



# KiDS

# Durham ATLAS mtg

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# KIDS-VIKING in a nutshell



- 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

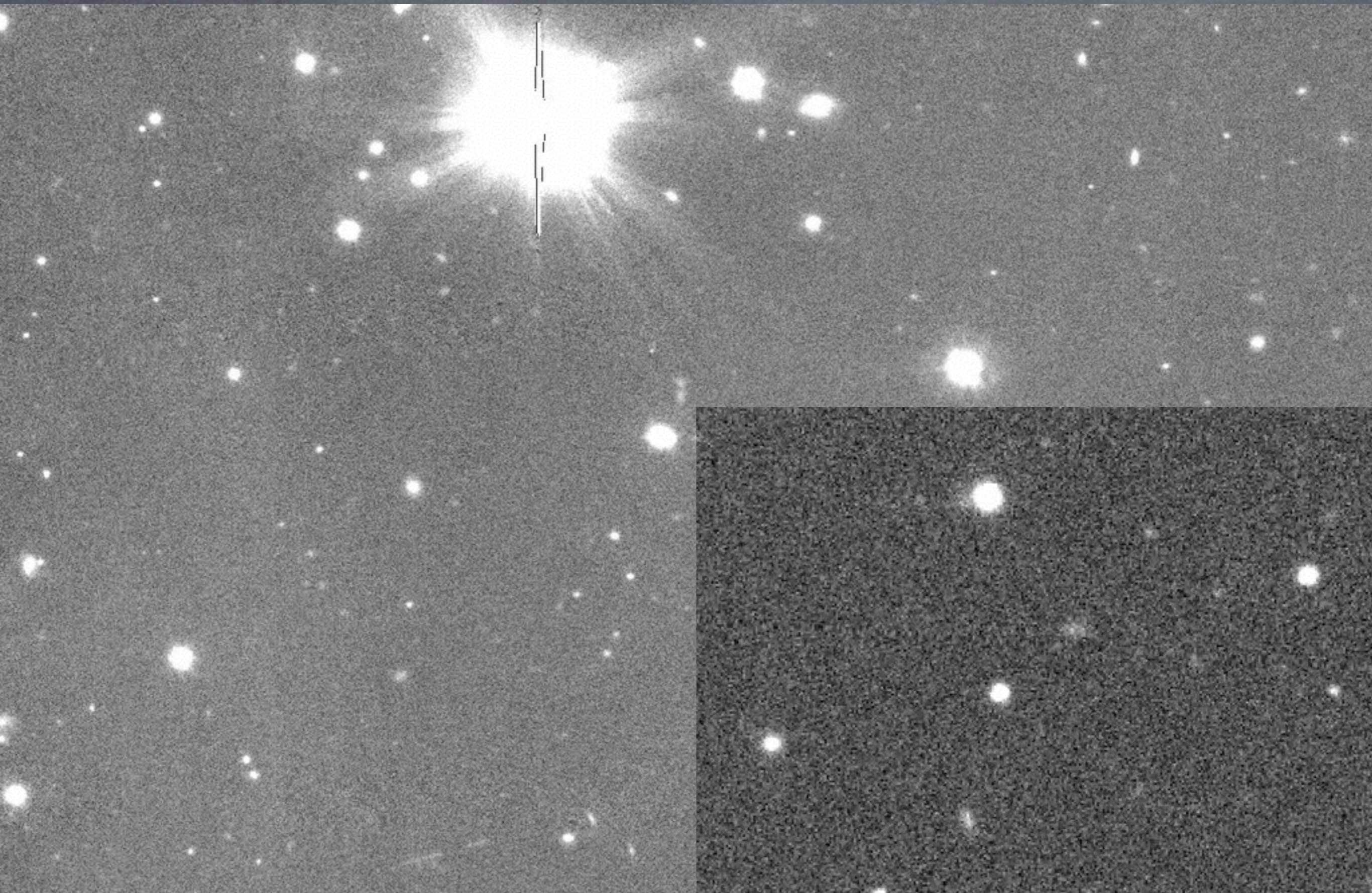
250 nights: VIKING  
(PI. Alastair Edge)

# 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



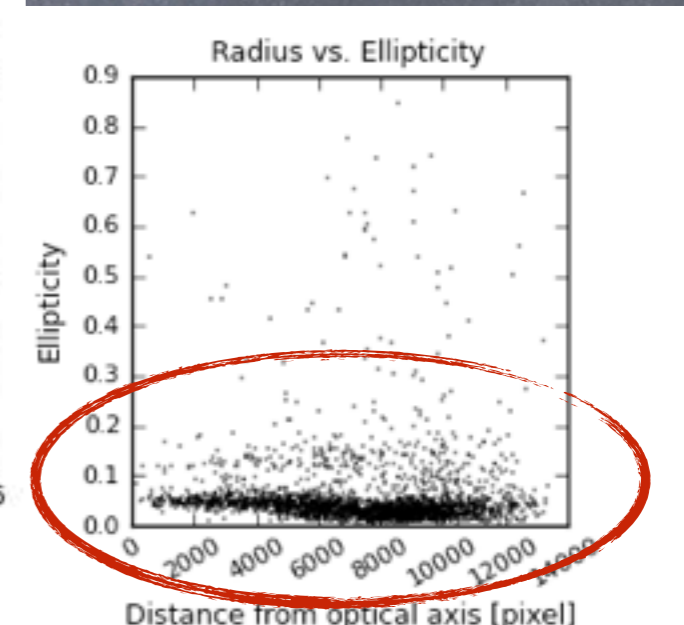
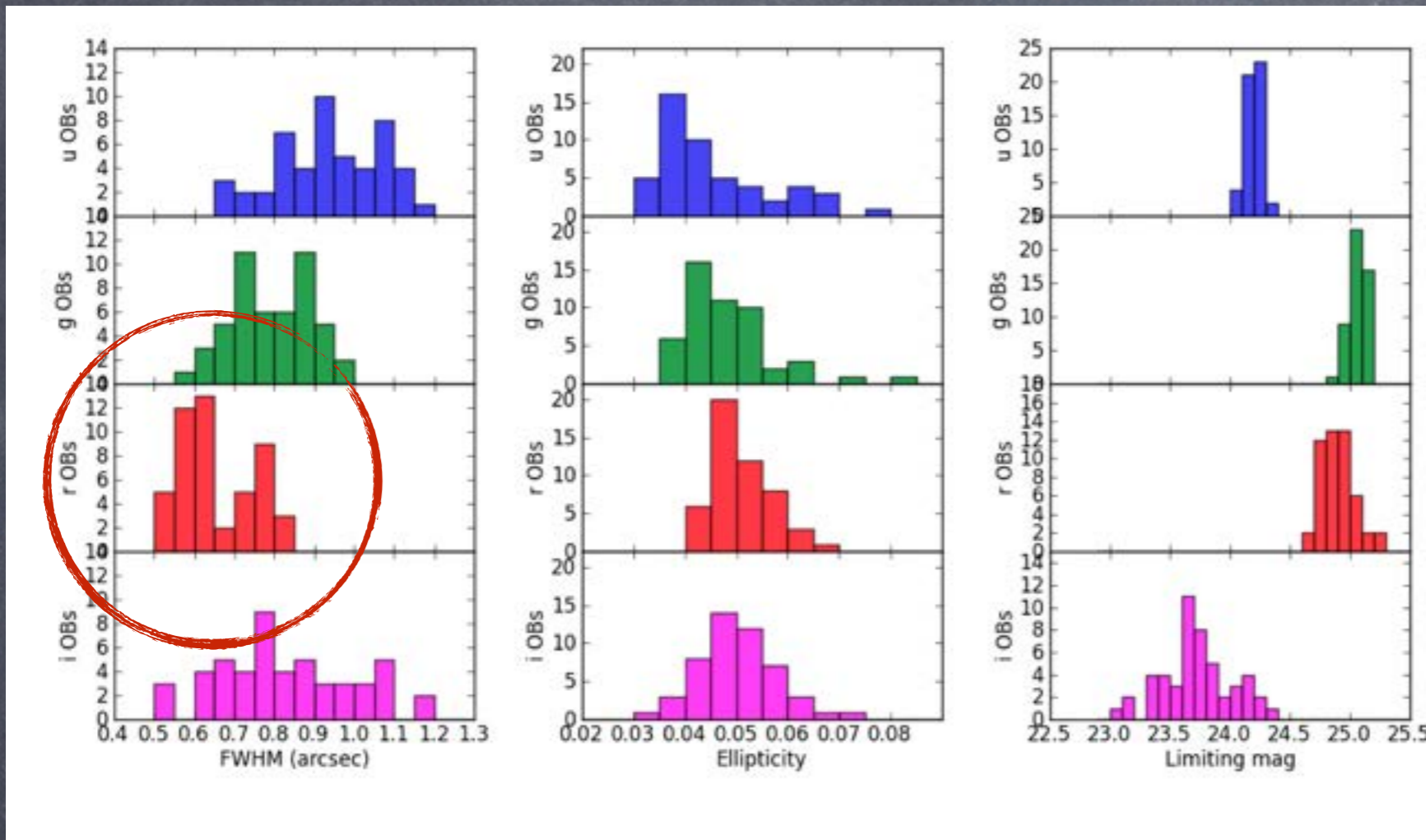
- Measure matter distribution as function of redshift using lensing
  - tomography: use sources at different redshifts
- **Galaxy formation**: relation between dark matter haloes and embedded galaxies
- **Power spectrum evolution** = probe of expansion history
  - lensing also provides expansion history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

# Status of survey

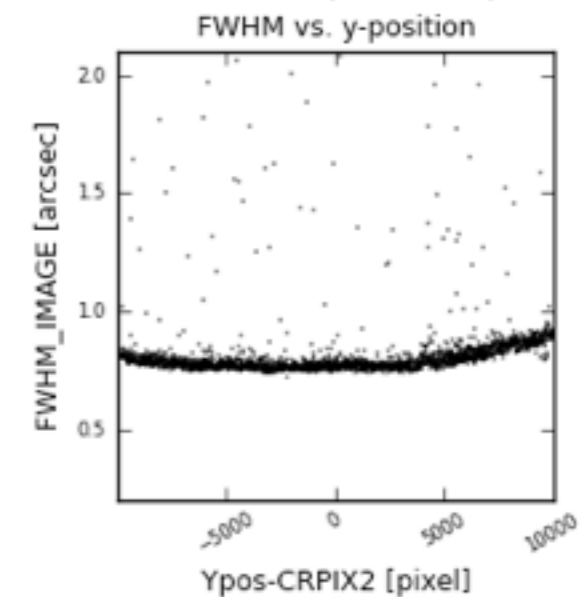
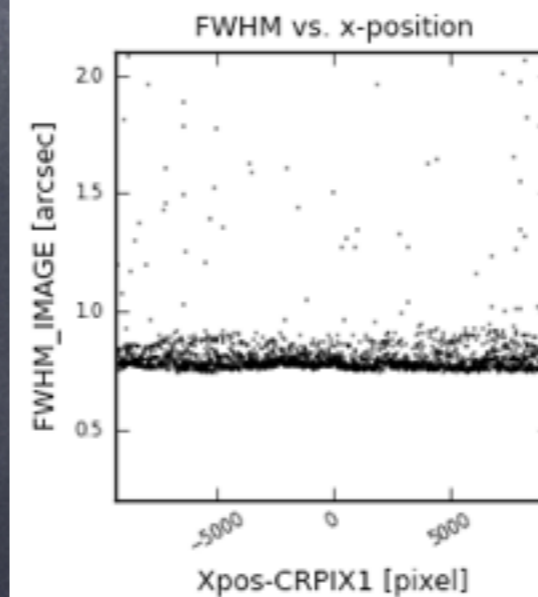


