BOSS Overview
Paris, September 2010

BOSS QSOs
15,000 objects

BOSS galaxies
105,000 objects

SDSS DR7

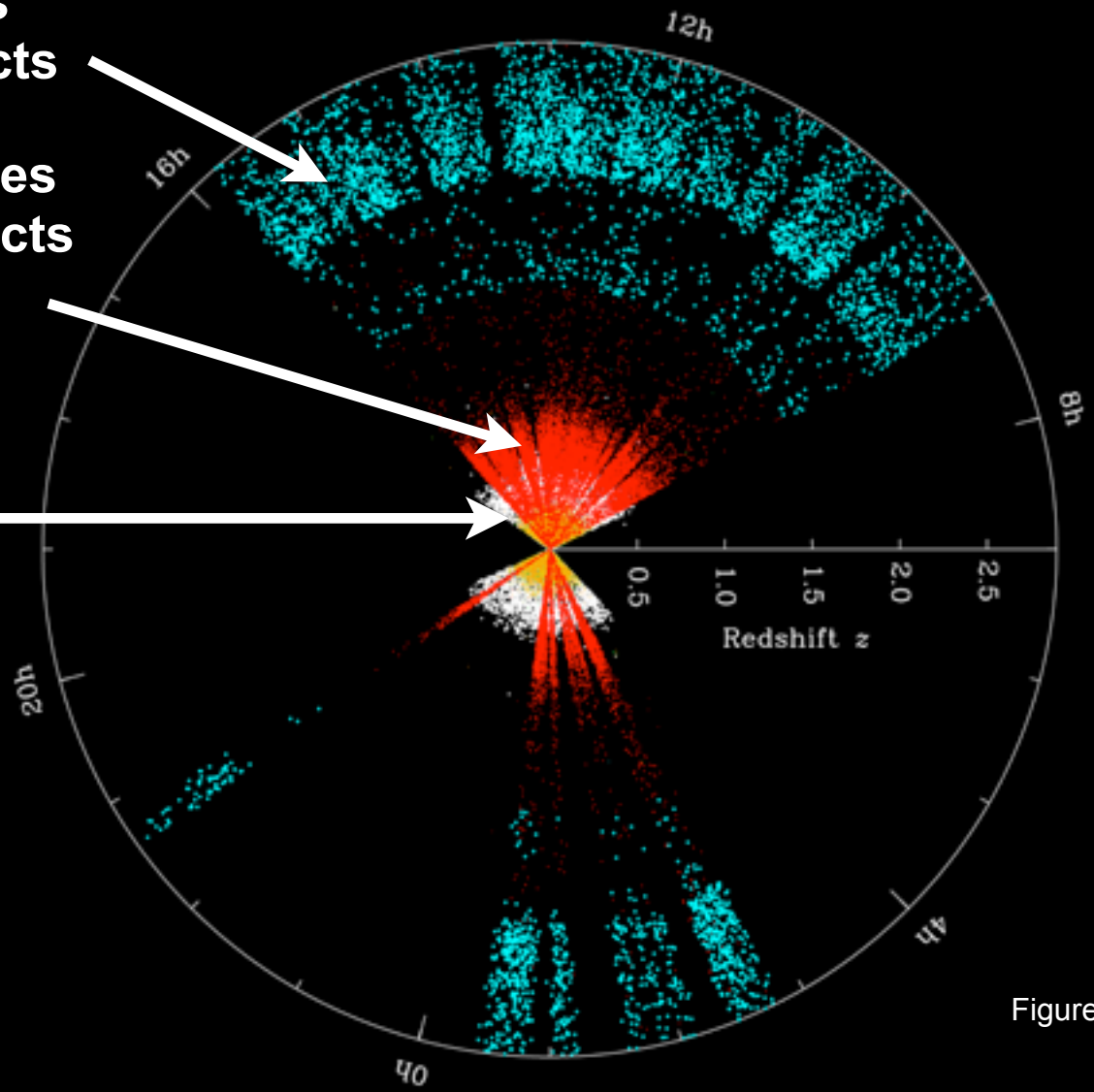

Figure: Michael Blanton

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Paris, September 2010

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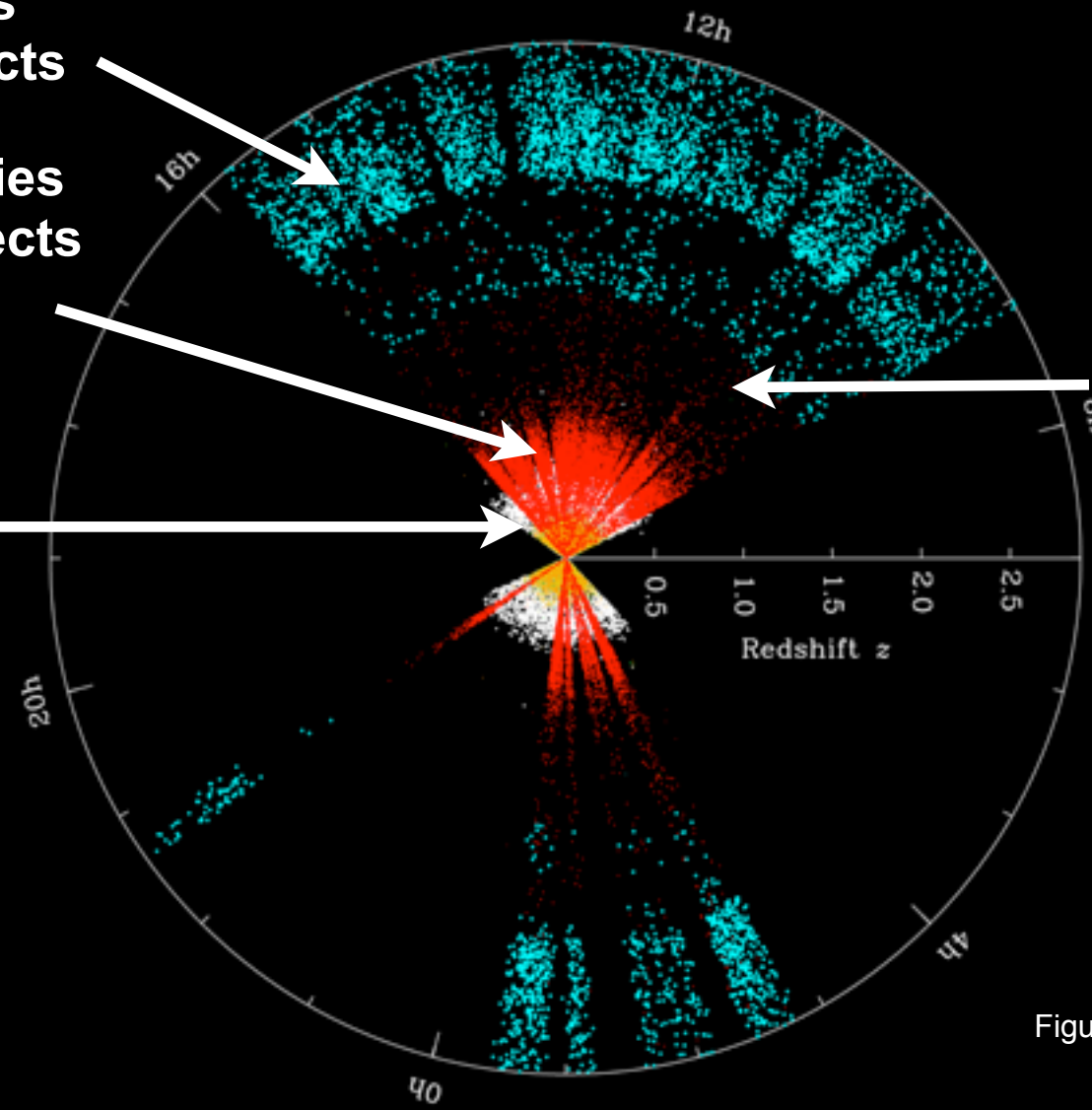

