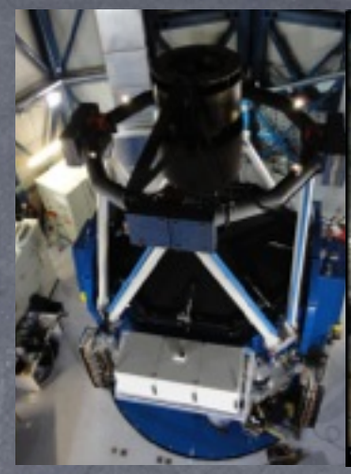
KiDS
Durham ATLAS mtg

Konrad Kuijken
Leiden Observatory

KiDS-VIKING in a nutshell



The VISTA telescope in its entirety.

- 9-band survey u-K with VST/OmegaCAM and VISTA
- 1500 square degrees
- 2mag deeper than SDSS, 2x sharper
- weak lensing + photoz optimized: **DARK M&E**
- started Oct 15 2011

440 nights: KiDS

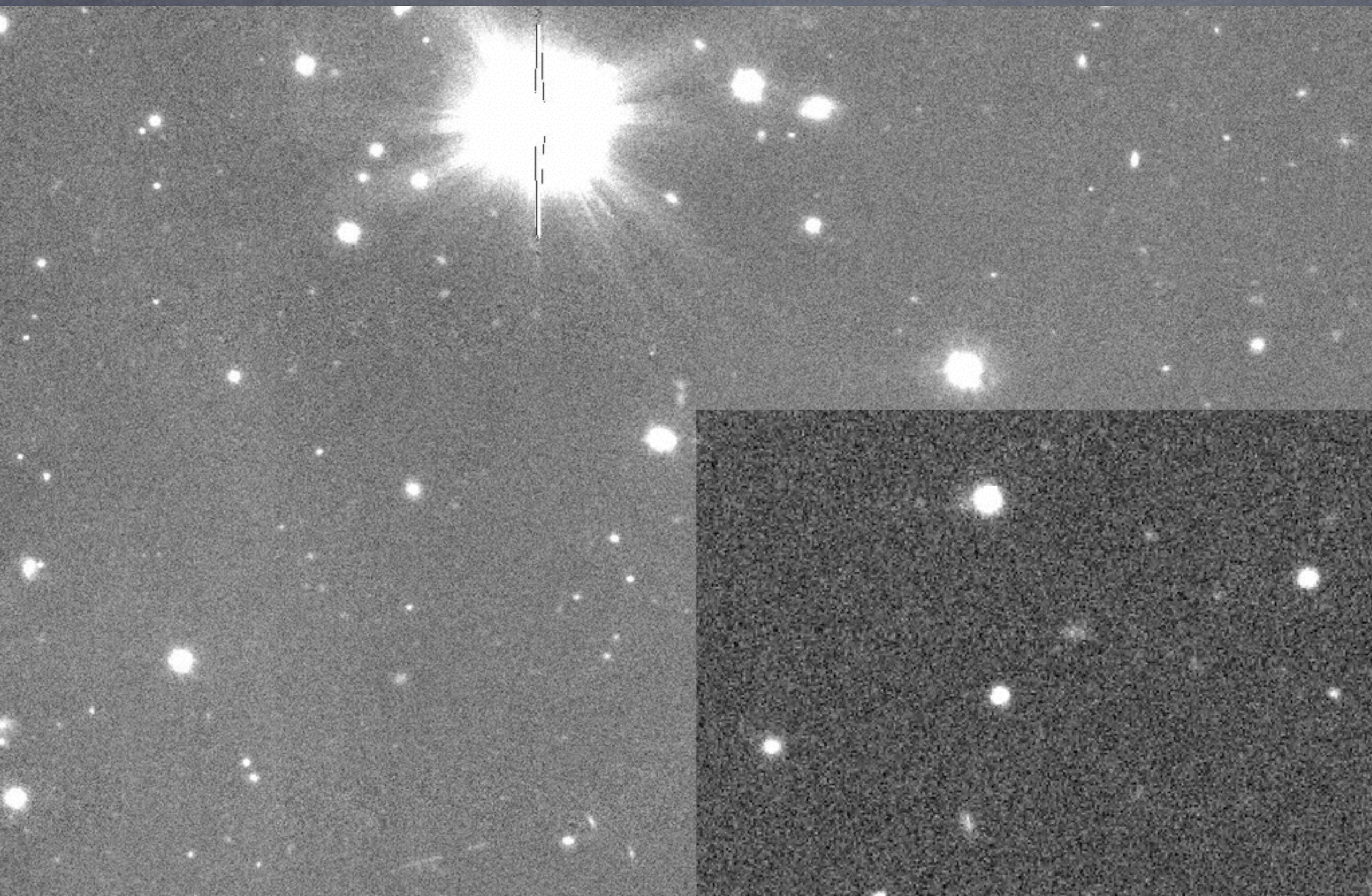
250 nights: VIKING

(PI. Alastair Edge)

KiDS vs. ATLAS

- 2 mag deeper (also matching VIKING survey cf. VHS)
  - 1/3 area
- Image quality (for lensing)
- Targets dense foreground redshift surveys (GAMA, 2dFGRS)
- Longer integrations (efficiency!!)

KiDS vs. ATLAS



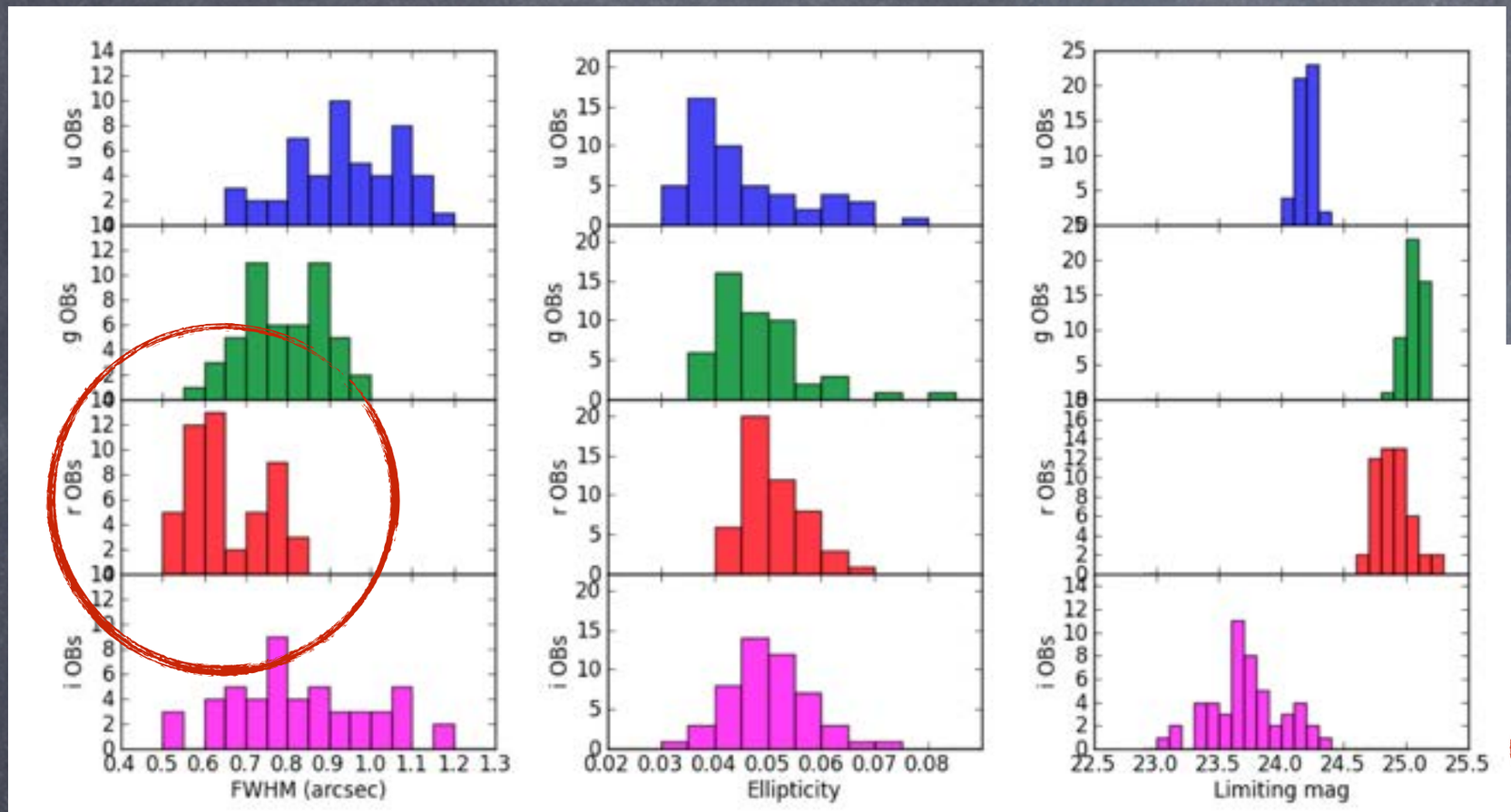
Lensing tomography

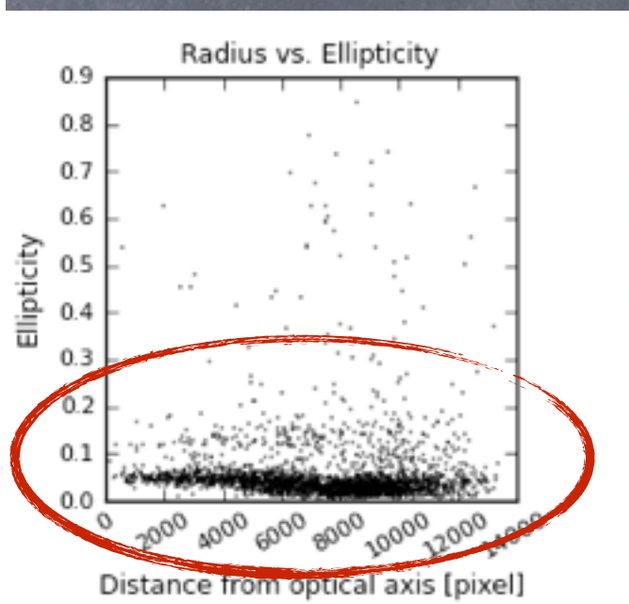
- Measure matter distribution as function of redshift using lensing
  - tomography: use sources at different redshifts
- Galaxy formation: relation between dark matter haloes and embedded galaxies
- Power spectrum evolution = probe of expansion history
  - lensing also provides expansion history directly via angular diameter distances
  - test of gravity