- ca 300 sqdeg observed in 4 bands (800 in i band)
- Focus on GAMA survey regions
  - >200k complete redshifts ( $r < 19.8$ )
  - Much other data (Herschel, VIKING, ...)
- Data rate so far is only 10% of survey per year...
  - happy with image quality we are getting

# Seeing distributions

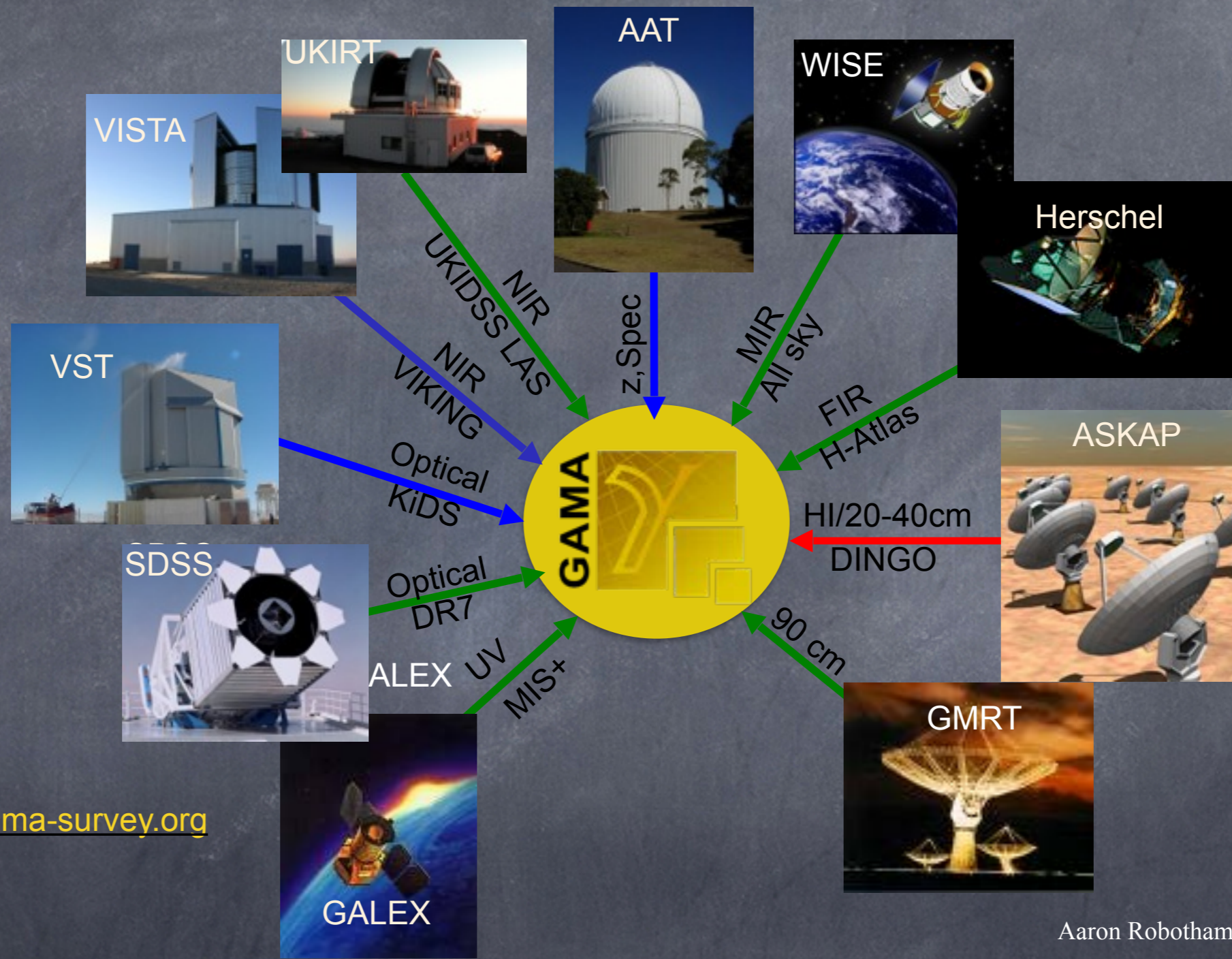
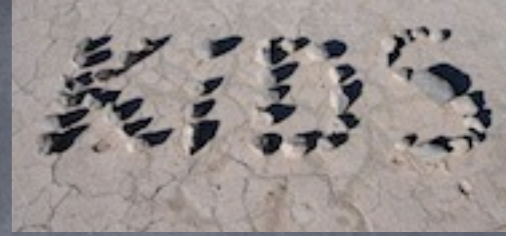


Unique!





# GAMA



[www.gama-survey.org](http://www.gama-survey.org)

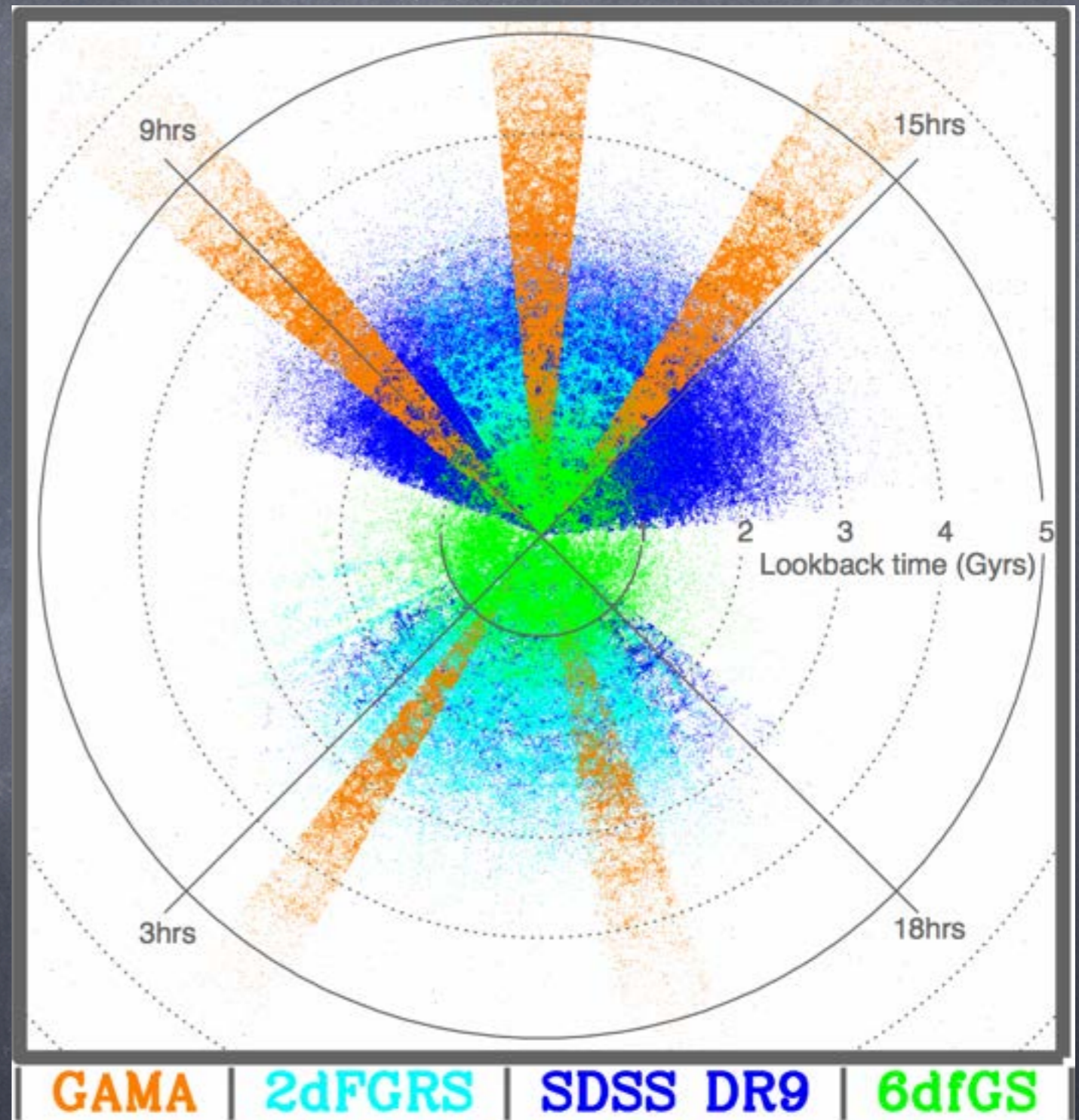




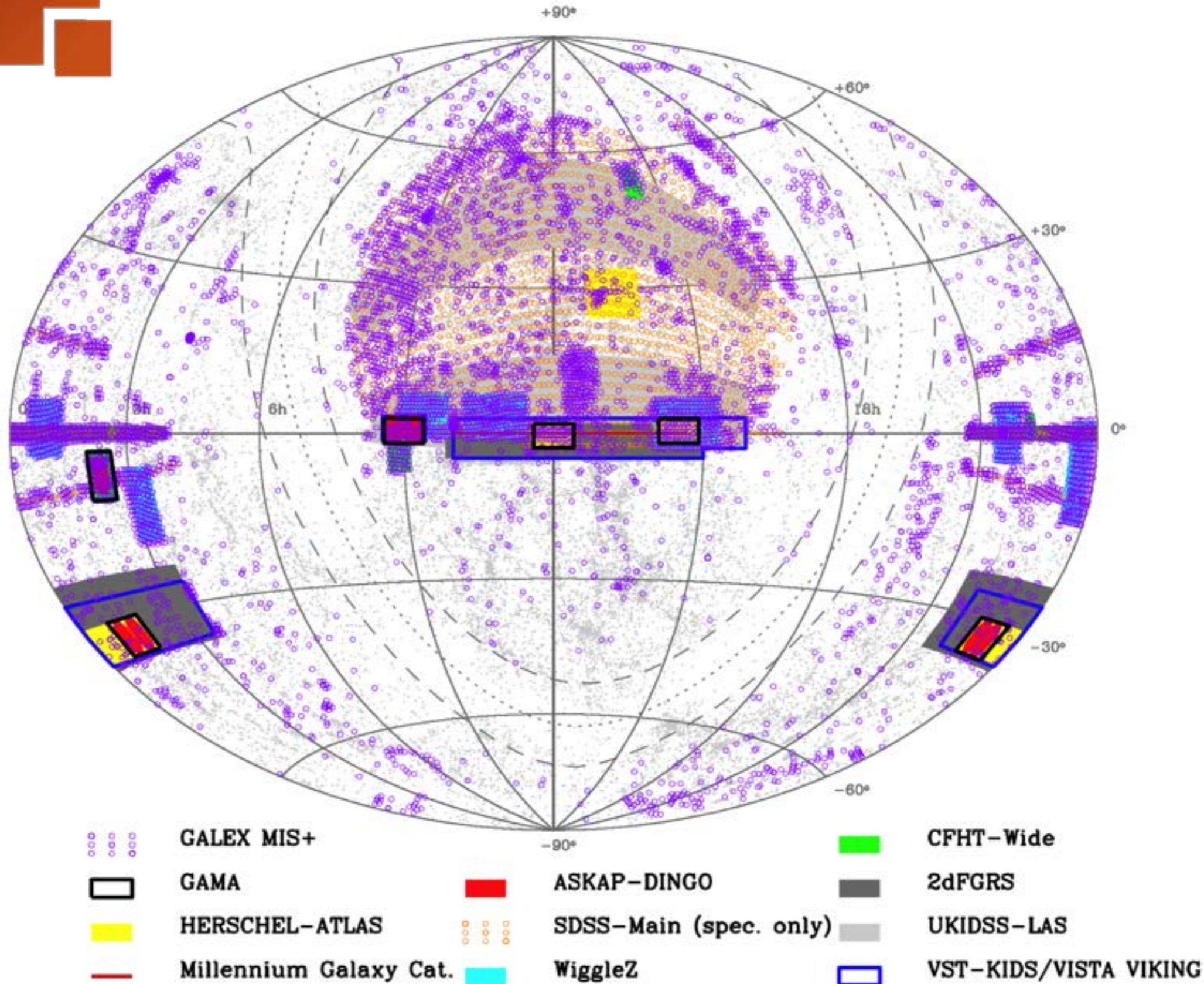
# GAMA



- 250k redshifts, AA $\Omega$ @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