Dark energy turns on here ?

Figure: Michael Blanton

BOSS Operations

Kyle Dawson - Survey Scientist

Erin Sheldon - Target selection coordinator

Nikhil Padmanabhan - Galaxy T.S.
Nic Ross → Christophe Yeche - QSO T.S.
Michael Strauss - Ancillary targets

Adam Bolton - Spectro pipeline

Jeremy Tinker - Tiling

Demitri Muna - Plate design

Michael Blanton - Data
Ben Weaver - Archiver

Science Archive Server (files)

SkyServer (database)

FPG QSO database

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...
D. Schlegel - linear algebra programmer

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BOSS Operations

What do we talk about at operations, spectro pipeline, data telecons?

⇒ Stuff we promised in the SDSS-III proposal

Data model, data releases, ...

⇒ Stuff in the SRD == science requirements document

S/N, survey speed, redshift success **and defines "good enough"**

⇒ Ticketed stuff

What do we talk about at operations, spectro pipeline, data telecons?

BOSS Science Teams

Martin White - SST Chair

Will Percival + Nikhil Padmanabhan
- Galaxy clustering
Rupert Croft - LyA IGM
Anze Slosar - LyA clustering
Claudia Maraston - Galaxy evolution
Nic Ross - QSO science
"Informal" working group for stripe 82

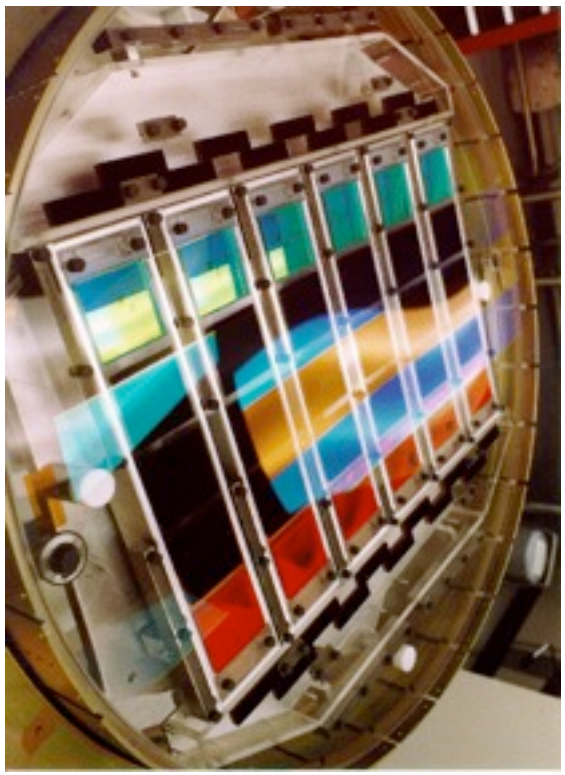
Topical meetings:
BOSS @ Salt Lake, March 2010
LyA @ CMU Pittsburgh, June 2010
Galaxy evolution @ IPMU Japan, Oct 2010
BOSS @ Où suis-je?, Spring 2010?

BOSS is an imaging + spectroscopic survey

Completed!

Camera retired Dec. 2009 → Smithsonian Retirement Home

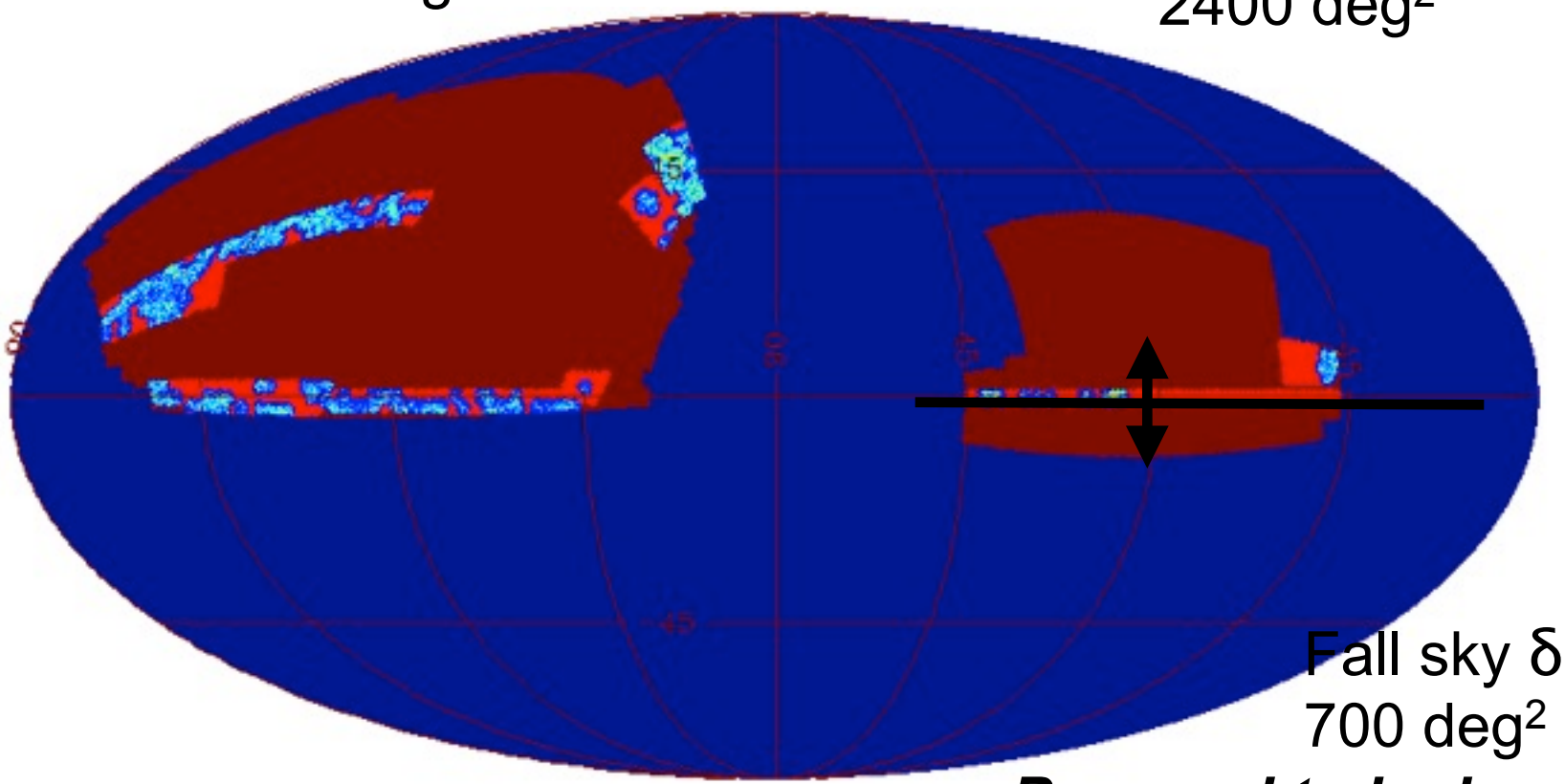
(now I know why Jim Gunn doesn't want to retire...)



