- Validation OU-PHZ & SWGs

Next Steps

- Preparation of data packs / reference catalogs (archival surveys & simulated catalogs) for tests & validation
- Submission of the different algorithms for tests / objective benchmark
- Simulation plan document in preparation
- Progress on different areas : empirical & simulated templates, algorithms & meta-algorithms (classification, physical parameters, ...)

Work in progress...