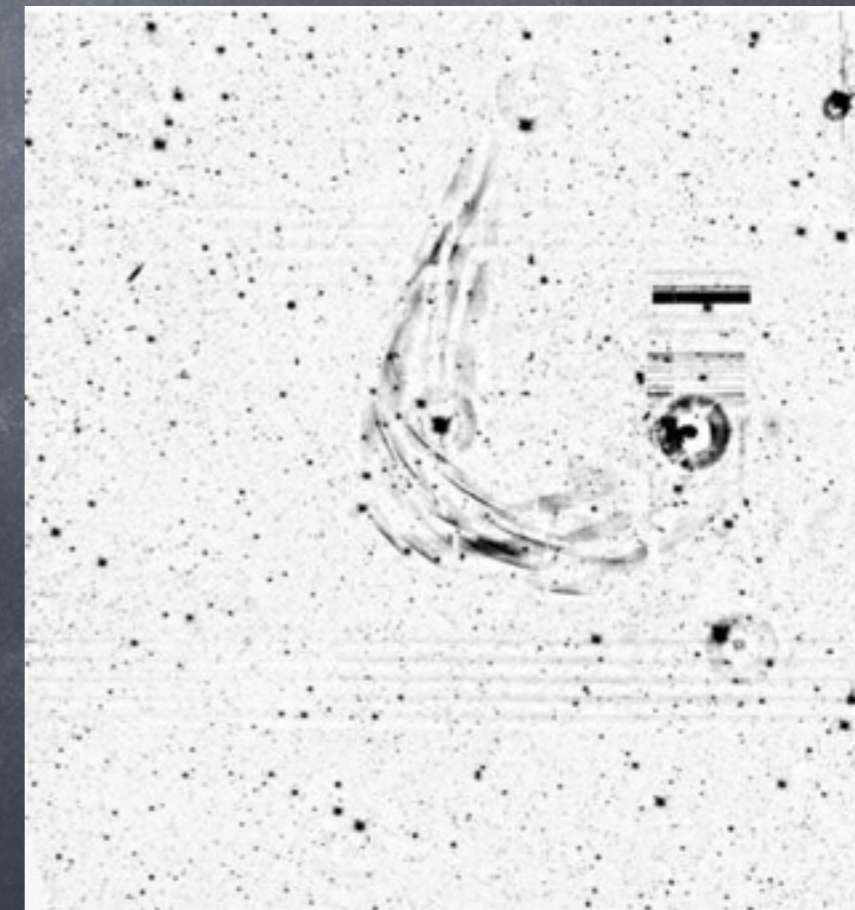
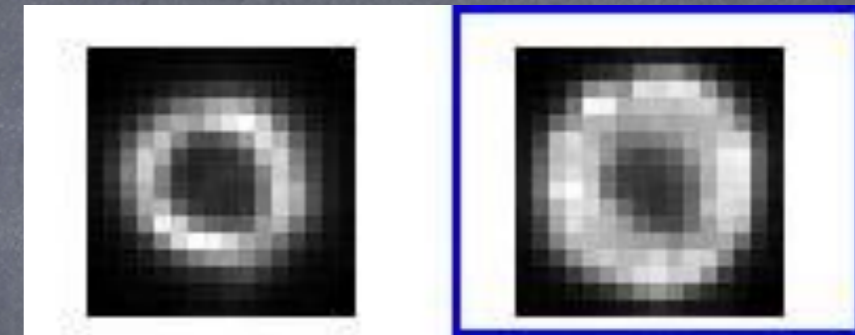
## GAMA



# Operations on Paranal



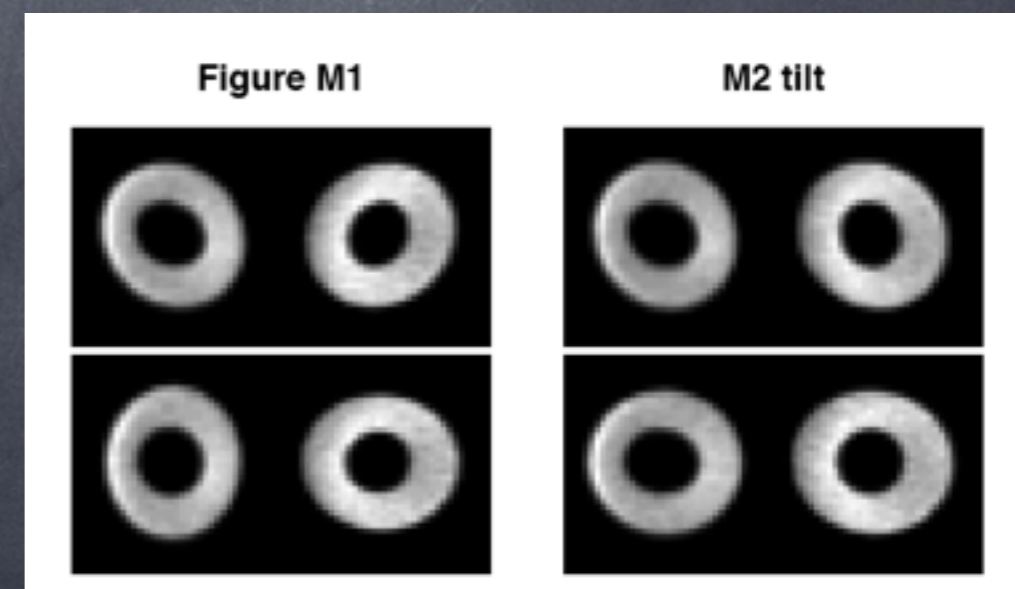
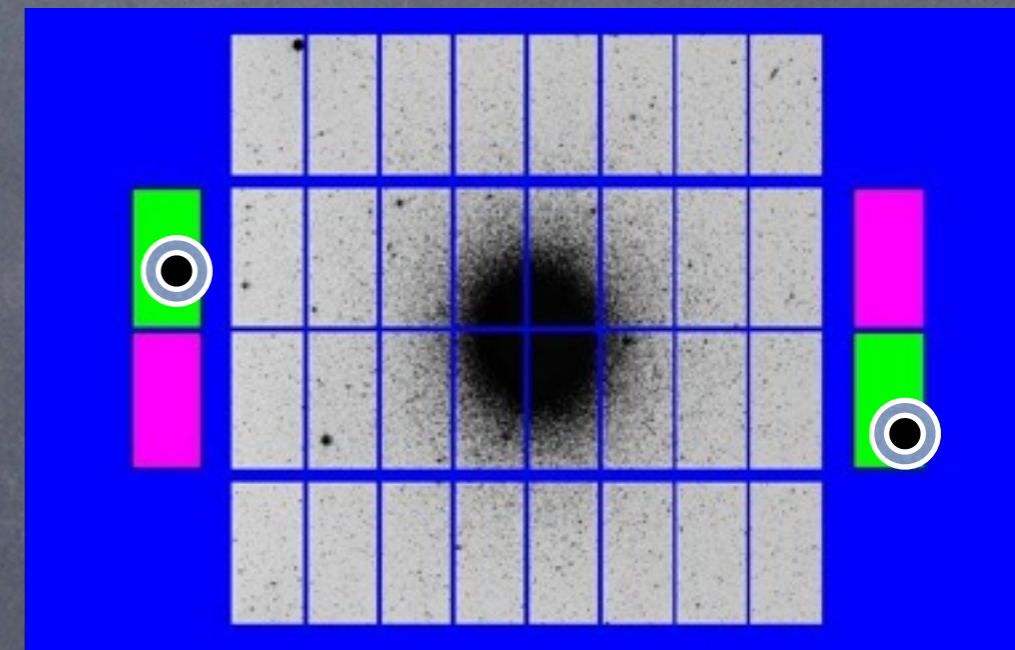
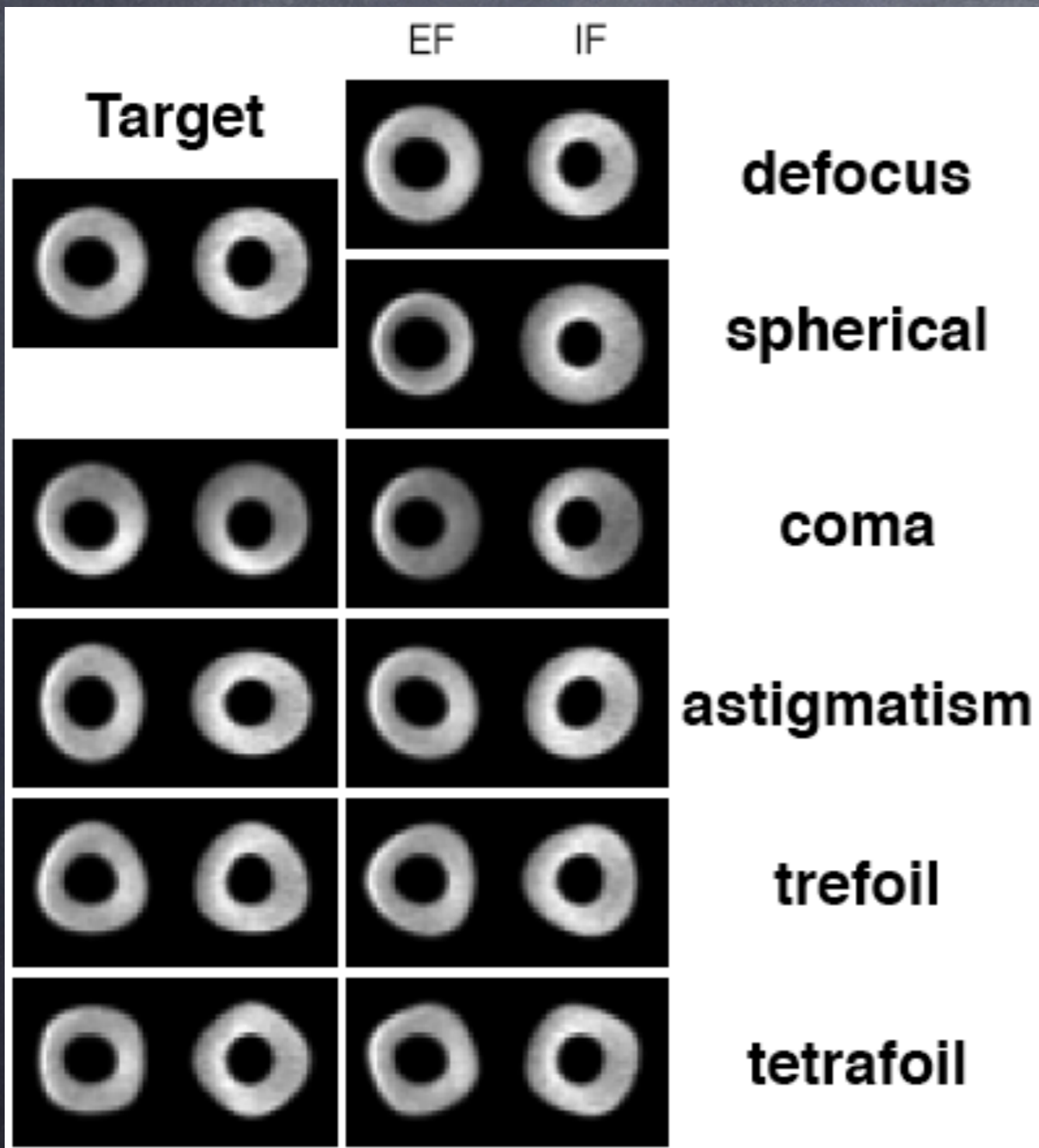
- technical runs to improve efficiency
  - speed up acquisition of new targets:
    - don't forget previous alignment
    - improve lookup tables for M1,M2
    - faster analysis of 'donuts'
- Avoid repeating useful observations!
- VST issues
  - M2 failures
  - Atm. Dispersion Compensator
  - telescope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