BOSS is an imaging + spectroscopic survey

Spring sky
7600 deg^2

Fall sky $\delta > -1°$
2400 deg^2



Fall sky $\delta < -1°$
700 deg^2

Proposal to be lowest priority for spectroscopy

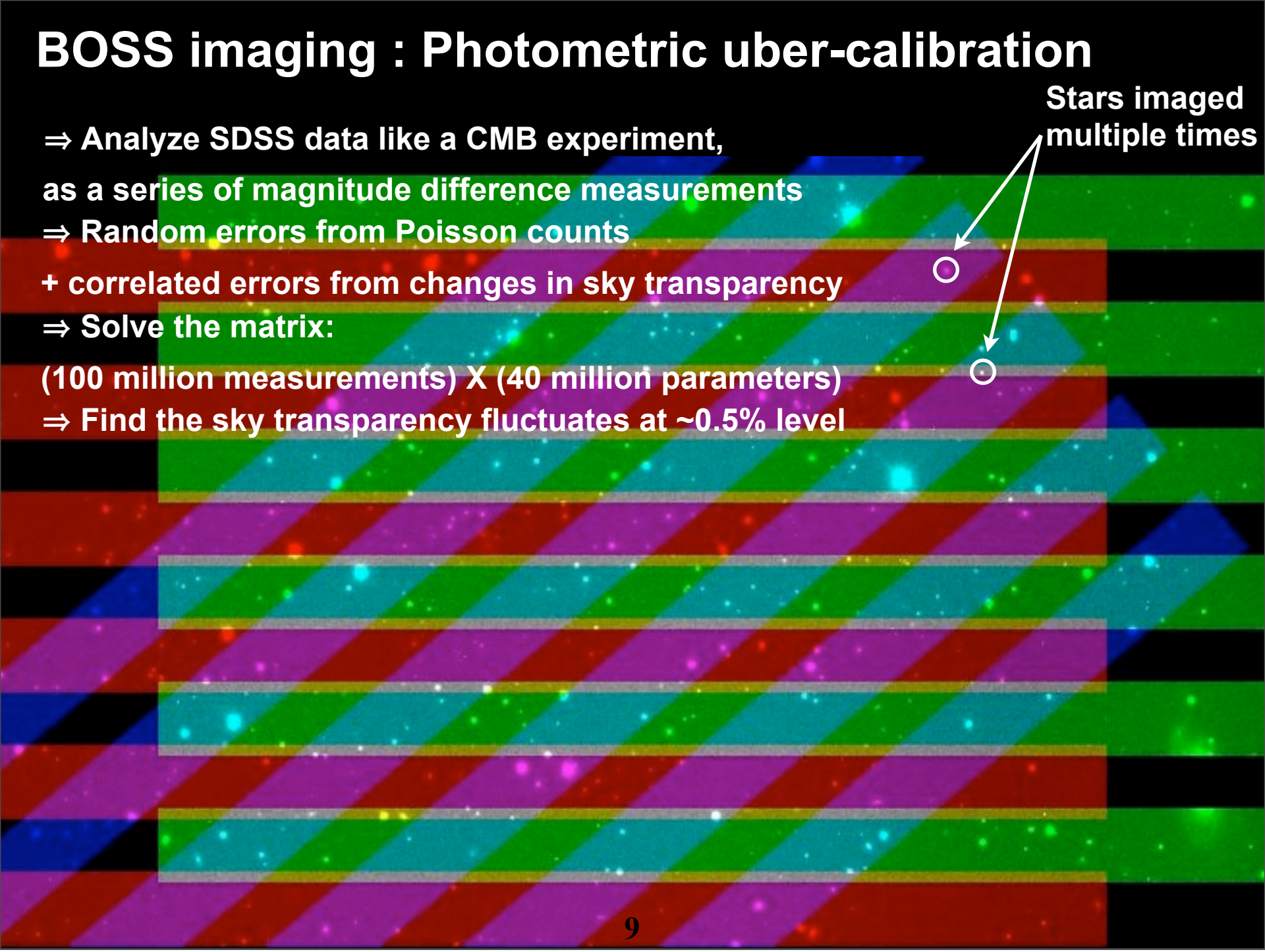
BOSS is an imaging + spectroscopic survey

All imaging to be released in DR8 = December 2010
- Calibrated images
  - Sky-subtraction improved from DR7
  - Photometry is "uber-calibration"
  - (... but astrometry not as good as DR7)
- Masks?

Value-added catalogs could be after December
- Photo-z's for LRGs (Ho, Cuesta)
- Photo-z's for all galaxies?
- Photo-z's for QSOs?
- QSO selections?

N.B. - If we don't do these, someone else gets credit!