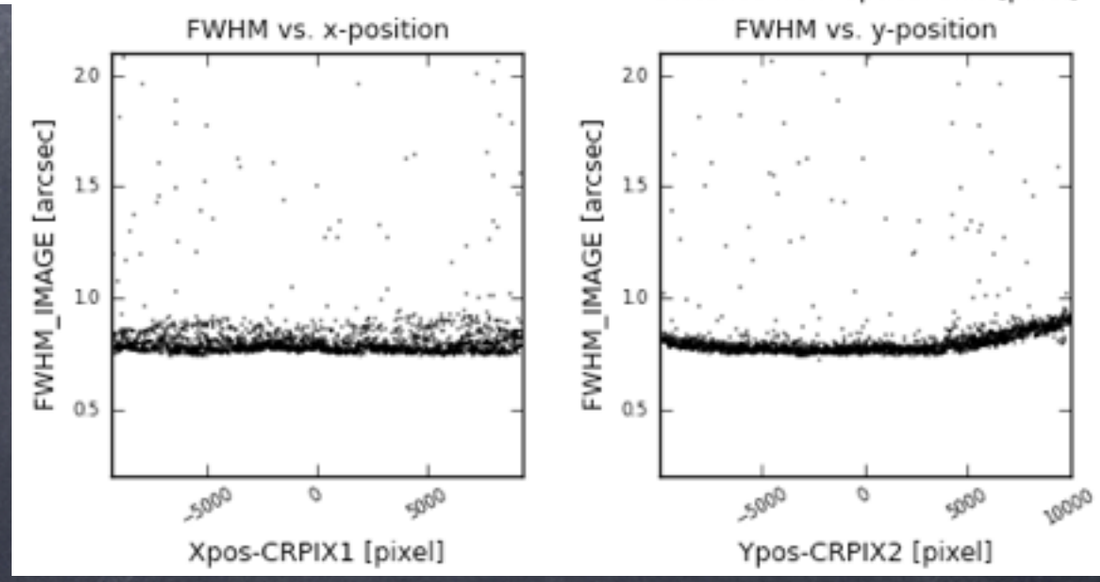
Status of survey

- ca 300 sqdeg observed in 4 bands (800 in i band)
- Focus on GAMA survey regions
  - >200k complete redshifts (r<19.8)
  - Much other data (Herschel, VIKING, ...)
- Data rate so far is only 10% of survey per year...
  - happy with image quality we are getting

Seeing distributions



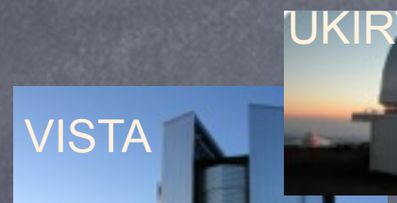


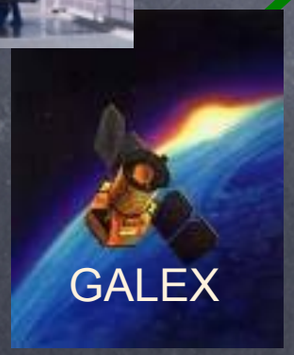


- Unique!

GAMA

KiDS





NIR UKIDSS LAS

NIR VIKING

Optical KiDS

z,Spec

MIR All sky

FIR H-Atlas

HI/20-40cm DINGO

90 cm

Optical DR7

ALEX UV

MIS+

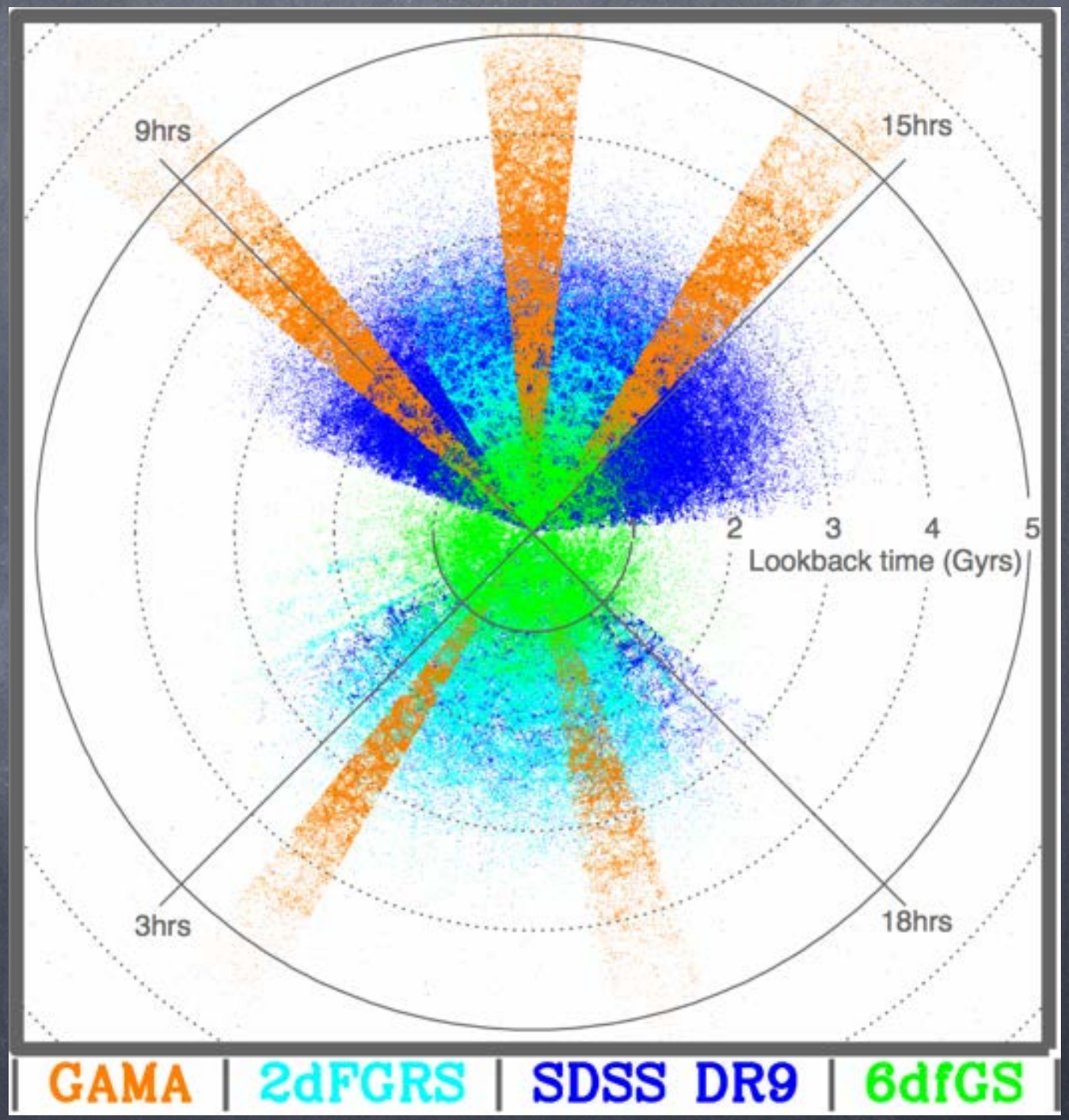
www.gama-survey.org

Aaron Robotham

GAMA

KiDS

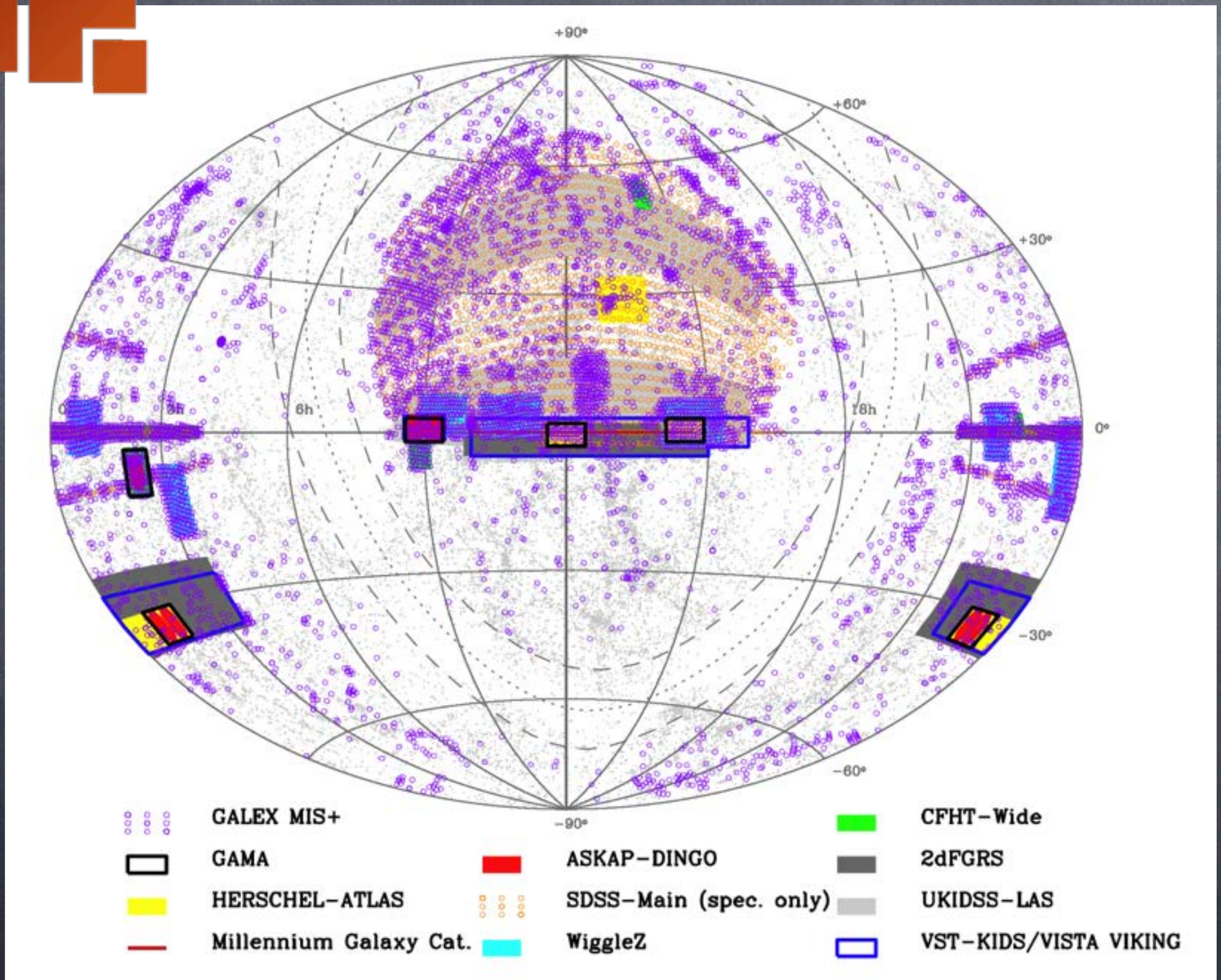
- 250k redshifts, AAOmega@AAT. Dense sampling
- 4 areas, 60 sqdeg each
- Complete to r=19.8
- Excellent information on galaxy environment
- Excellent multi-survey coverage
- KiDS: morphology, surface brightness, lensing masses