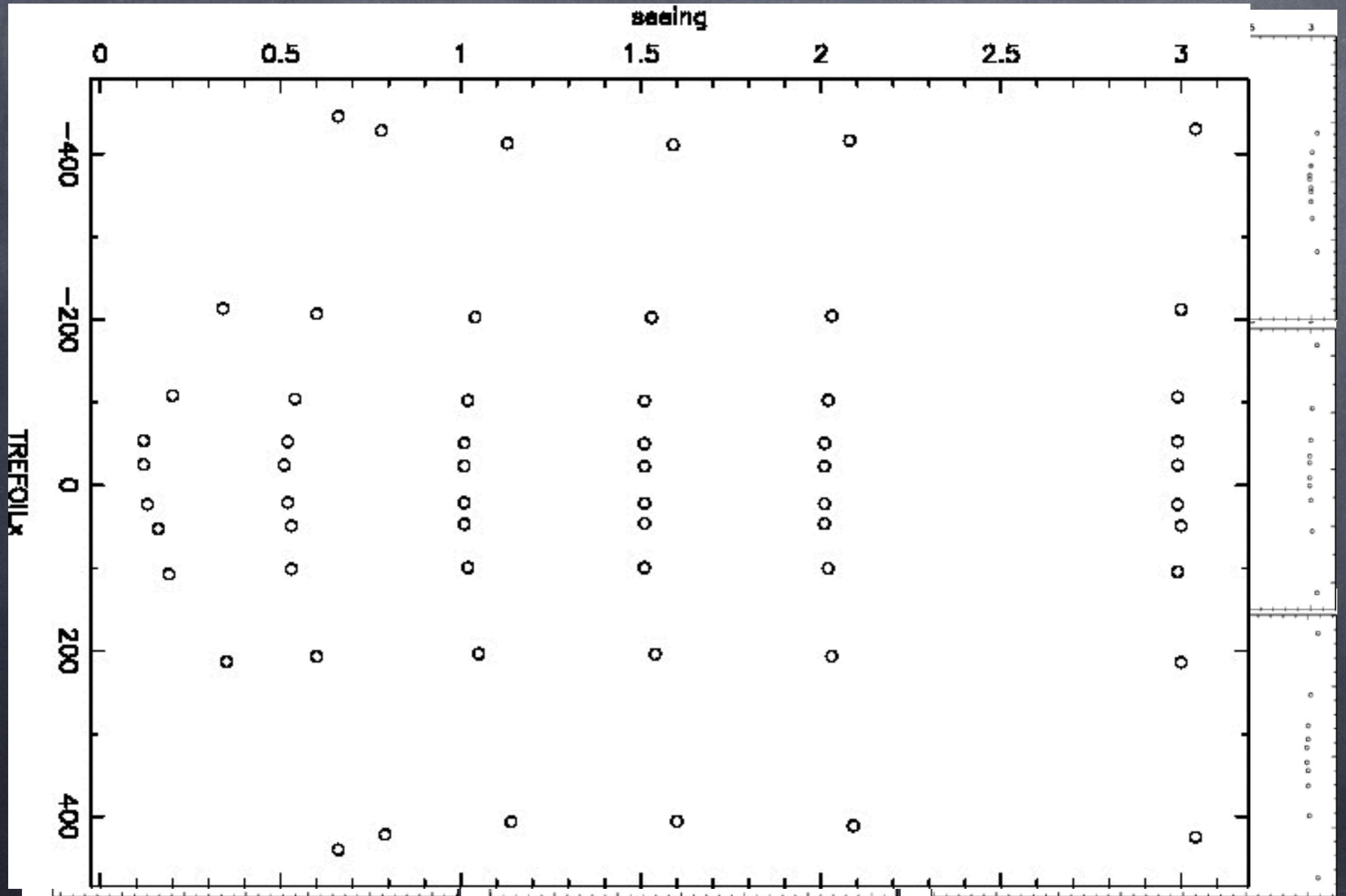
# Operations on Paranal

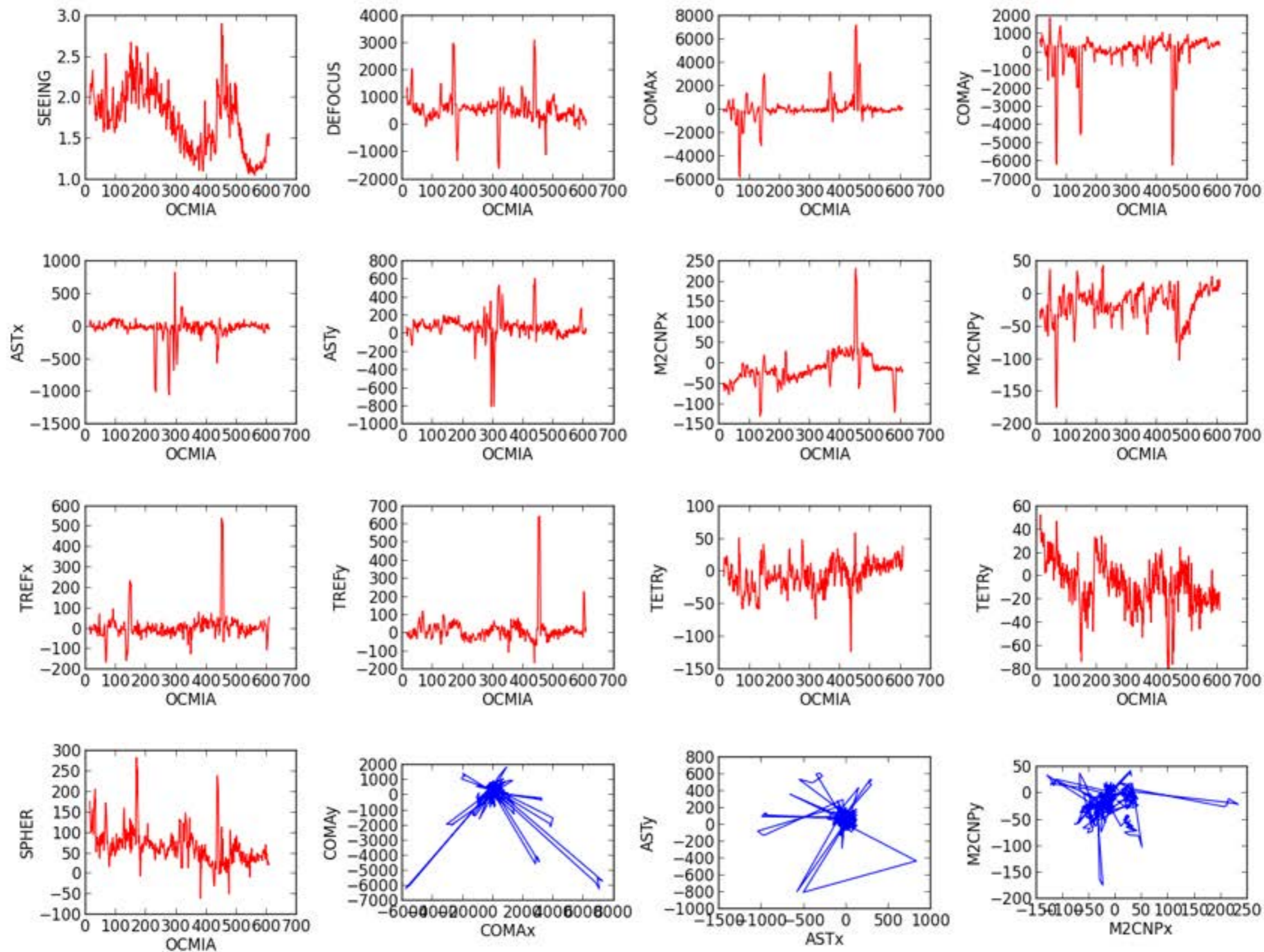


- Improved 'donut' algorithms being developed



# New IA algorithm

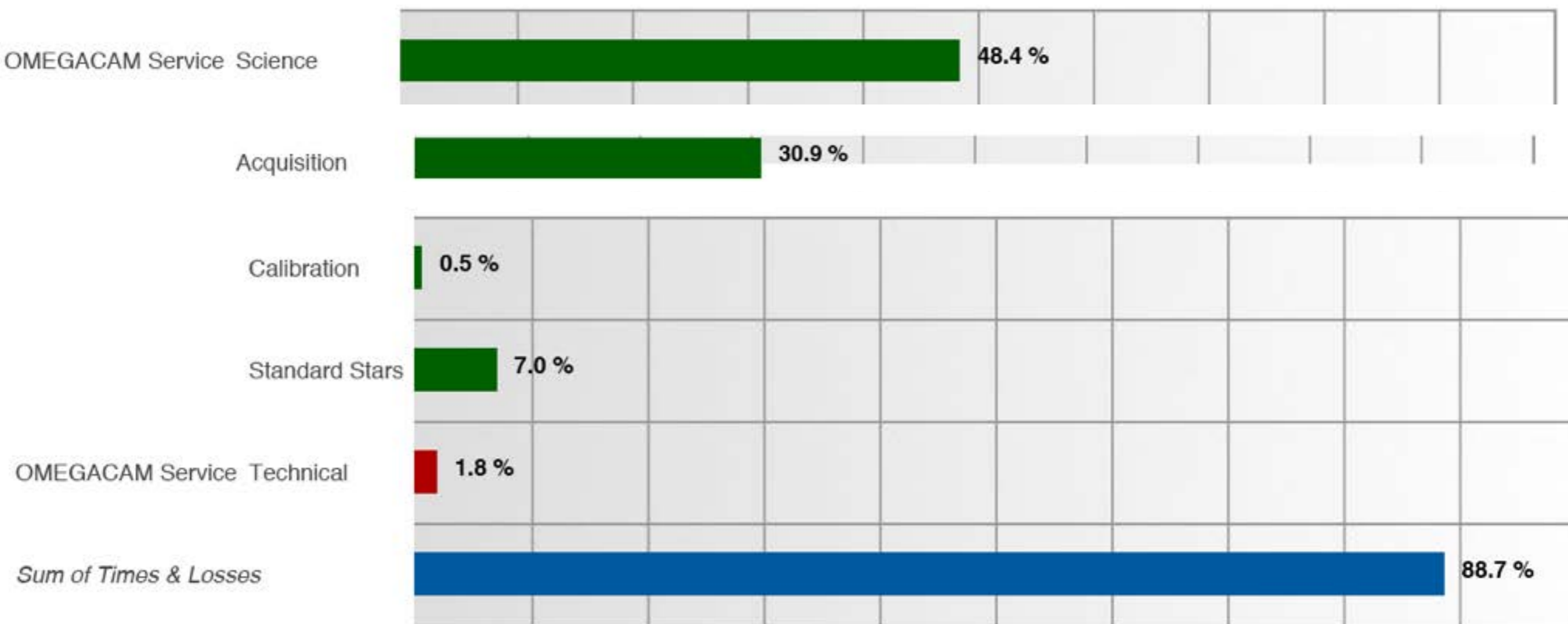




# Operations on Paranal



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 Gamma 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**