BOSS imaging : Photometric uber-calibration



⇒ Analyze SDSS data like a CMB experiment,

as a series of magnitude difference measurements

⇒ Random errors from Poisson counts

+ correlated errors from changes in sky transparency

⇒ Solve the matrix:

(100 million measurements) X (40 million parameters)

⇒ Find the sky transparency fluctuates at ~0.5% level

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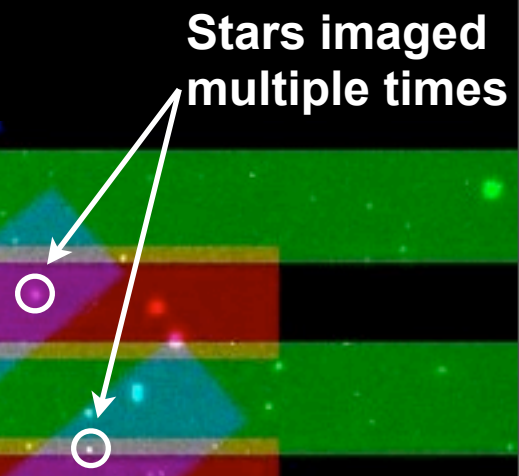


$$\begin{bmatrix} 1\,0\,0\,0\,1\,0\,0\,0\,\ldots \\ 0\,1\,0\,0\,1\,0\,0\,0\,\ldots \\ 0\,0\,1\,0\,1\,0\,0\,0\,\ldots \\ 1\,0\,0\,0\,0\,1\,0\,0\,\ldots \\ \ldots\ldots\ldots\ldots \end{bmatrix} \begin{bmatrix} a_0 \\ a_1 \\ \ldots \\ k_0 \\ k_1 \\ \ldots \end{bmatrix} = \begin{bmatrix} m_0 \\ m_1 \\ m_2 \\ m_3 \\ m_4 \\ \ldots \end{bmatrix}$$

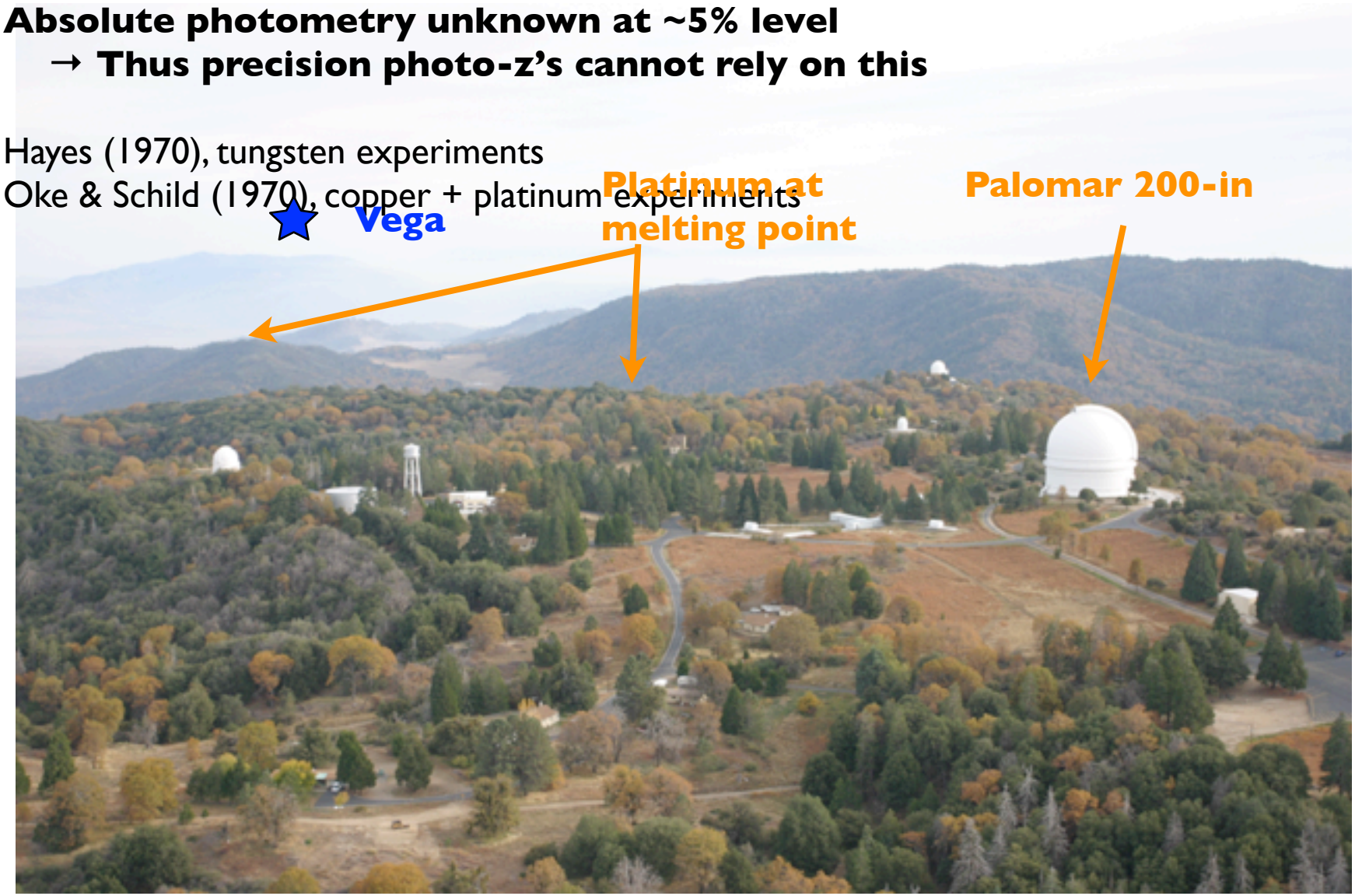
Photometric zero-points, ...

Observed fluxes

BOSS imaging : Absolute photometric calibration

Relative photometry errors < 1%
Absolute photometry unknown at ~5% level
→ Thus precision photo-z's cannot rely on this

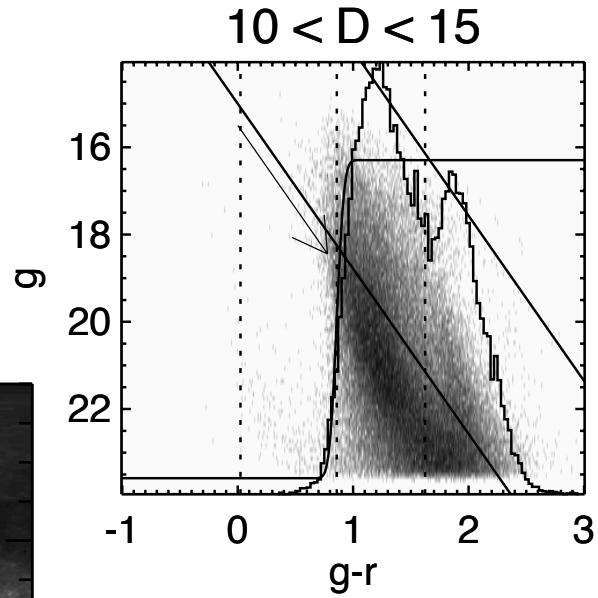
Hayes (1970), tungsten experiments
Oke & Schild (1970), copper + platinum experiments