GAMA

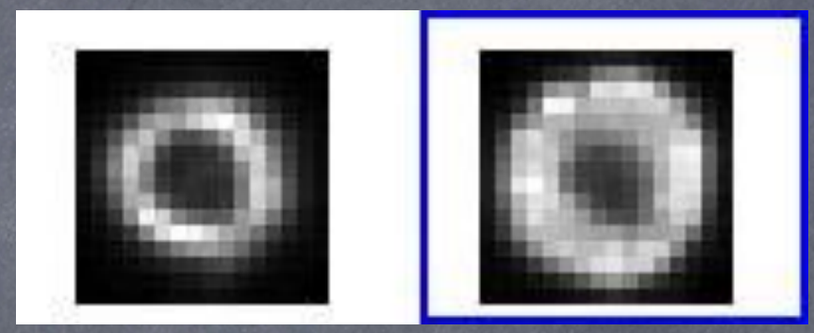
GAMA

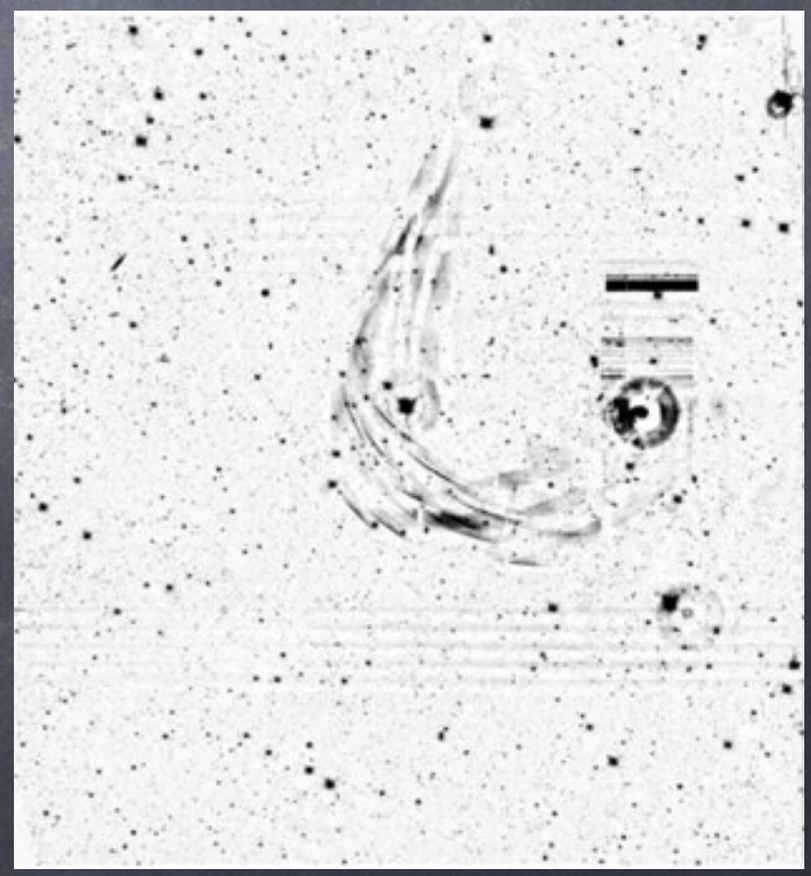
KiDS



Operations on Paranal

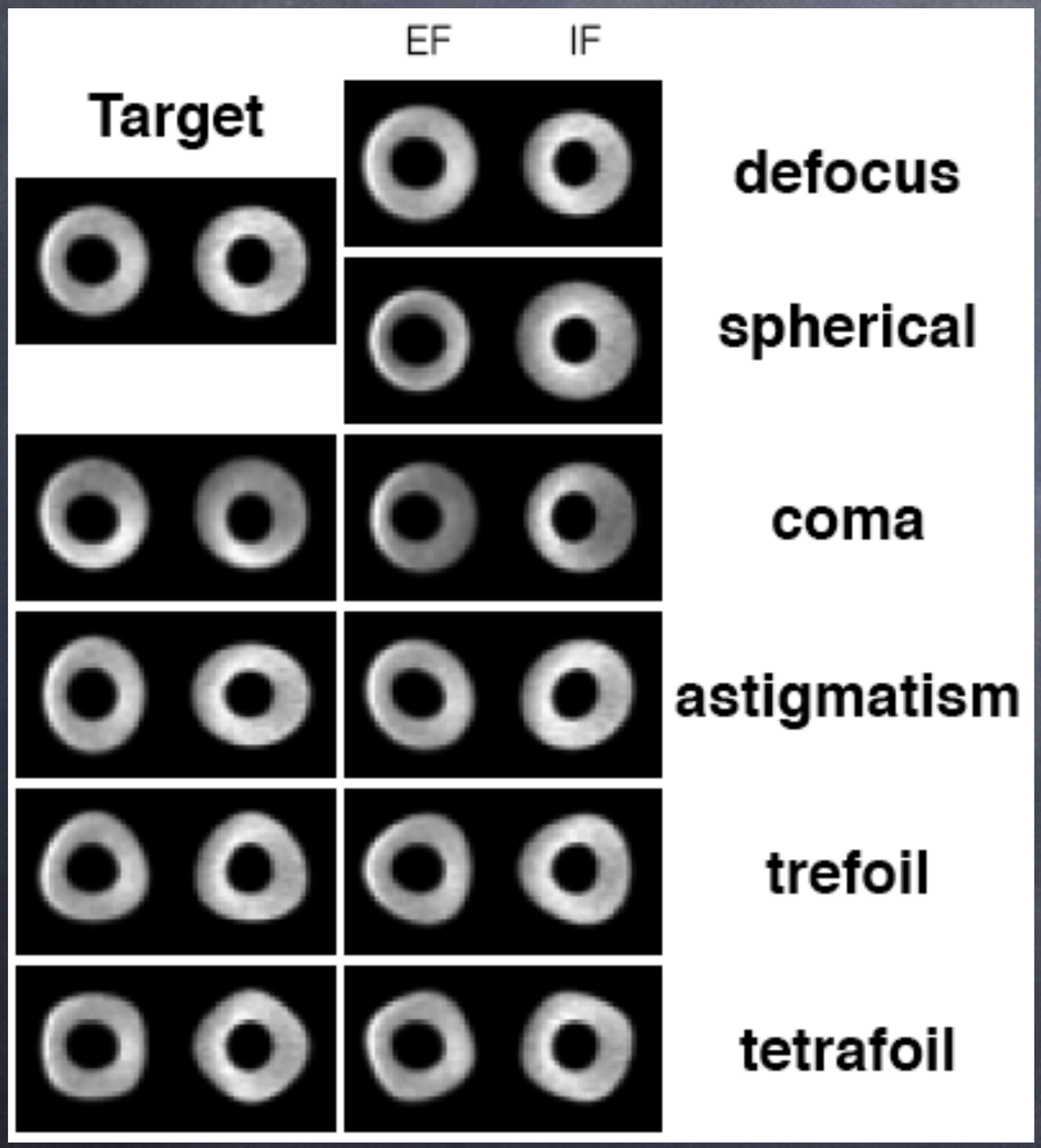
- technical runs to improve efficiency
  - speed up acquisition of new targets:
    - don't forget previous alignment
    - improve lookup tables for M1,M2
    - faster analysis of 'donuts'
- Avoid repeating useful observations!
- VST issues
  - M2 failures
  - Atm. Dispersion Compensator
  - telescope baffling being fixed

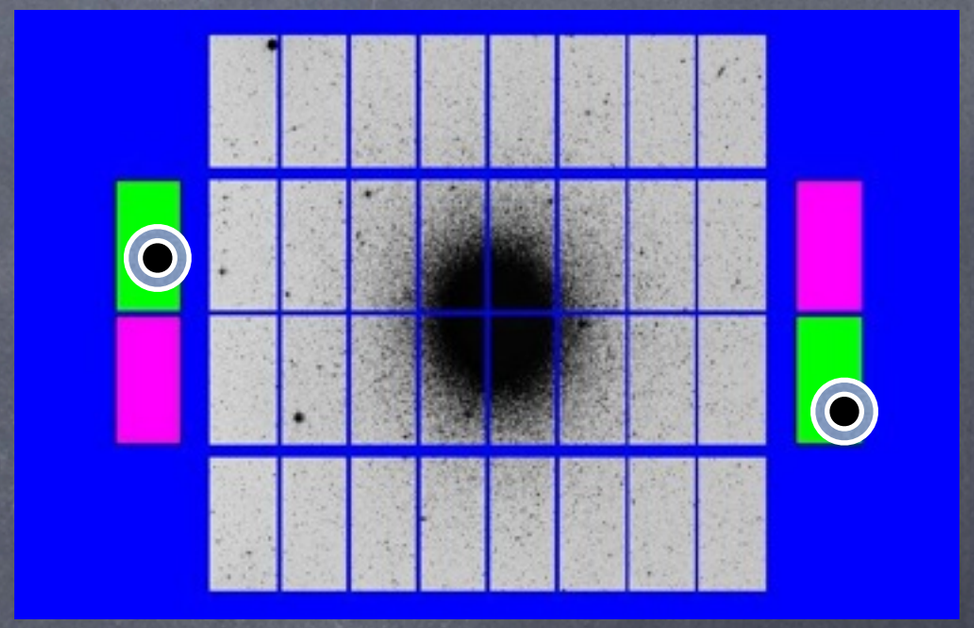


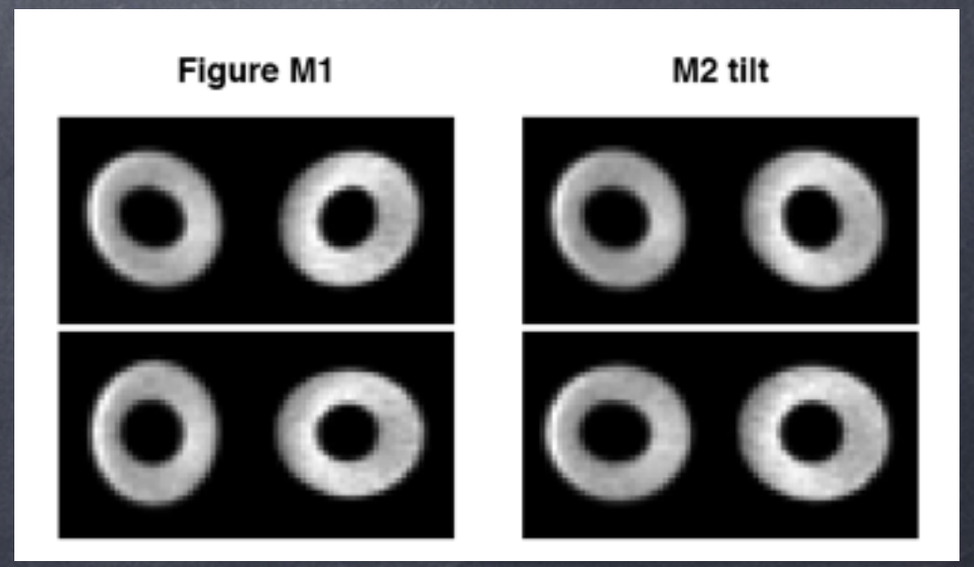


Operations on Paranal

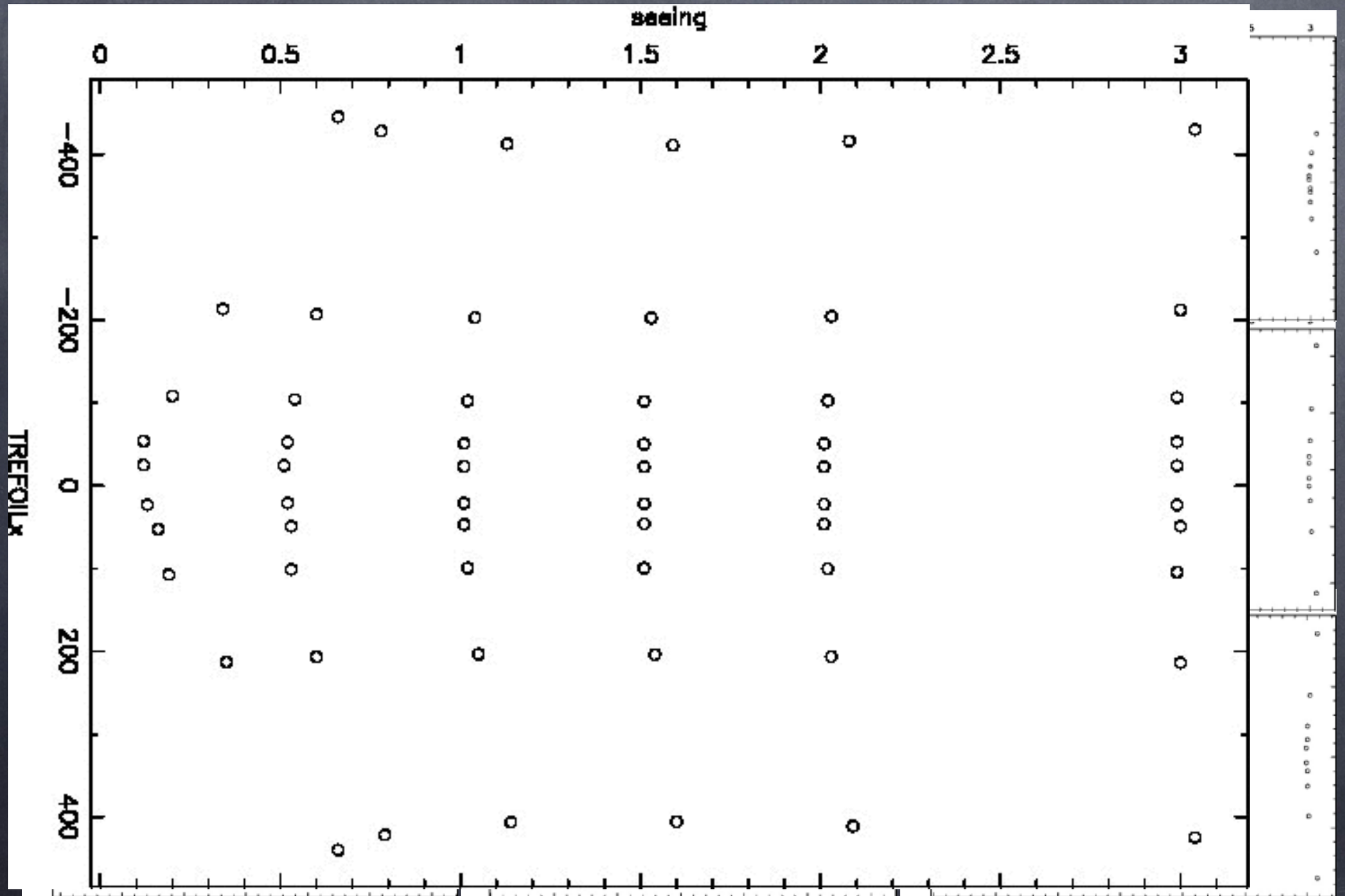
- Improved 'donut' algorithms being developed