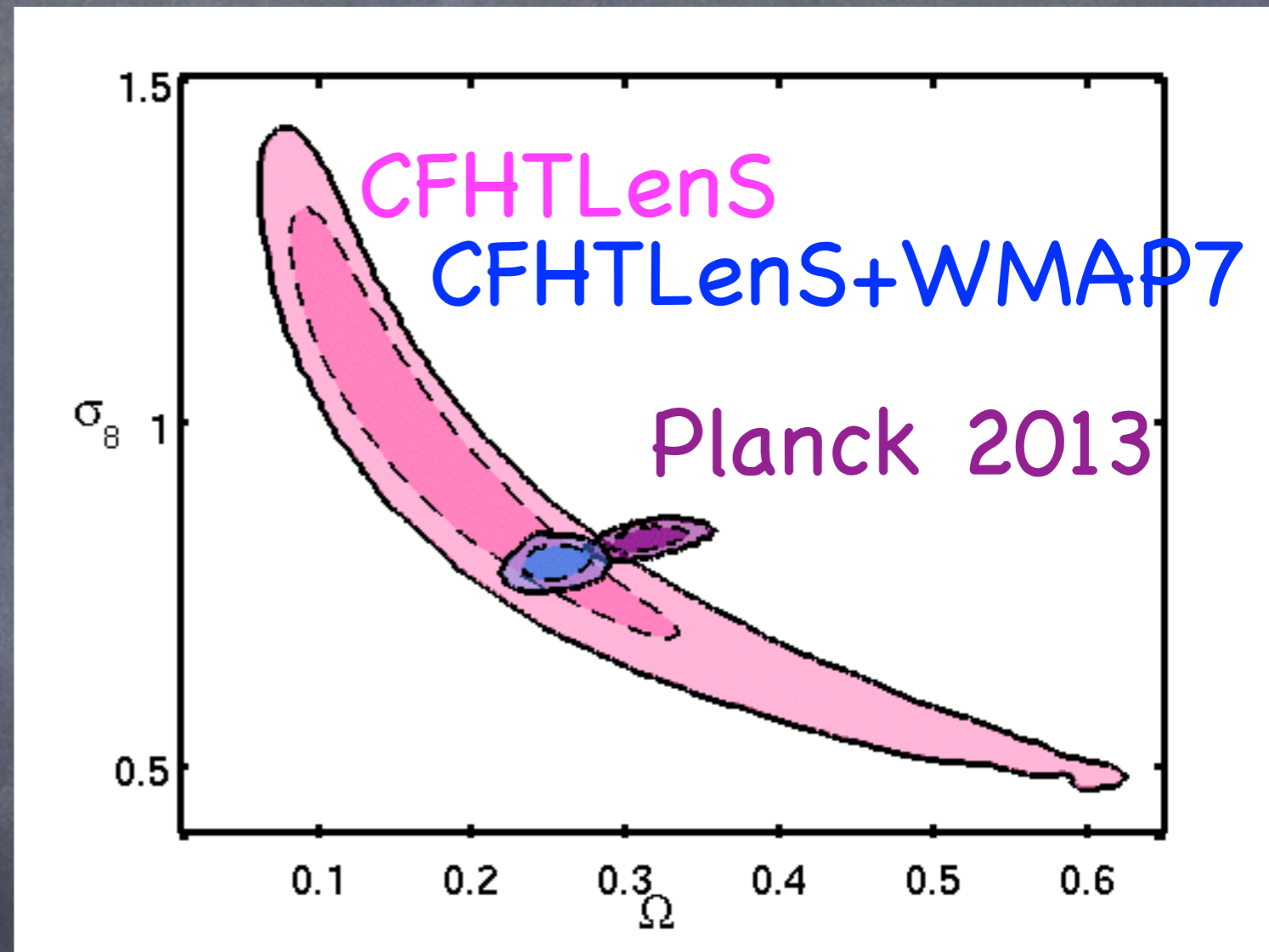
## • Photometric redshifts

- BPZ algorithm
- PSF gaussianization
- Gaussian-aperture photometry
- uses **AstroWISE** stacks and calibration
- 4-band for now, working on incorporating VIKING

# Why blind the ellipticities?

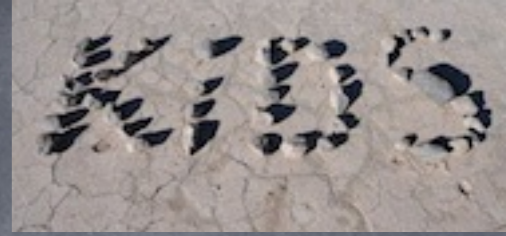


- CFHTLenS — Planck
- 2.7 sigma tension
- tomographic analysis

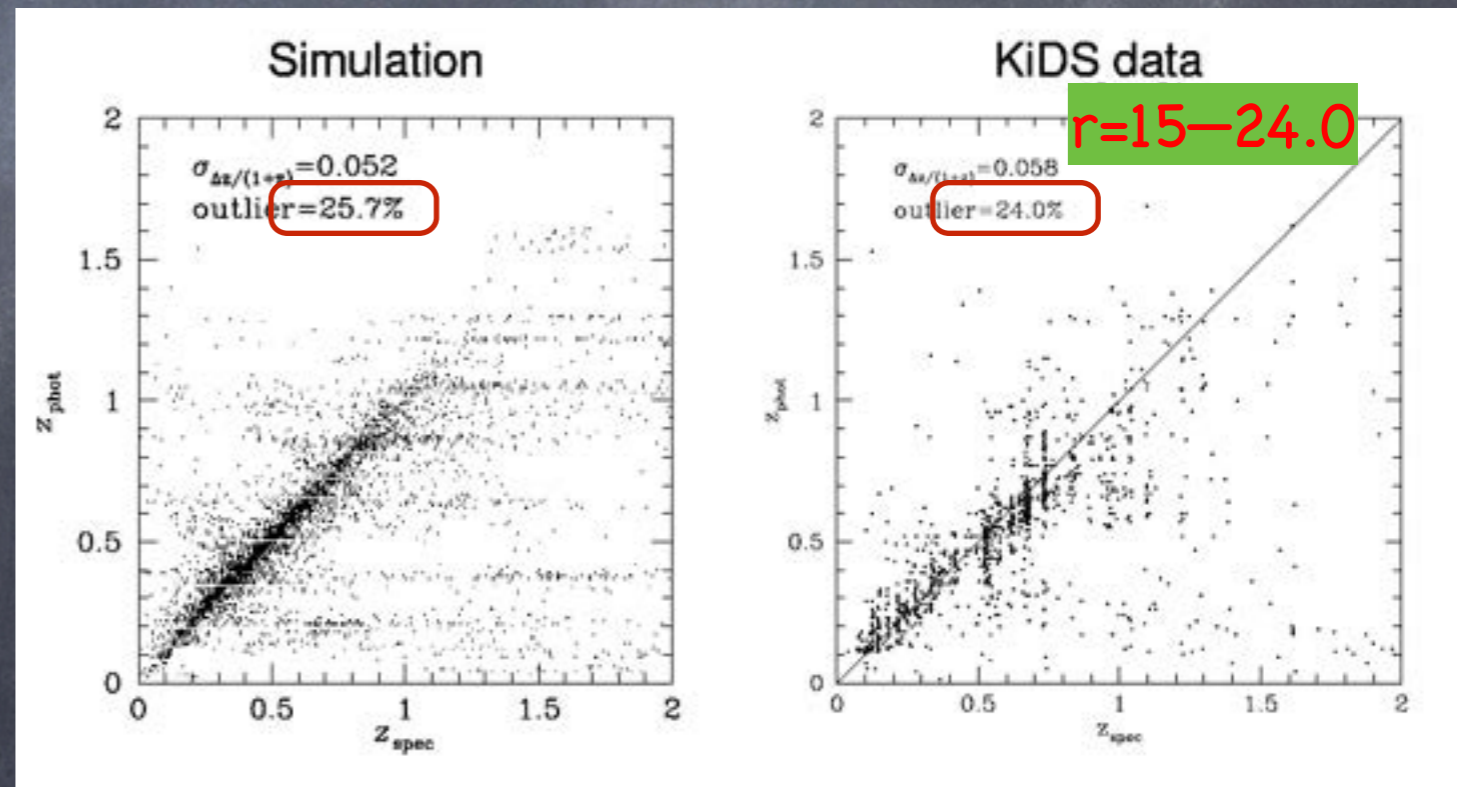
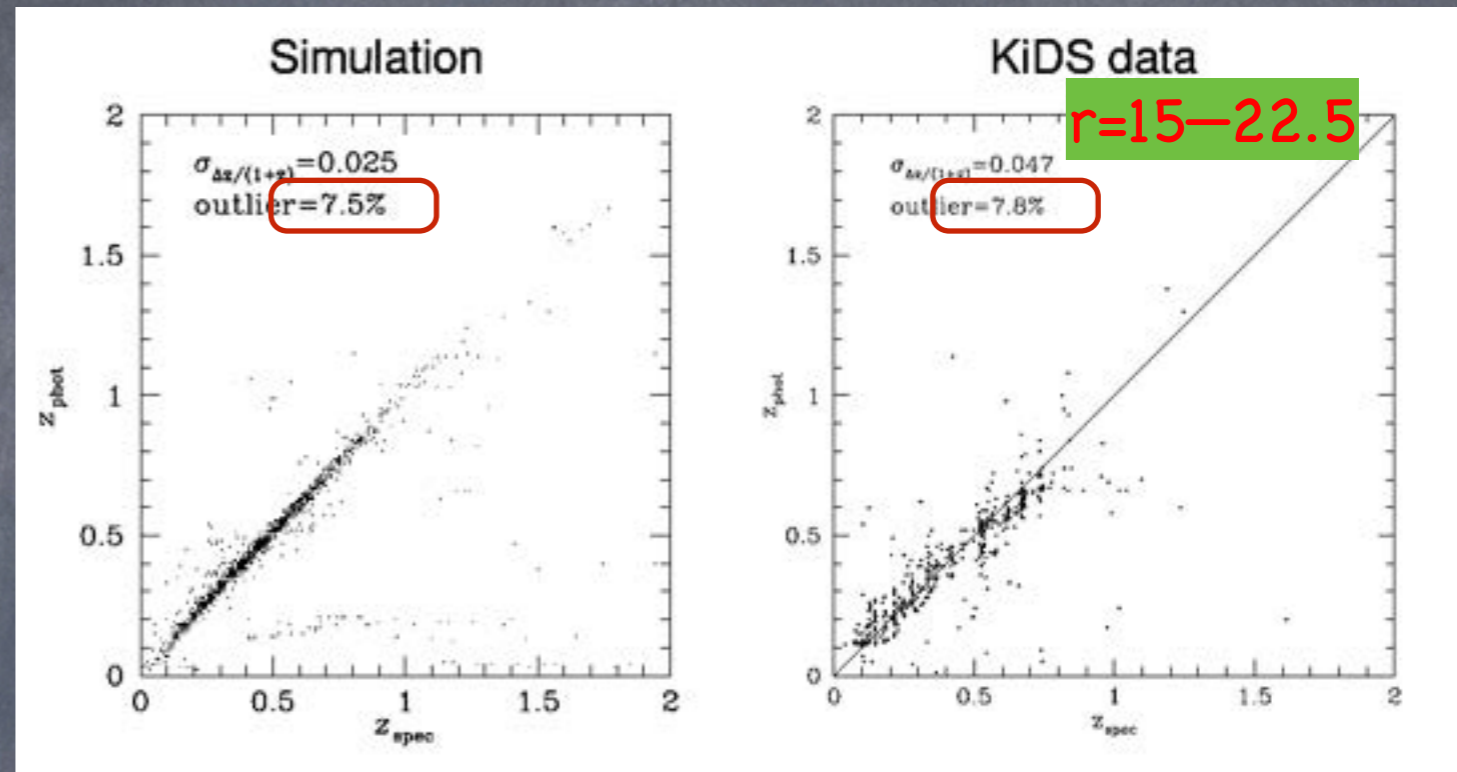