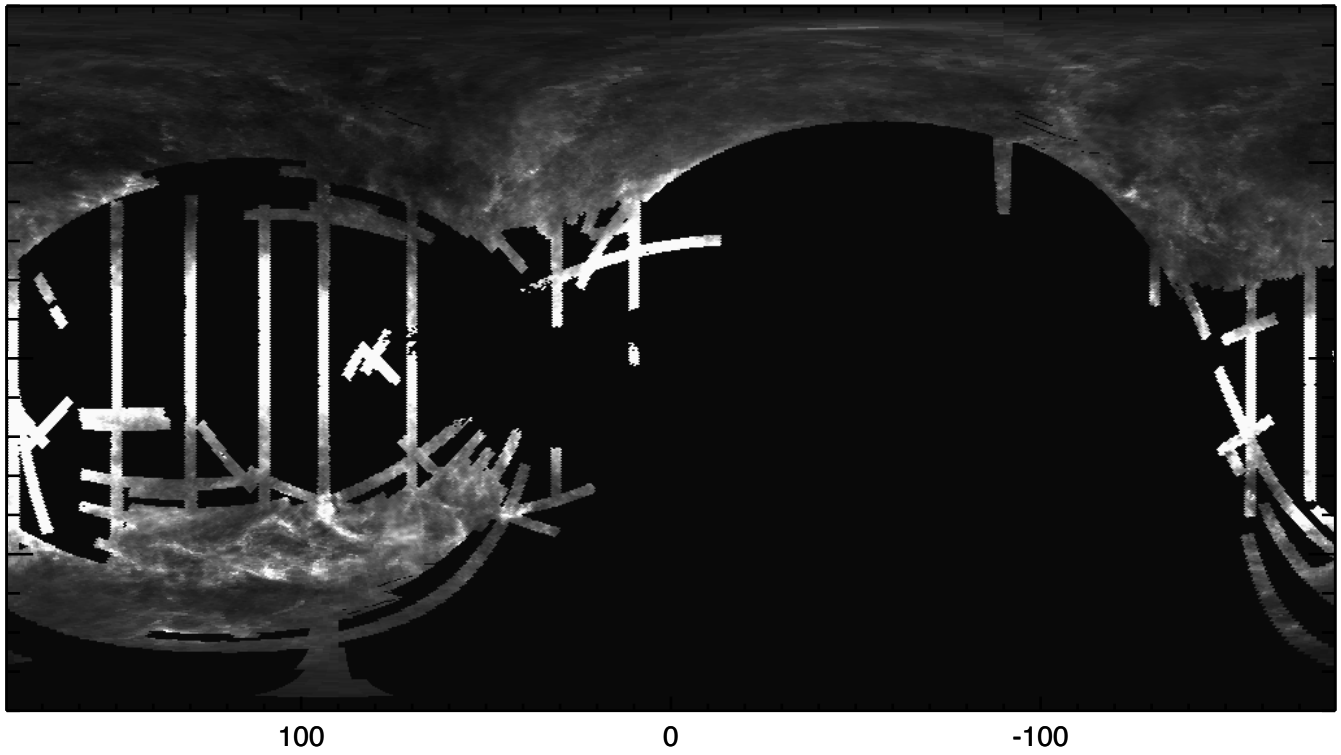
BOSS imaging results: *Eddie Schafly, D. Finkbeiner*

Project #22
Measure dust and extinction law (R_V)
from colors of stars ("blue-tip")

Paper accepted Sep 2010
First BOSS data paper !?



SDSS-III sky coverage and SFD



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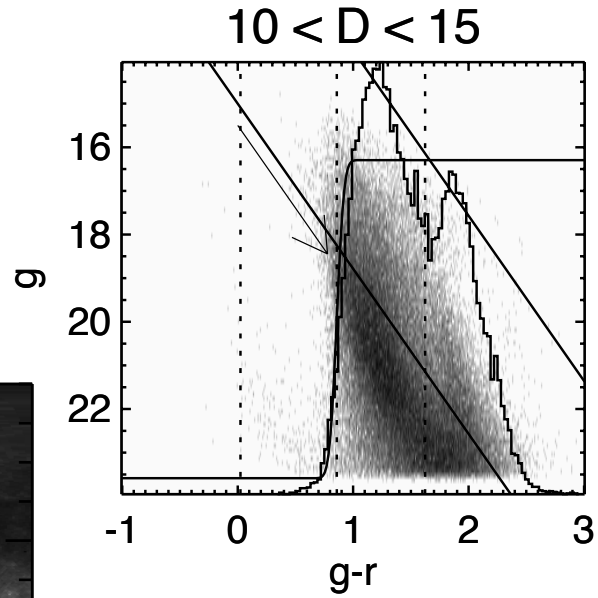

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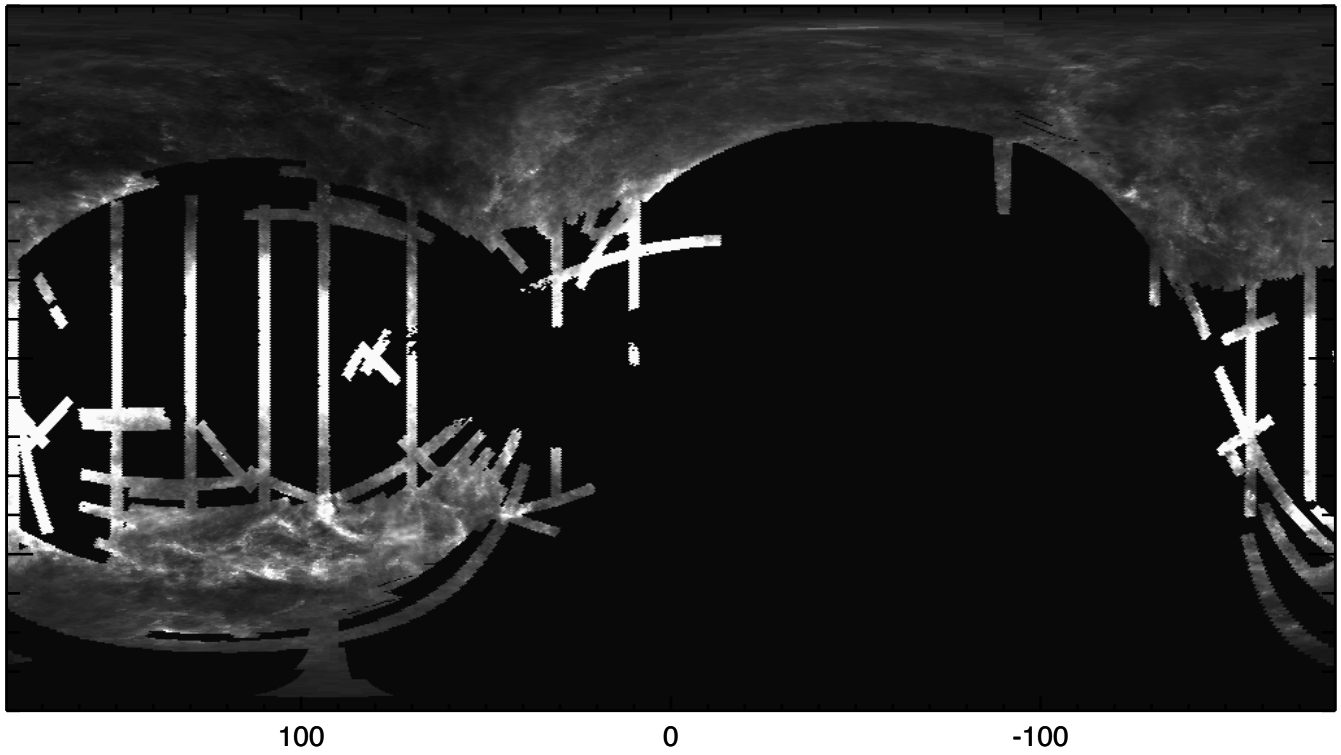