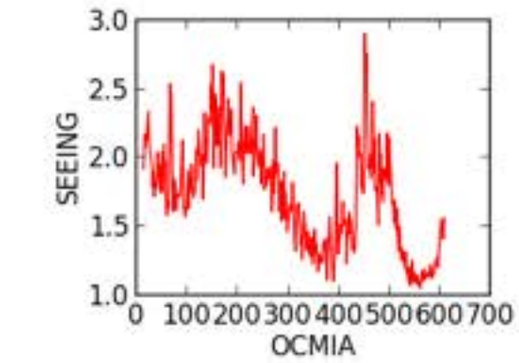


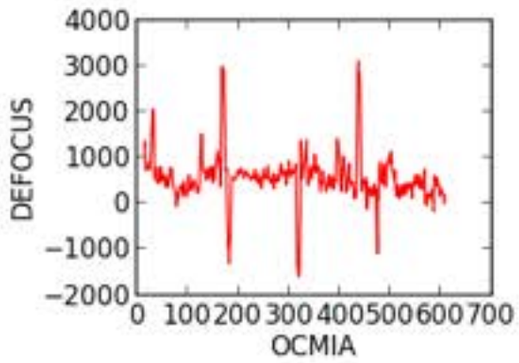


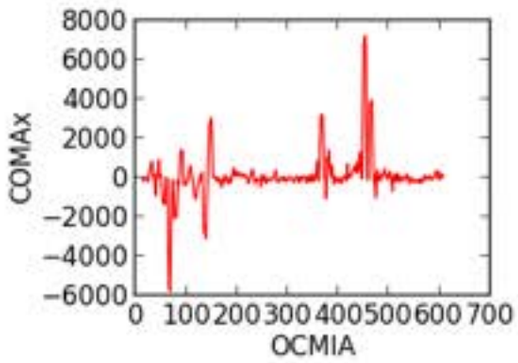
New IA algorithm

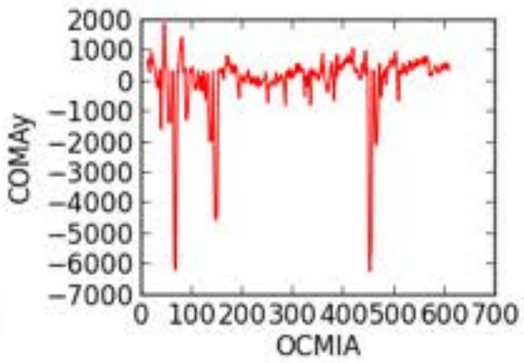


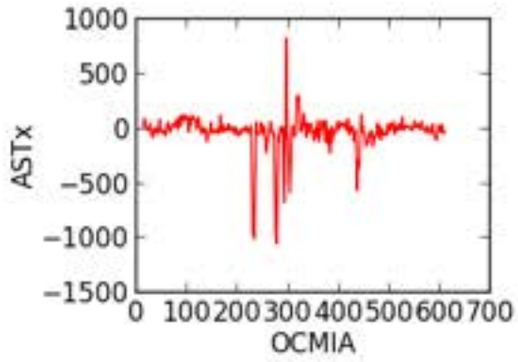
FULL NIGHT OBS0001-0140: ocmia files 13 to 607 on 2013-11-16