- Motivates analysis of new dataset, with blinding

# Photometric redshifts -1



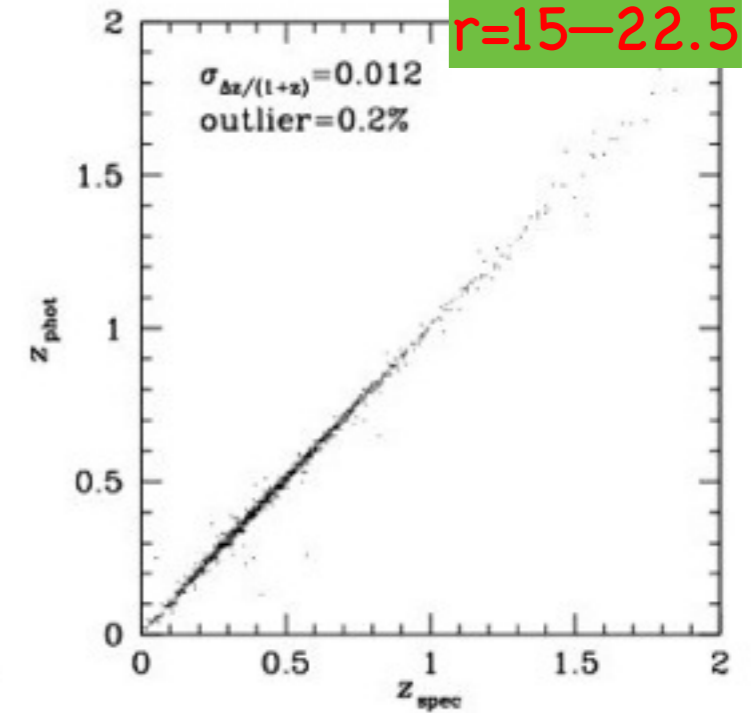
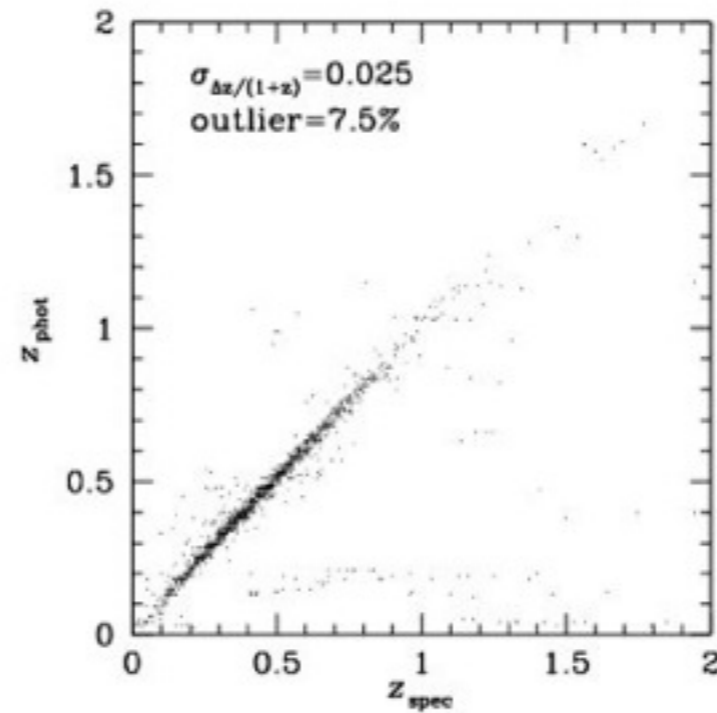
- ugri phot-z (H.Hildebrand)
- Tests with spec-z fields
- Approaching theoretical limiting accuracy!



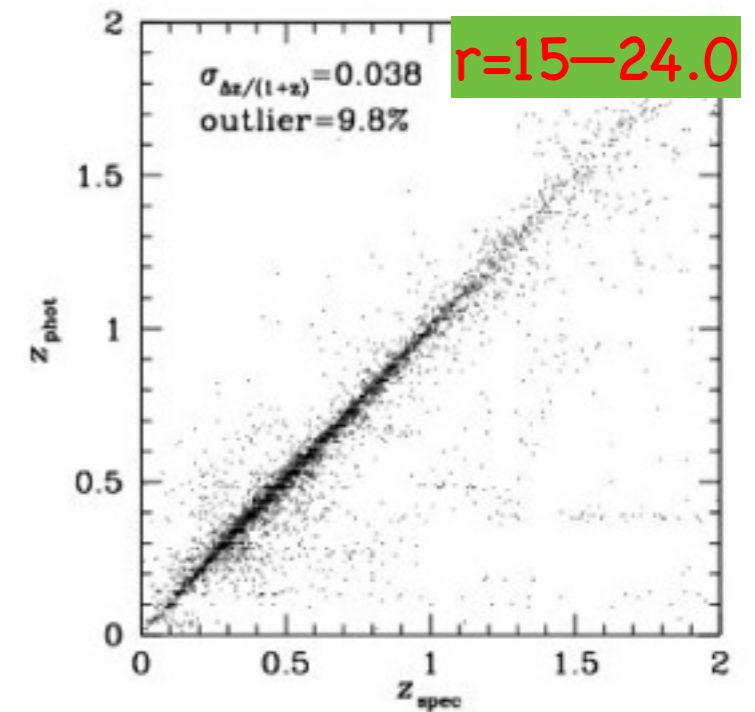
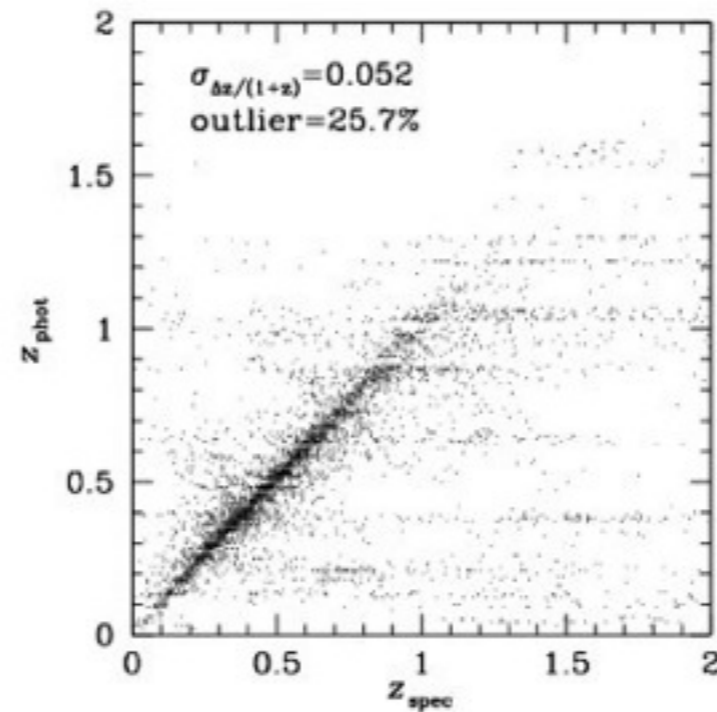
# Photometric redshifts -2



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



And for  $r < 24$ :