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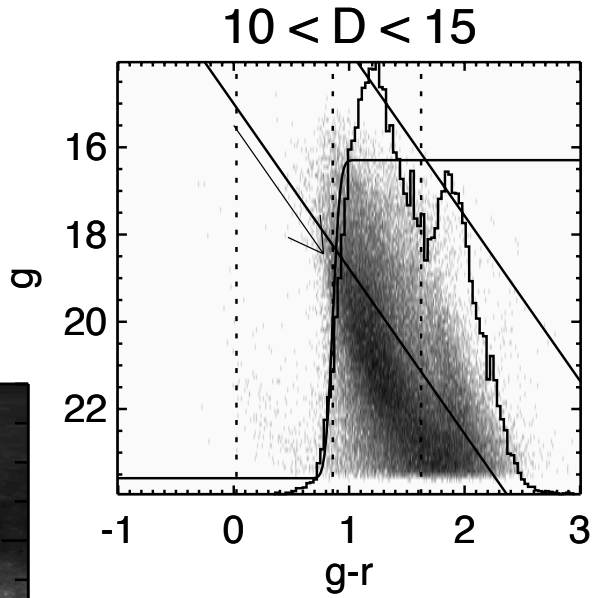

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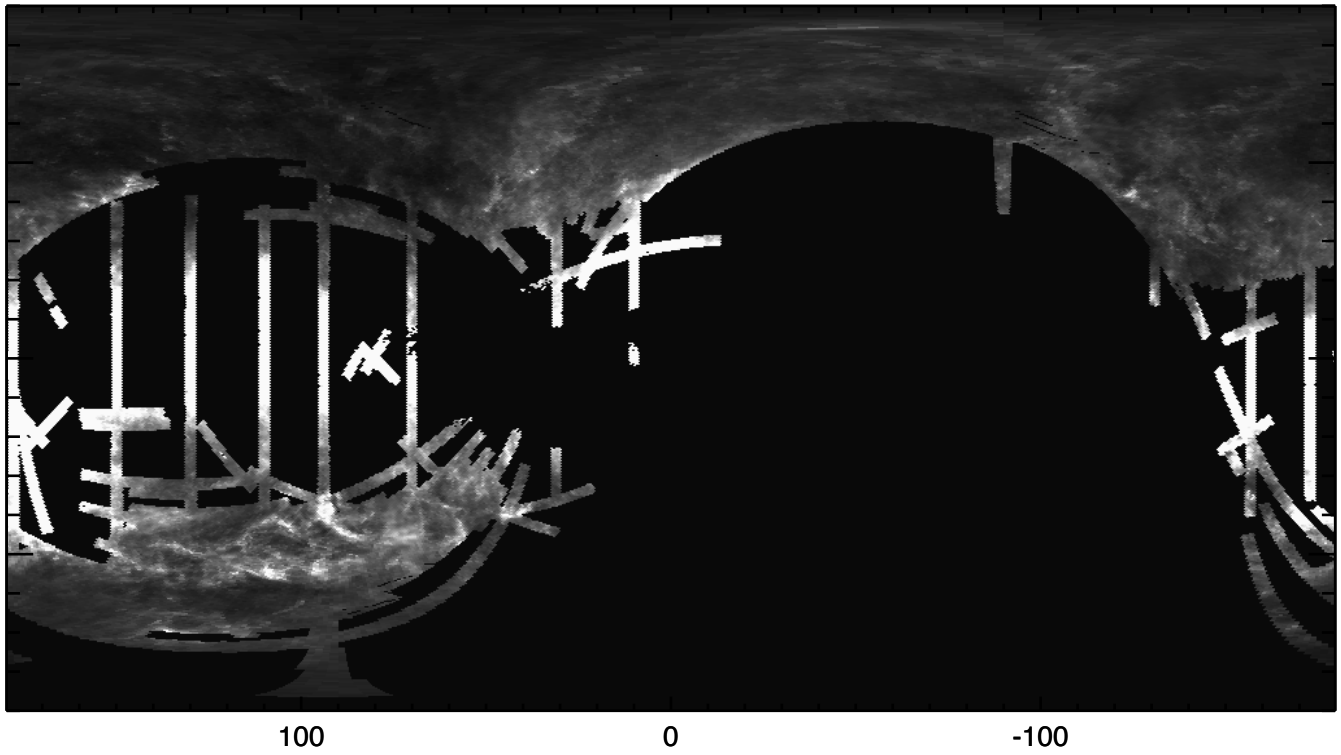
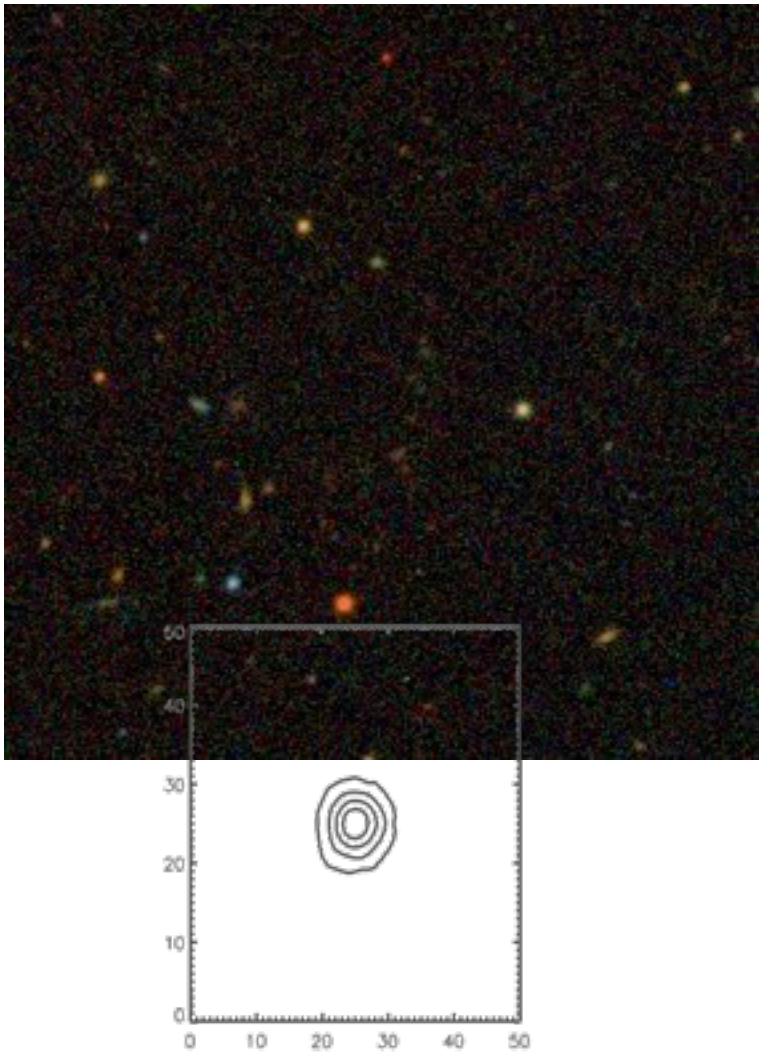