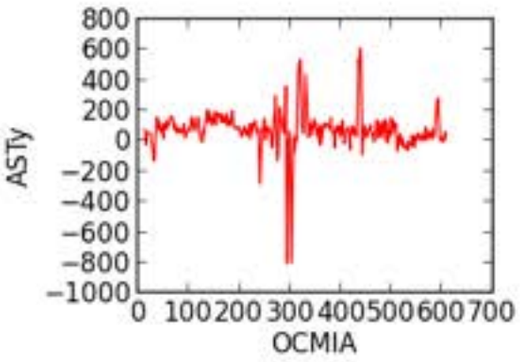


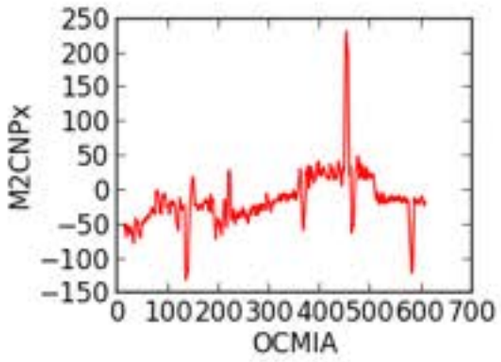


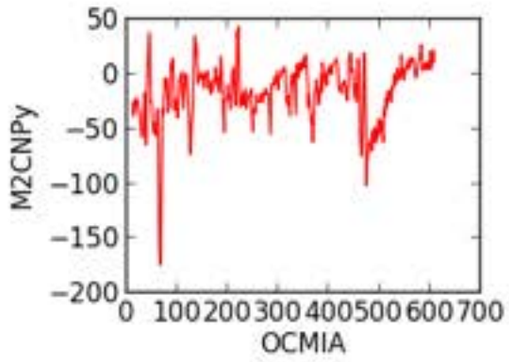


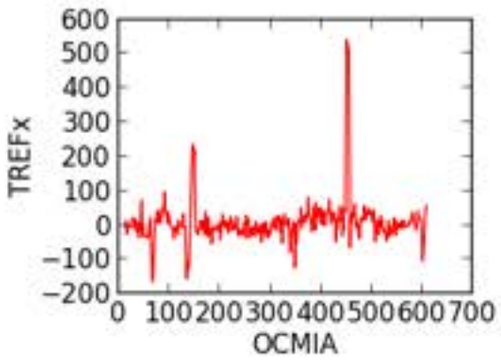


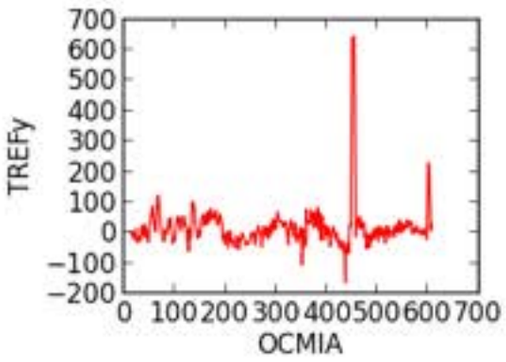


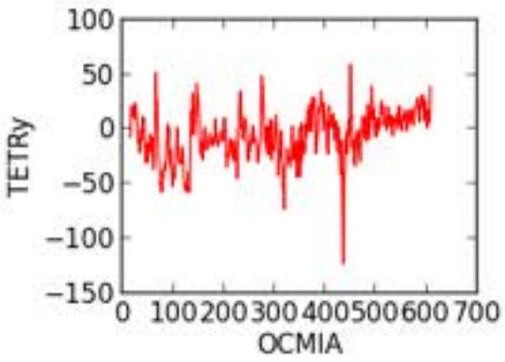


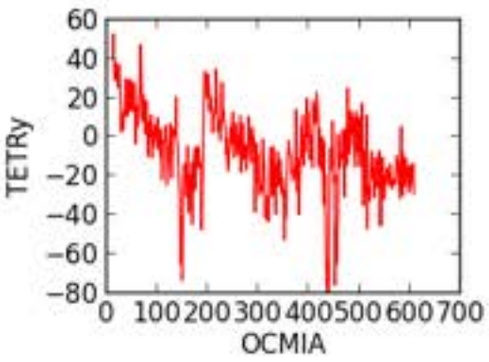


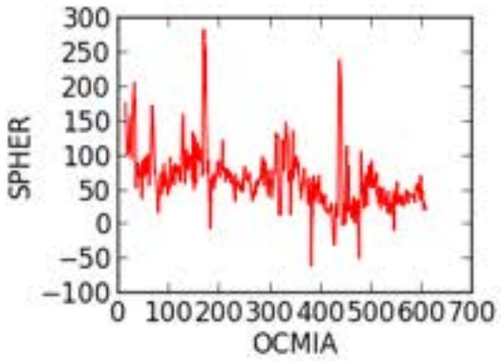


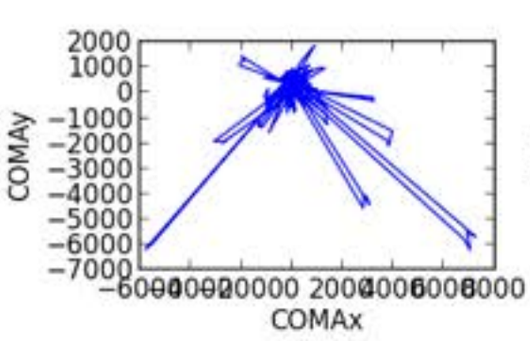


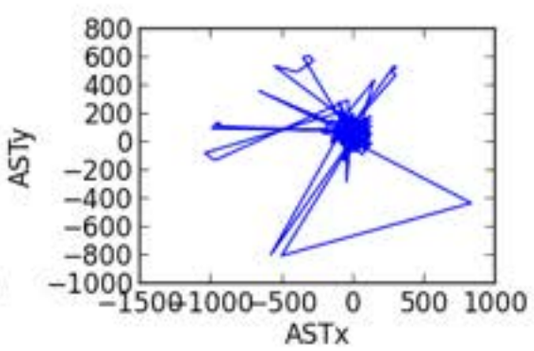


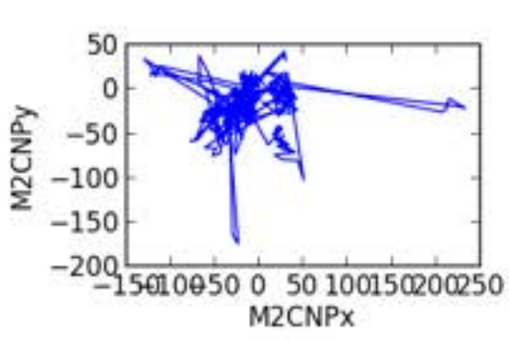








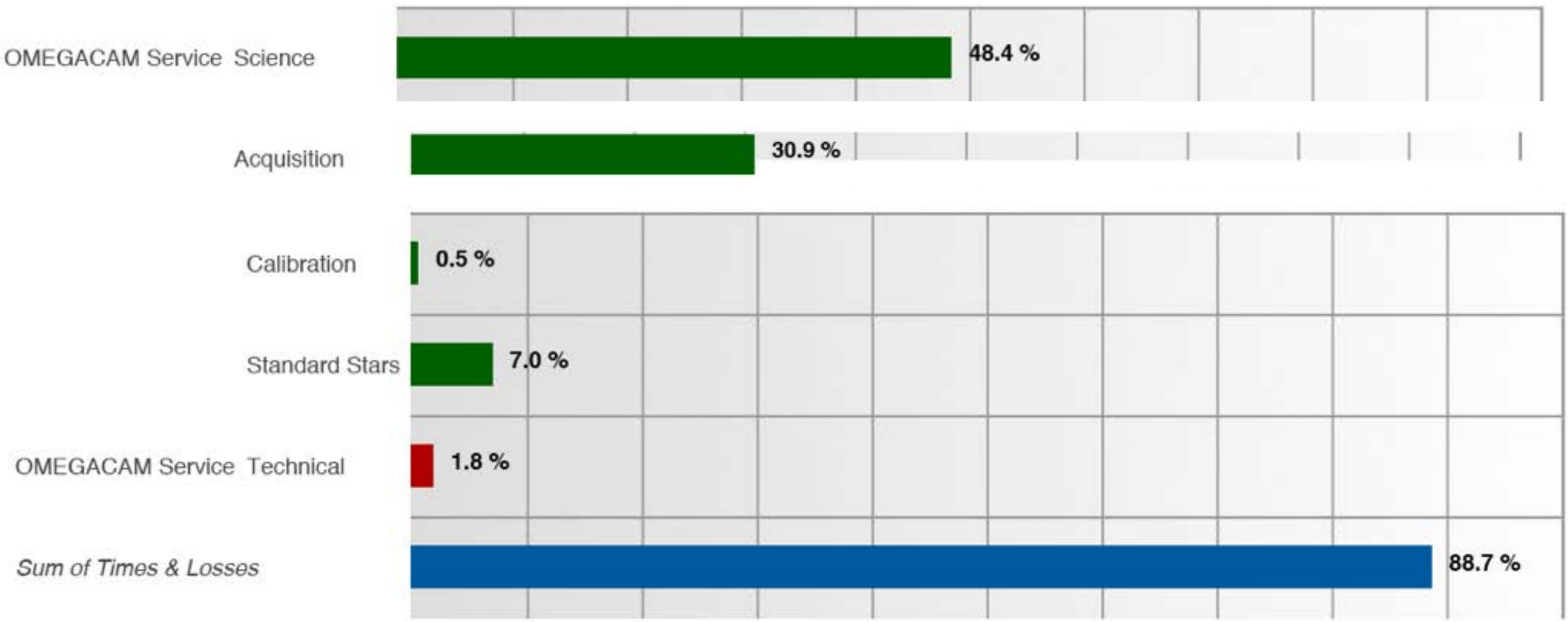




Operations on Paranal

KIDS

Typical night - March 6 2014

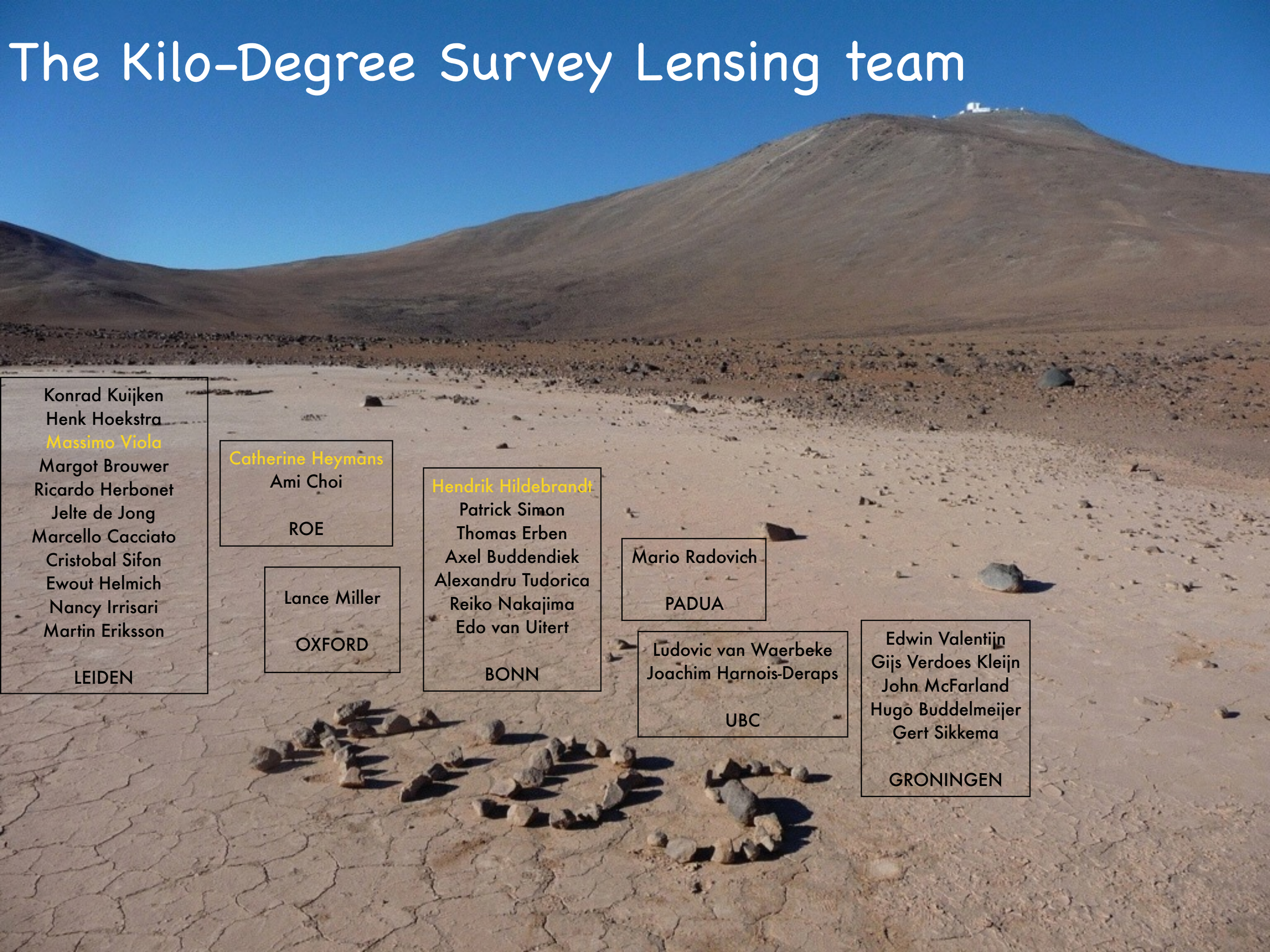


Percentages are relative to the night duration of 08:59. Instrument times (green bars) for Science, Calibration and Standard Stars are derived from produced FITS files using instrument-specific algorithms. Losses (red bars) are derived from Downtime Slots, Ob Slots and Partial Losses within OB Slots that were classified with some loss type.

Operations in Europe

- 'Feeding the monster' with OBs
- Quality Control of incoming data, interaction with ESO
- Calibration, per-night photometry and per-OB astrometry
- Processing, making stacks, masks and object catalogues
- Data release to ESO archive
- Internal data releases
- Reporting to ESO

The Kilo-Degree Survey Lensing team



Konrad Kuijken
Henk Hoekstra
Massimo Viola
Margot Brouwer
Ricardo Herbonet
Jelte de Jong
Marcello Cacciato
Cristobal Sifon
Ewout Helmich
Nancy Irrisari
Martin Eriksson

LEIDEN

Catherine Heymans
Ami Choi

ROE

Lance Miller

OXFORD

Hendrik Hildebrandt
Patrick Simon
Thomas Erben
Axel Buddendiek
Alexandru Tudorica
Reiko Nakajima
Edo van Uitert

BONN

Mario Radovich

PADUA

Ludovic van Waerbeke
Joachim Harnois-Deraps

UBC

Edwin Valentijn
Gijs Verdoes Kleijn
John McFarland
Hugo Buddelmeijer
Gert Sikkema

GRONINGEN

Lensing with KiDS

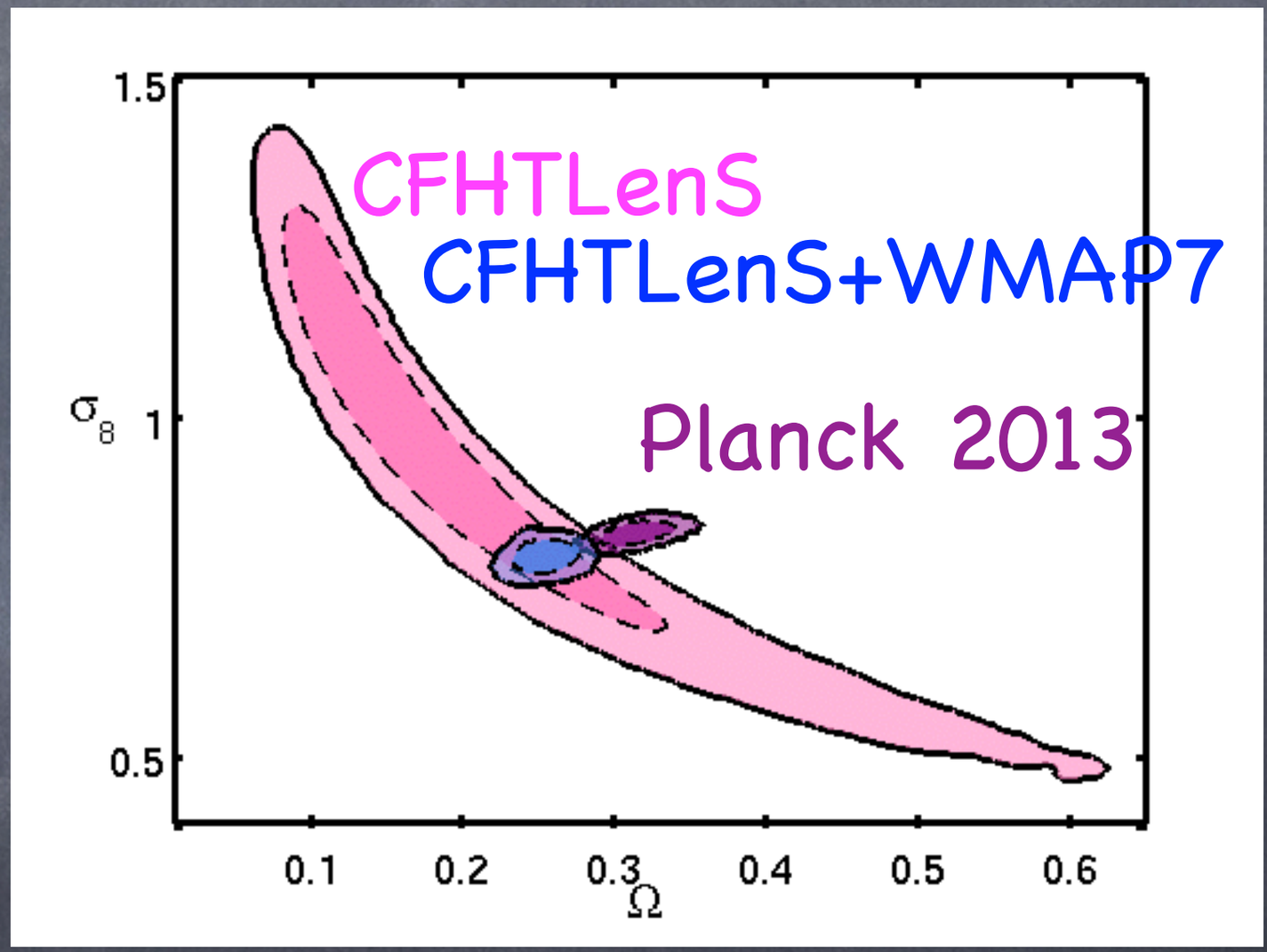
- Ultimate aim is tomographic survey of large-scale matter distribution
  - Probe of Dark Energy, Dark Matter
  - Precursor to Euclid, (with DES)
- Already larger than CFHTLS !
- First results are close
  - Measurements of weak lensing masses of Gama Groups and galaxies

Lensing with KiDS - 2

- Ellipticity catalogue
  - LensFit algorithm
  - PSF models
  - Bayesian fit of galaxy models, marginalised down to ellipticity & orientation
  - Uses individual exposures (no stacking, no regridding), THELI pipeline calibration
  - BLINDED
- Photometric redshifts
  - BPZ algorithm
  - PSF gaussianization
  - Gaussian-aperture photometry
  - uses AstroWISE stacks and calibration
  - 4-band for now, working on incorporating VIKING

Why blind the ellipticities?