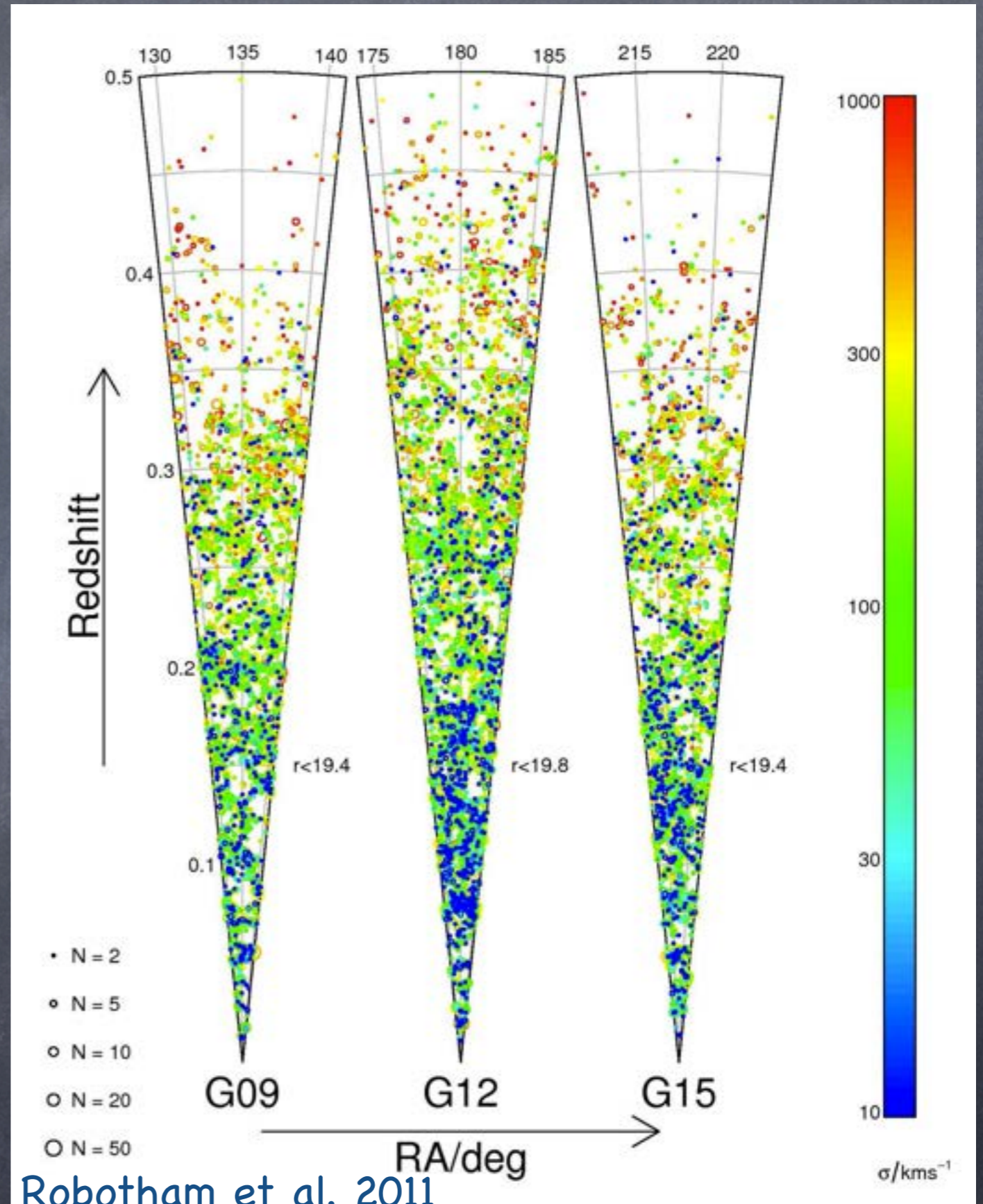
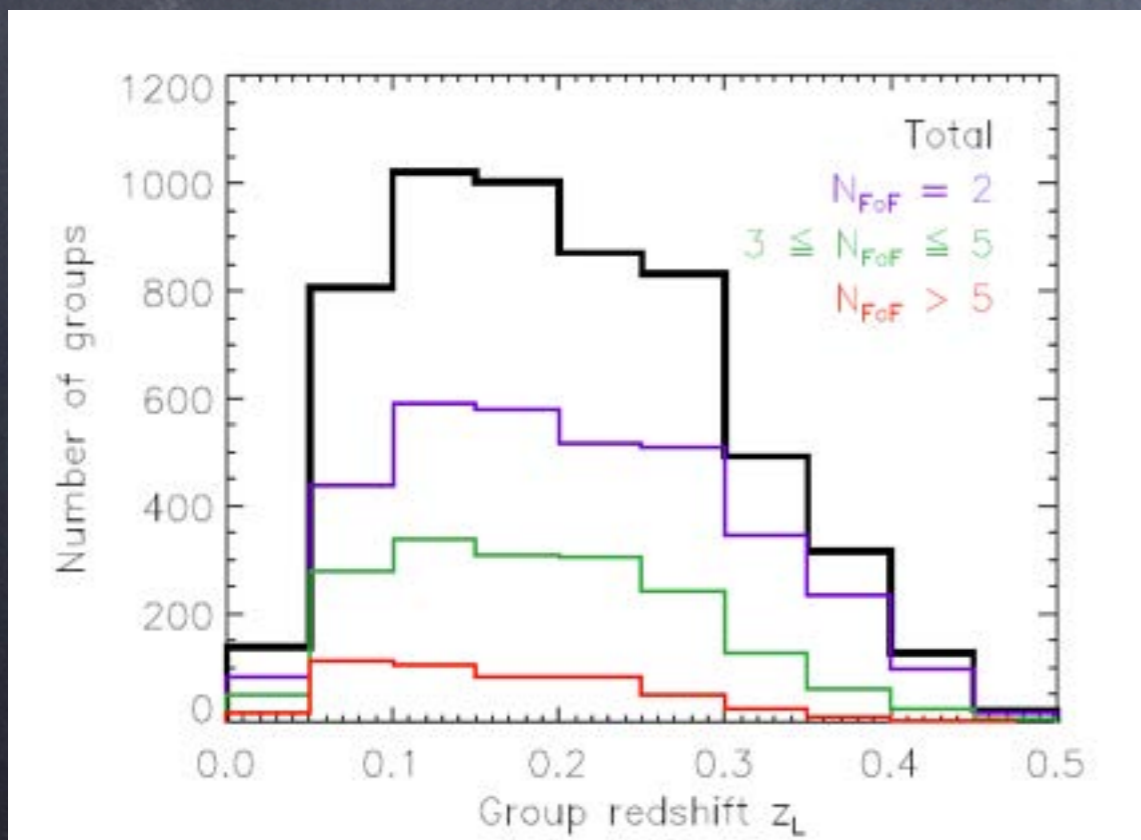
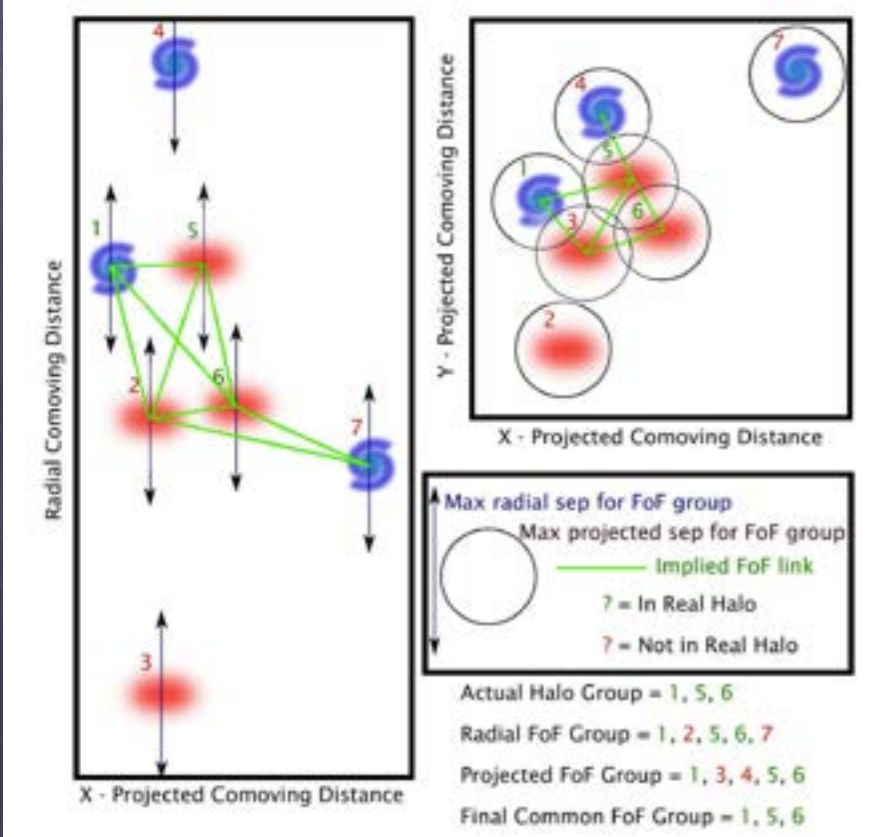
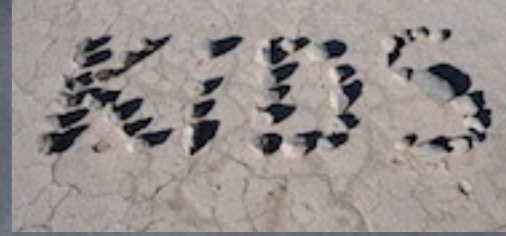


# Photometric redshifts -3



- 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

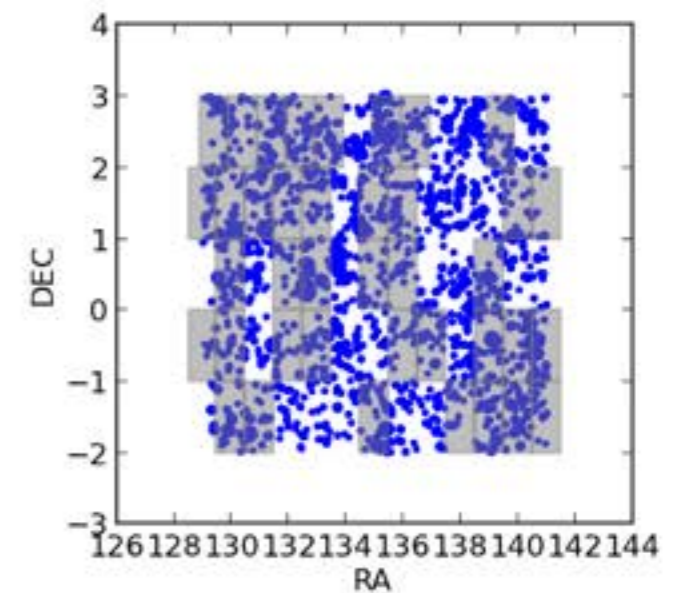
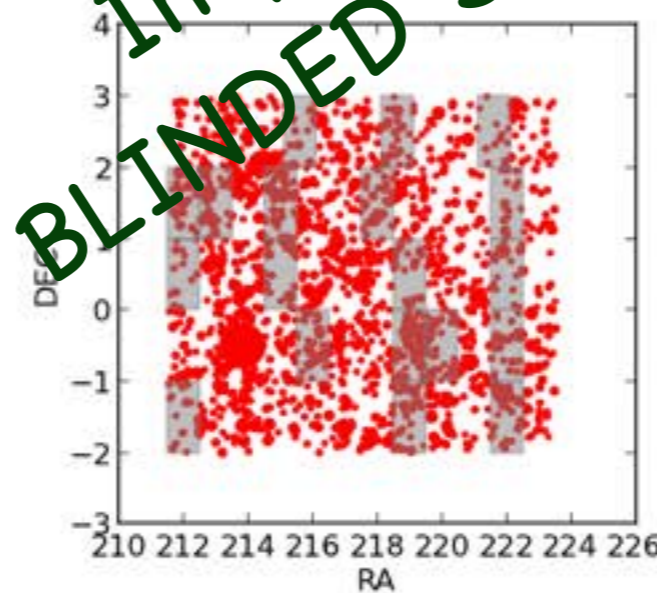
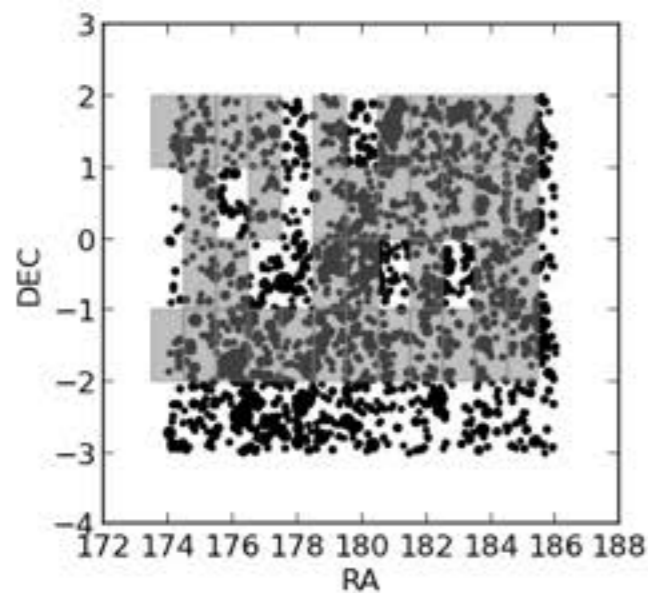
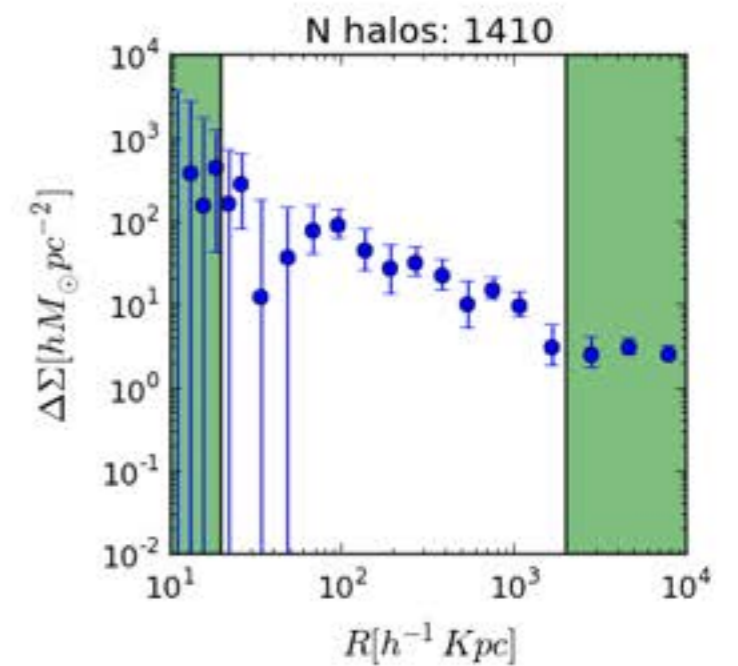
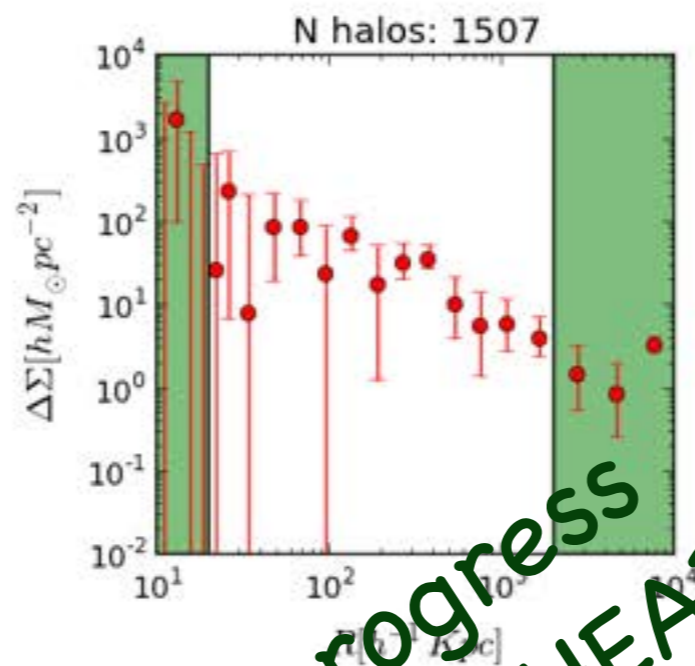
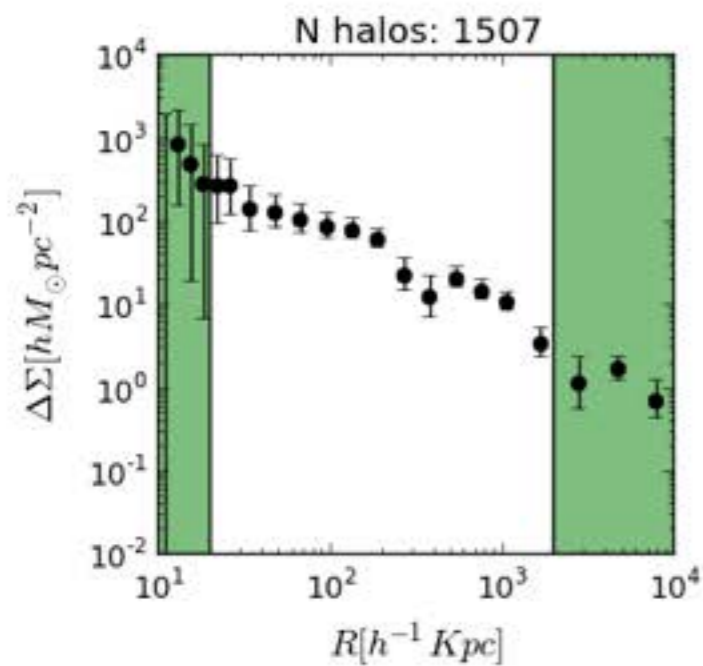