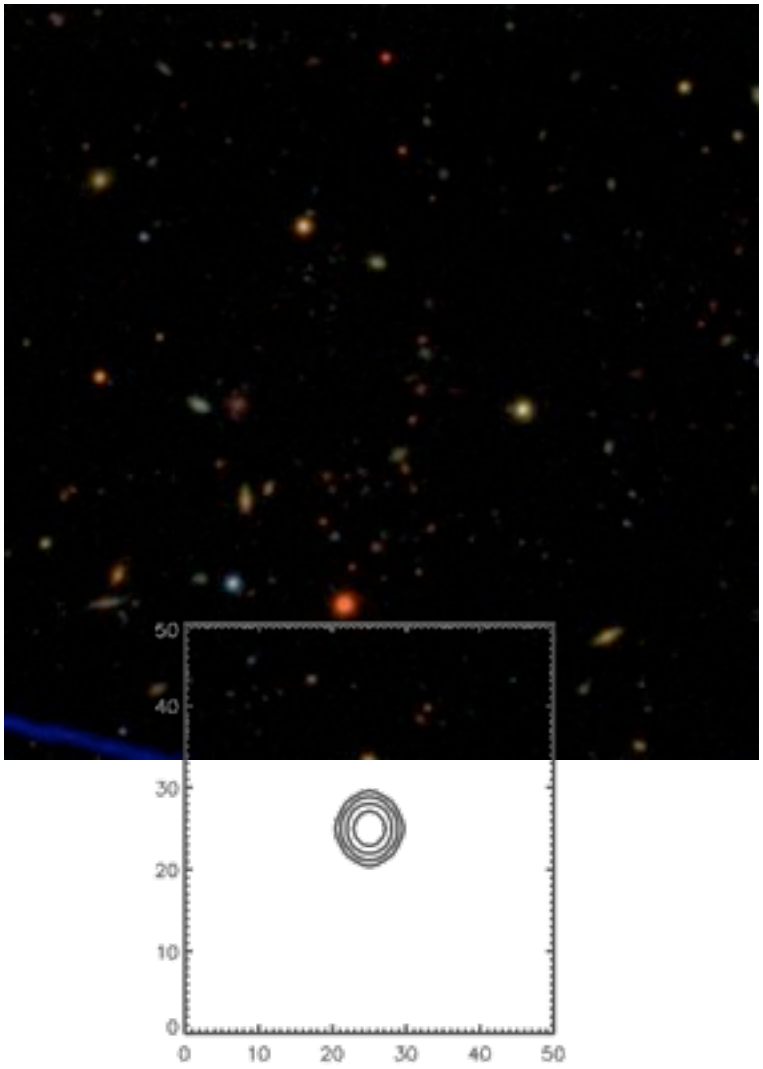


BOSS imaging results: *Eric Huff*

Stripe 82 co-adds for lensing maps, galaxy colors/photo-z's
Public imaging data -- but ubercal photometry + circularized PSFs