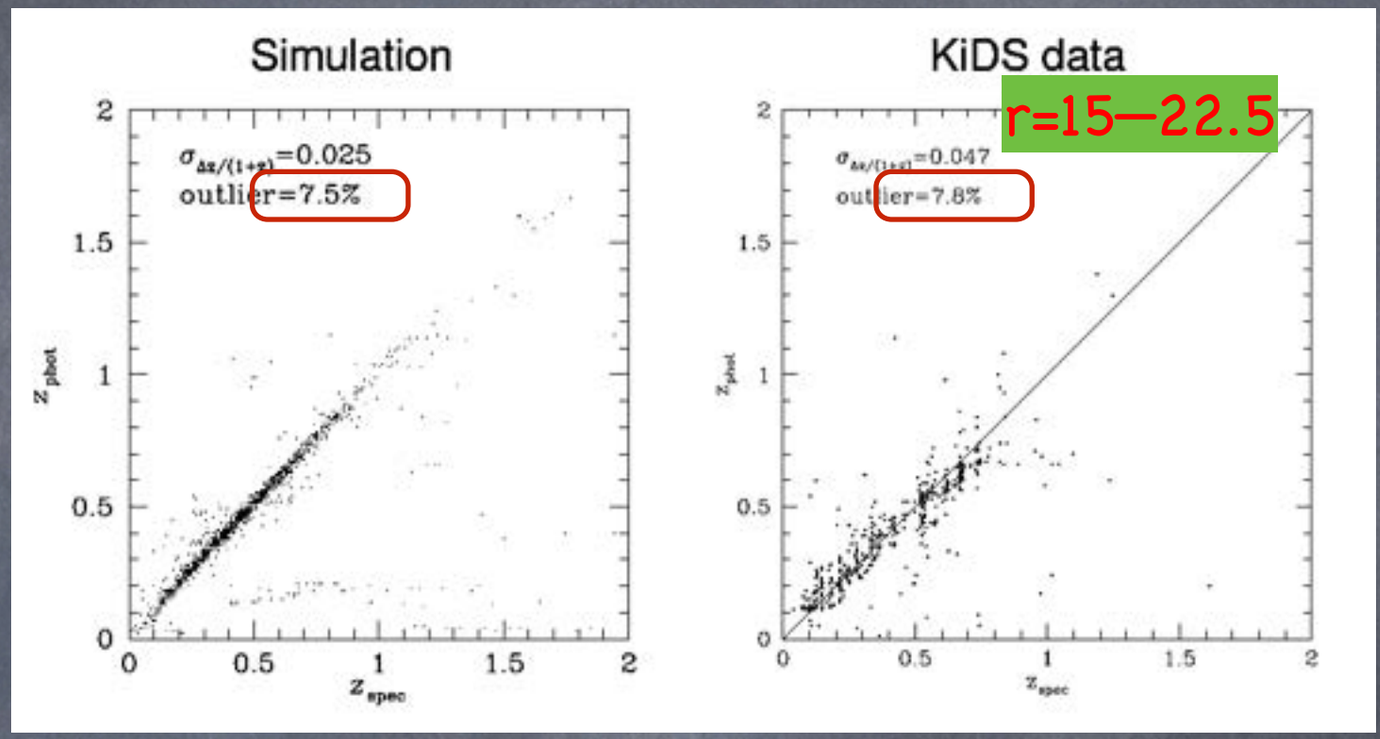
- CFHTLenS — Planck
- 2.7 sigma tension
- tomographic analysis

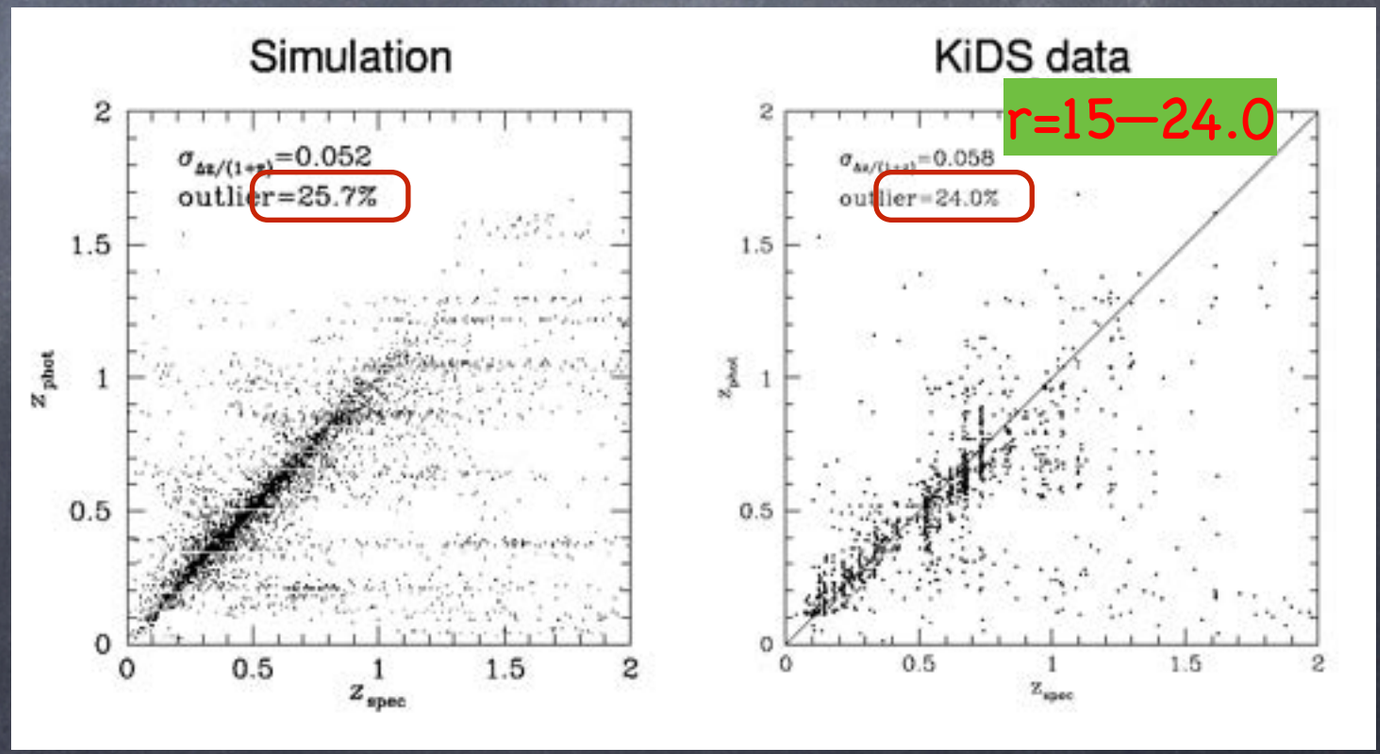


- Motivates analysis of new dataset, with blinding

Photometric redshifts -1

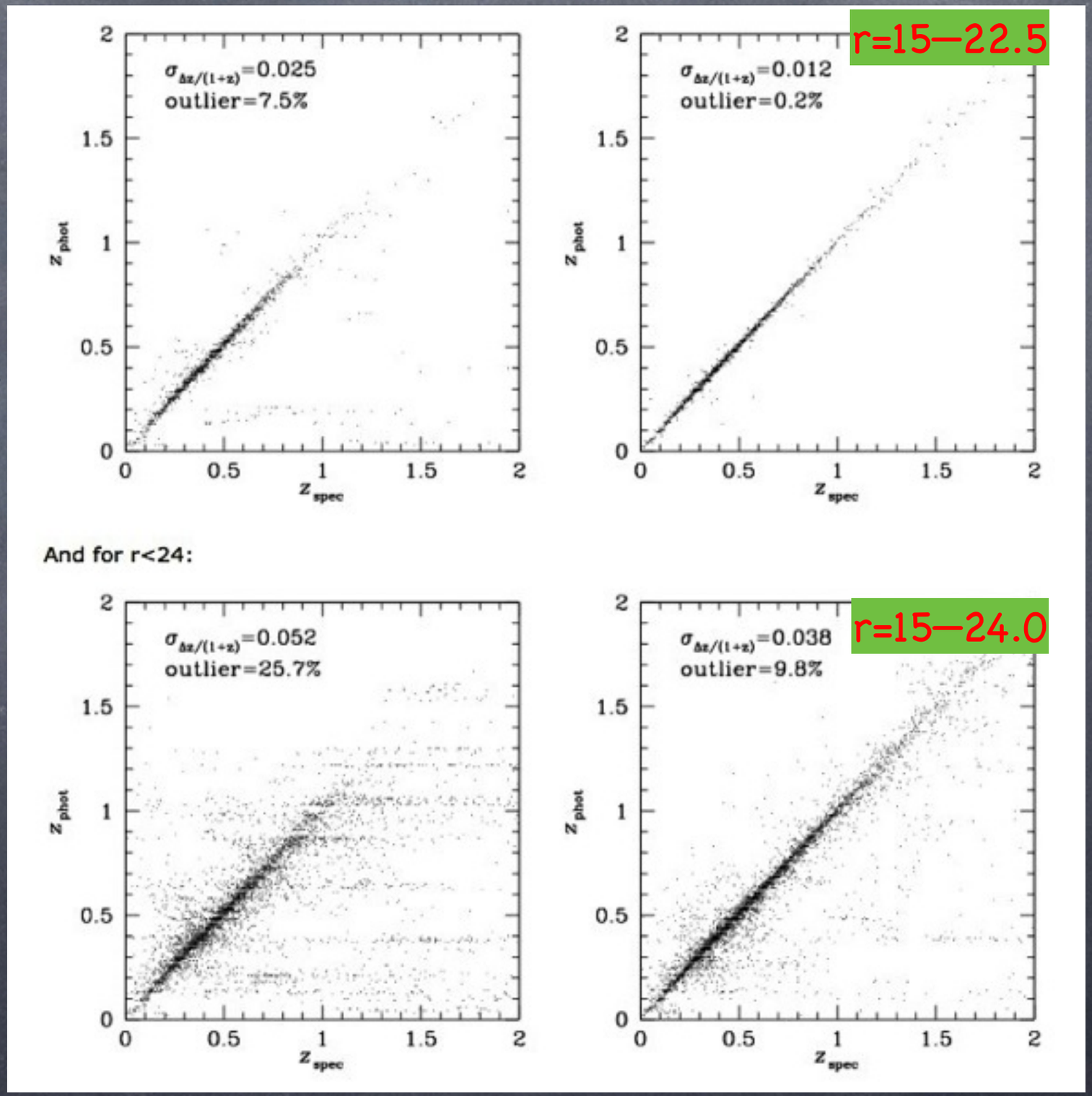
- ugri phot-z (H.Hildebrand)
- Tests with spec-z fields
- Approaching theoretical limiting accuracy!