# Lensing by GAMA groups



- groups with  $\geq 3$  members in GAMA catalogue



In progress  
BLINDED SHEARS!!

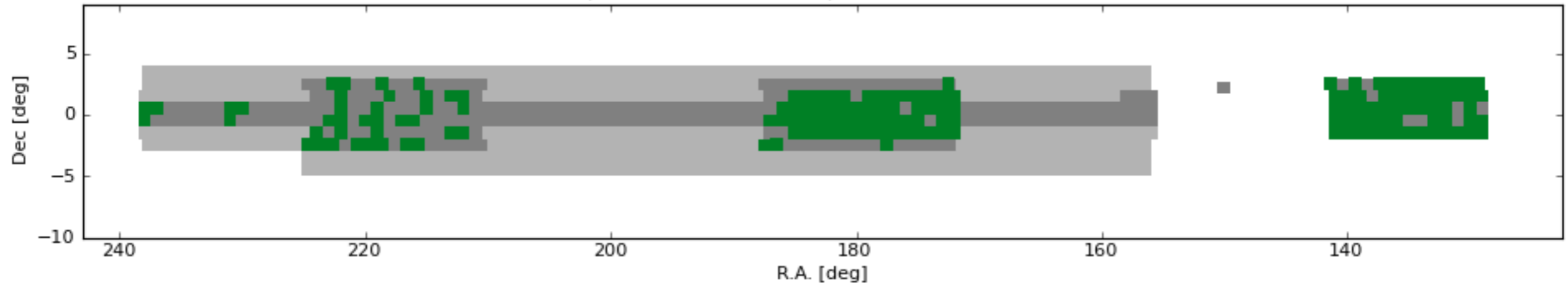


Next steps

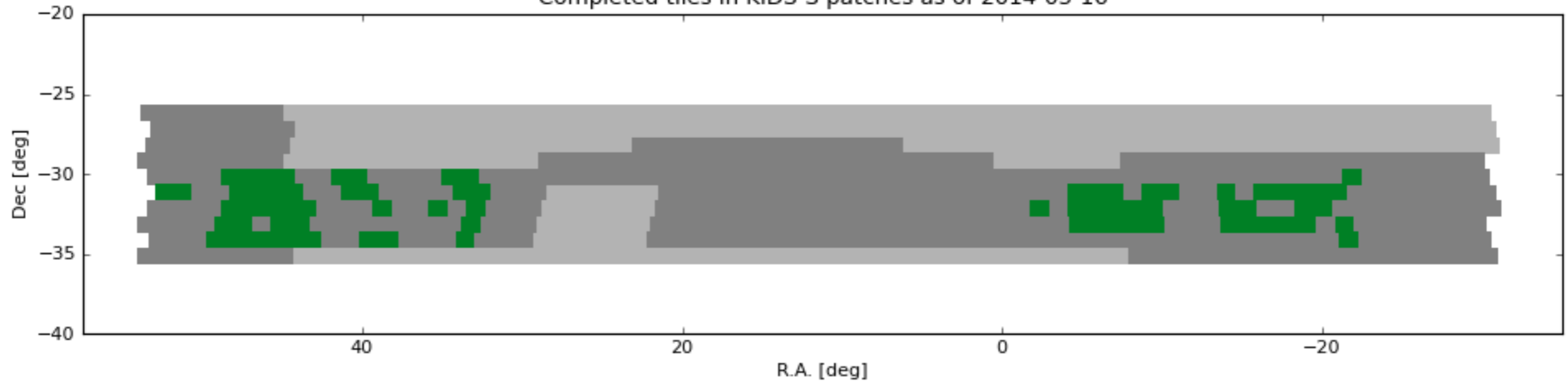
# ESO-DR2 imminent



Completed tiles in KIDS-N patches as of 2014-03-16



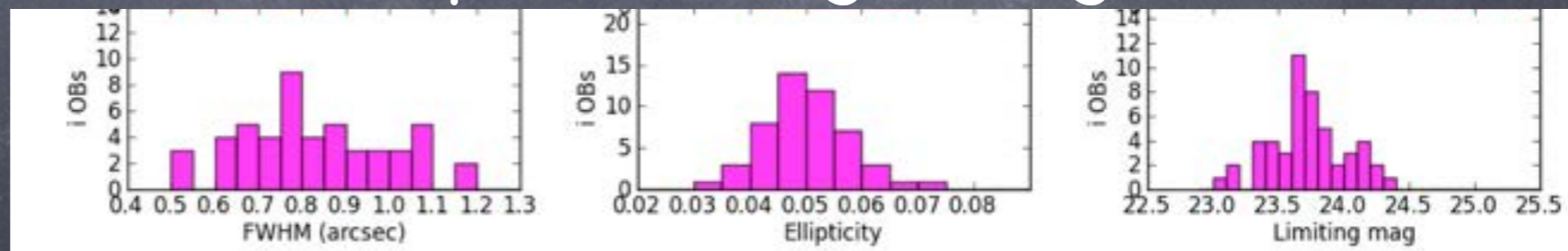
Completed tiles in KIDS-S patches as of 2014-03-16



# Observing strategy



- Complete GAMA
- Complete central strips in RA, then expand in Dec
- Room for prioritising most interesting regions
  - e.g. overlap with CMB ACTPol experiment
- Repeat i band exposures with poor seeing/background?

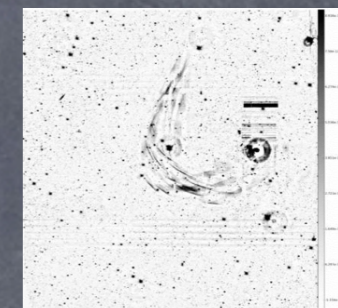


- Original plan includes a second repeat pass in g at end of survey, for proper motions and variability
  - do this in i band instead?

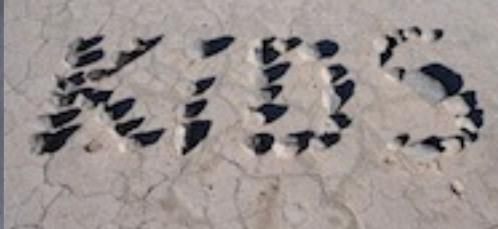
# Observing strategy



- Are we using all photometric calibration observations?
  - polar field, composite filter observations
  - costs  $\pm 5\%$  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

A screenshot of the KiDS Internal pages website. The page has a dark theme with a header featuring the KiDS logo and the text 'Internal pages'. Below the header, there is a navigation menu on the left with categories like 'General', 'Data access', 'Projects and papers', and 'Team'. The main content area is titled 'KIDS research projects' and shows a list of projects ordered by status. The projects listed are all 'ACTIVE' and include details such as the PI, Administrator, and End date. The projects are: 'Hunting for the MW Halo satellites', 'Intrinsic alignments with KiDS and GAMA', 'KiDS galaxy structural parameters', 'Lensing masses of galaxies in GAMA groups', 'Mass measurements of GAMA groups', 'Searching for galaxy clusters in KiDS', 'Stellar radial density profile of the MW halo', 'Strong-lensing', and 'The stellar-to-halo mass relation from KiDS+GAMA'.

**KiDS Internal pages**

**General**  
News  
Management structure  
Science policy  
Websites and resources

**Data access**  
Internal data deliveries  
Public data deliveries

**Projects and papers**  
List of projects  
PhD projects  
Project registration  
List of papers

**Team**  
KiDS team  
External collaborators

My KiDS  
Log out

**KIDS research projects**  
Order by: [status](#) [title](#) [end date](#)

**Projects ordered by status**  
[ACTIVE](#) | [ACCEPTED](#) | [PENDING](#) | [FINISHED](#)

**ACTIVE projects**

<b>Hunting for the MW Halo satellites</b> PI: Massimo Dall'Ora Administrator: Massimo Dall'Ora <a href="#">View details</a>	Project status: <b>ACTIVE</b> End date: Feb 2015
<b>Intrinsic alignments with KiDS and GAMA</b> PI: Benjamin Joachimi Administrator: Benjamin Joachimi <a href="#">View details</a>	Project status: <b>ACTIVE</b> End date: Oct 2014
<b>KiDS galaxy structural parameters</b> PI: Nicola Napolitano Administrator: Nicola Napolitano <a href="#">View details</a>	Project status: <b>ACTIVE</b> End date: Nov 2014
<b>Lensing masses of galaxies in GAMA groups</b> PI: Henk Hoekstra Administrator: Henk Hoekstra <a href="#">View details</a>	Project status: <b>ACTIVE</b> End date: Nov 2014
<b>Mass measurements of GAMA groups</b> PI: Massimo Viola Administrator: Massimo Viola <a href="#">View details</a>	Project status: <b>ACTIVE</b> End date: Nov 2014
<b>Searching for galaxy clusters in KiDS</b> PI: Mario Radovich Administrator: Mario Radovich <a href="#">View details</a>	Project status: <b>ACTIVE</b> End date: Oct 2014
<b>Stellar radial density profile of the MW halo</b> PI: Berenice Pila-Diez Administrator: Berenice Pila-Diez <a href="#">View details</a>	Project status: <b>ACTIVE</b> End date: Nov 2014
<b>Strong-lensing</b> PI: Gijs Verdoes Kleijn Administrator: Gijs Verdoes Kleijn <a href="#">View details</a>	Project status: <b>ACTIVE</b> End date: Jan 2015
<b>The stellar-to-halo mass relation from KiDS+GAMA</b> PI: Edo van Uitert Administrator: Edo van Uitert <a href="#">View details</a>	Project status: <b>ACTIVE</b> End date: Nov 2014

**ACCEPTED projects**