Photometric redshifts -2

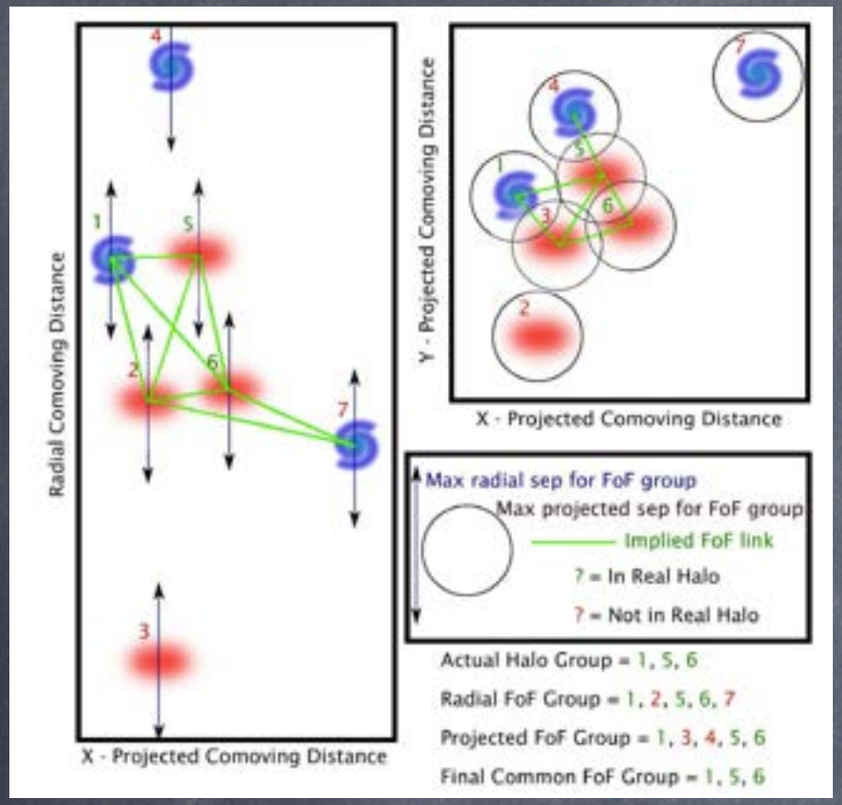
- simulations KiDS + VIKING ugriZYJHK
- Offers great potential…
- … but we are not there yet.

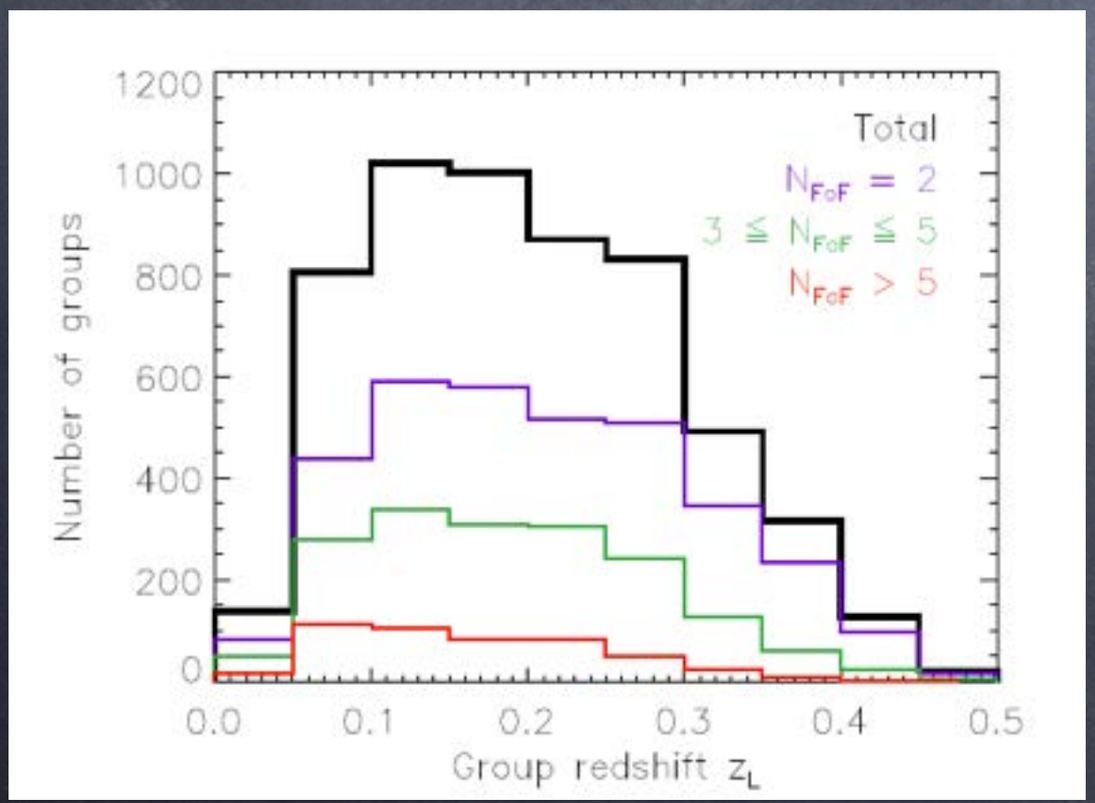


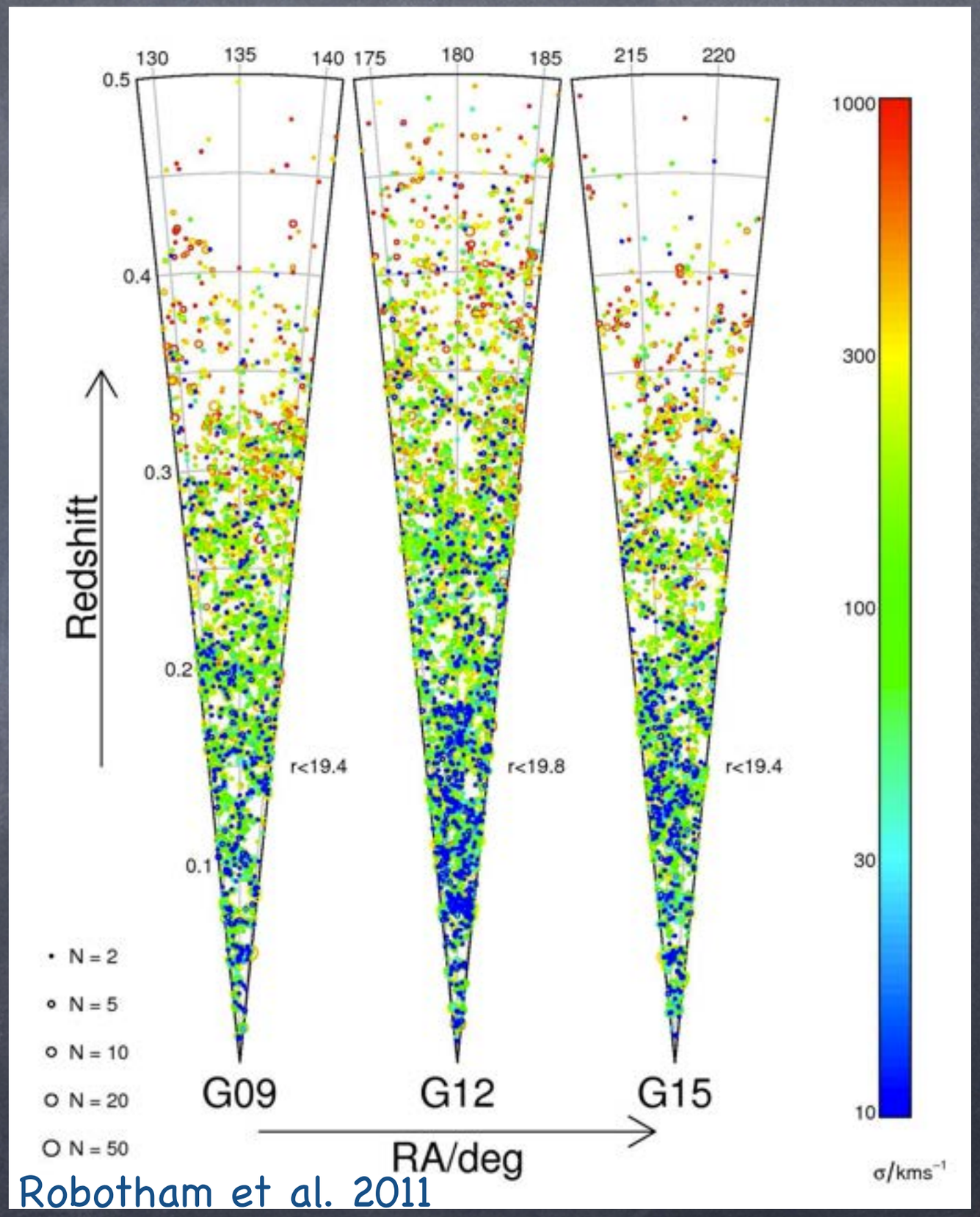
Photometric redshifts -3

- Ultimate goal is to include VIKING data as well
- We have not yet been able to achieve improvement in photo-z when adding IR
  - CASU reduction?
  - Inappropriate spectral templates?
- Continuing
  - improve phot-z — particularly catastrophic failures
  - SED information (in particular, stellar masses)

Lensing by GAMA groups



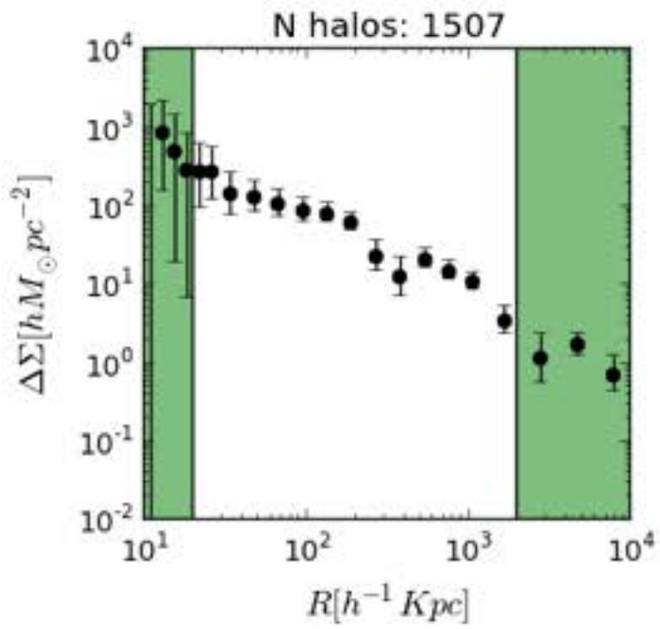


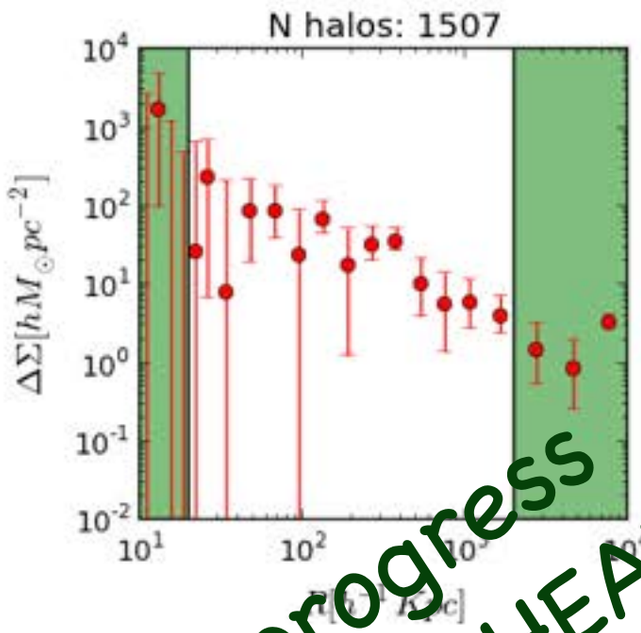


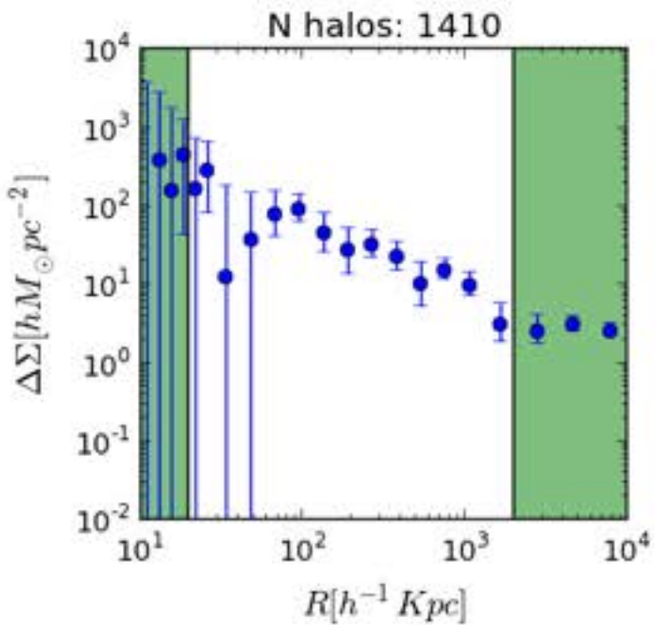
Robotham et al. 2011

Lensing by GAMA groups

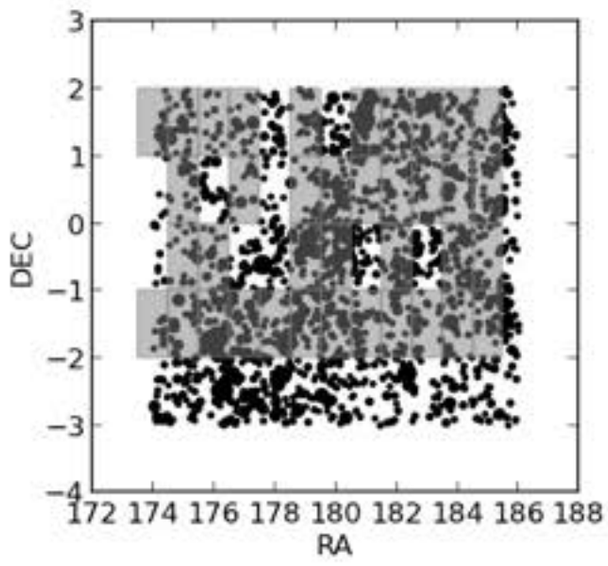
- groups with ≥ 3 members in GAMA catalogue

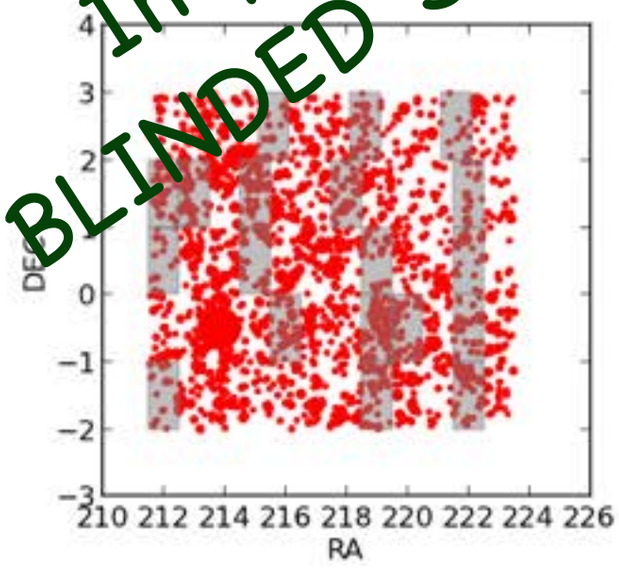


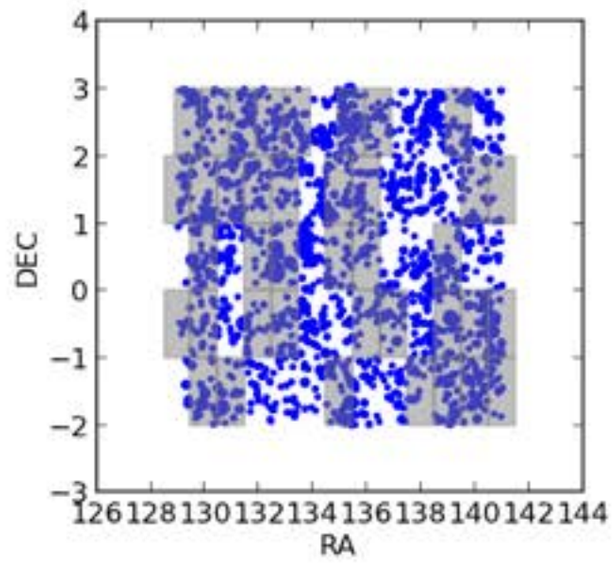




In progress
BLINDED SHEARS!!

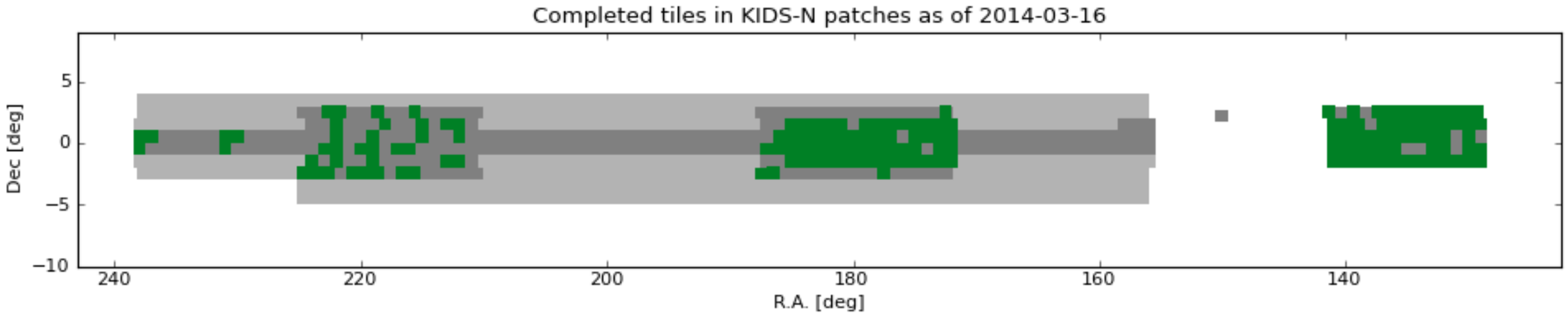


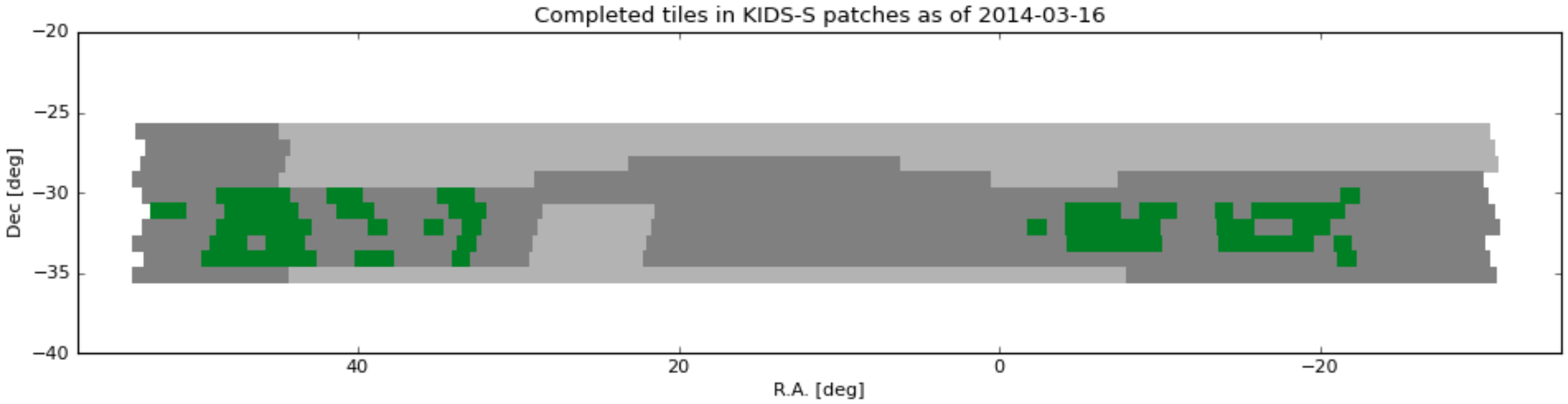




Next steps

ESO-DR2 imminent

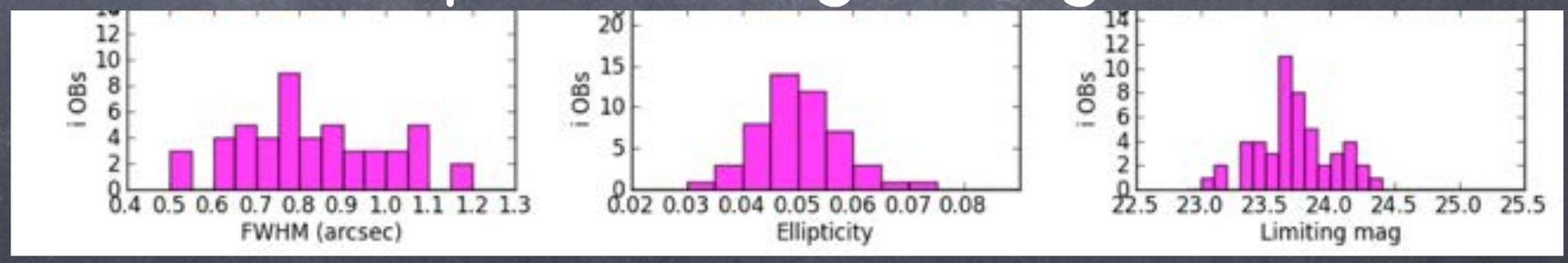




Observing strategy

- Complete GAMA
- Complete central strips in RA, then expend in Dec
- Room for prioritising most interesting regions
  - e.g. overlap with CMB ACTPol experiment

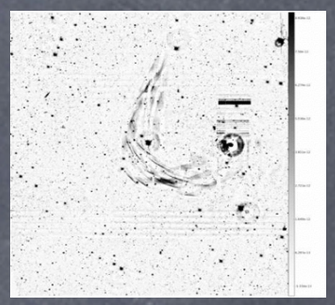
- Repeat i band exposures with poor seeing/background?



- Original plan includes a second repeat pass in g at end of survey, for proper motions and variability
  - do this in i band instead?

Observing strategy

- Are we using all photometric calibration observations?
  - polar field, composite filter observations
  - costs ±5% per night
  - some done in twilight
- Do we need all photometric calibration observations?



'Other' science

- Through project registration
- Groups on cluster finding, galactic str, qso's, galaxy morphology, strong lensing...
- KiDS spawning z-survey proposals as well