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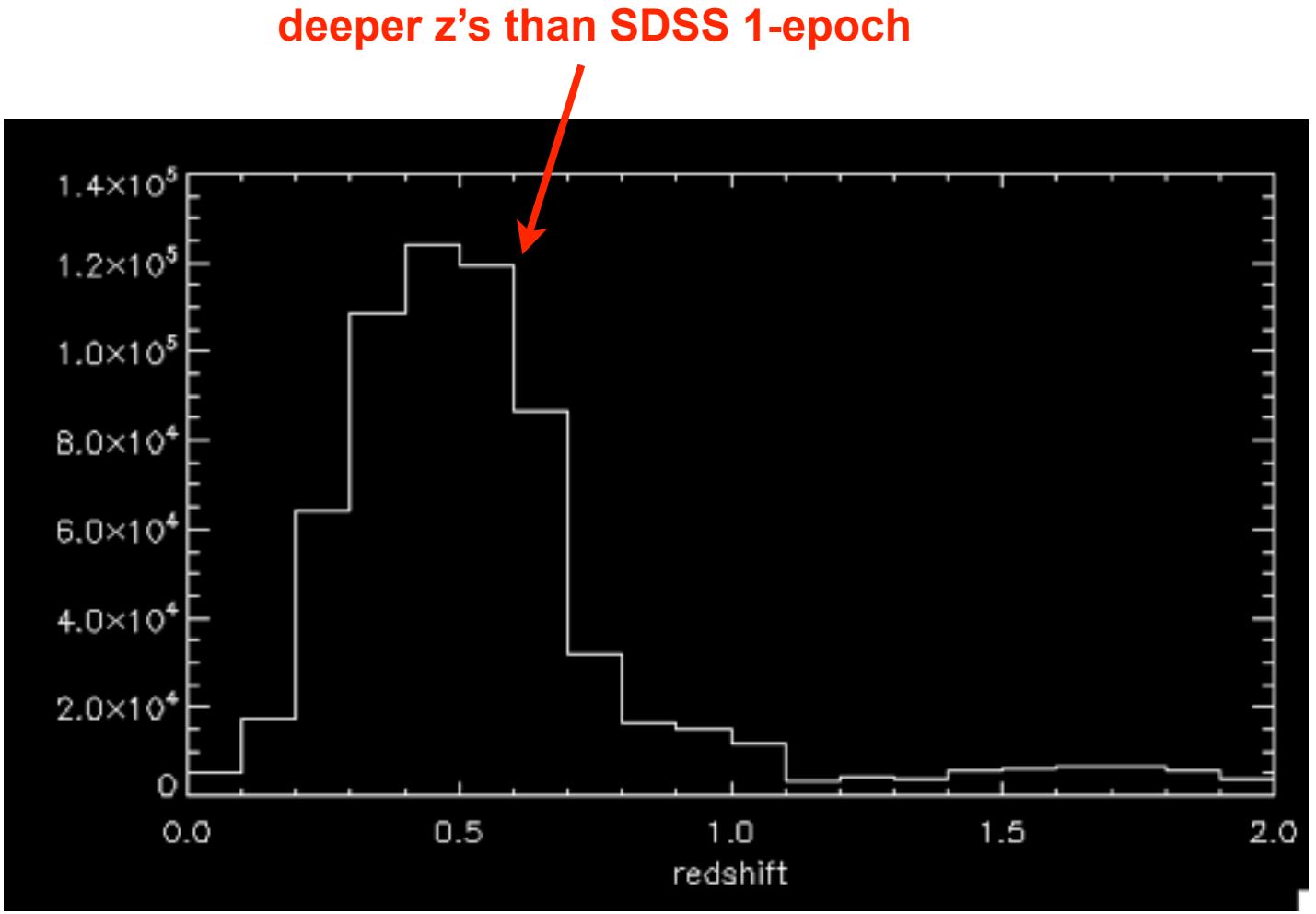


BOSS imaging results: *Antonio Cuesta & Shirley Ho*

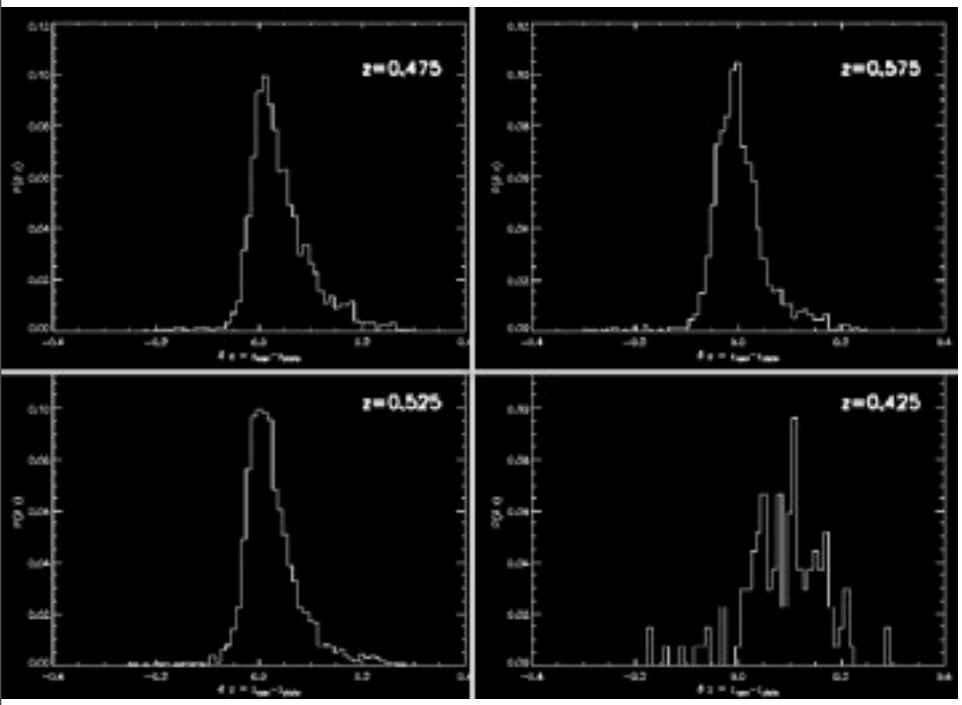
Project #27

Photo-z slices to measure 3D P(k) and BAO peak

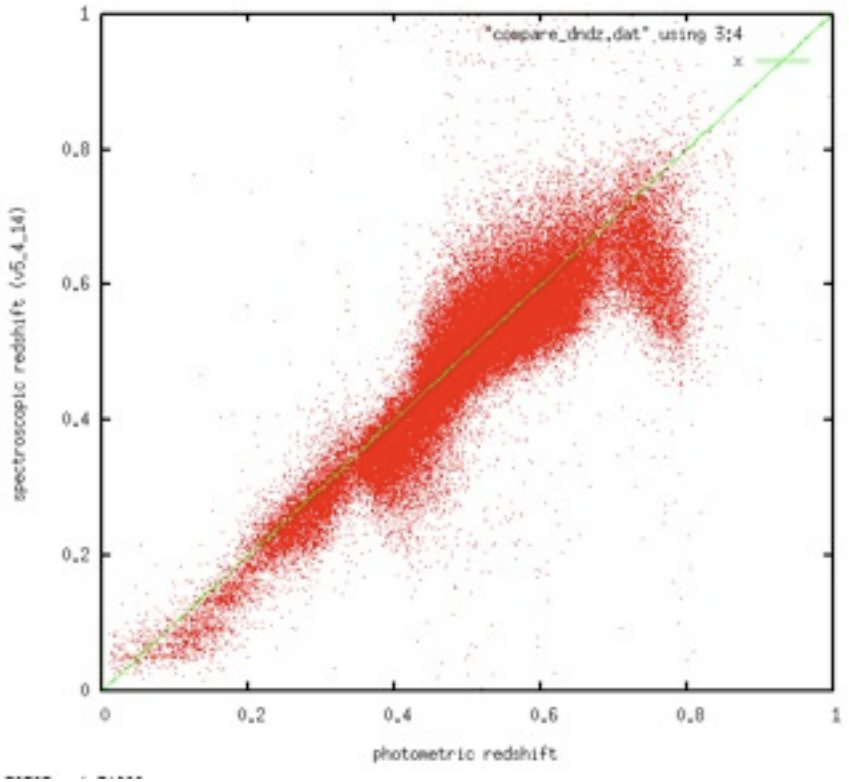
Improve upon Padmanabhan et al 2007, 3500 deg^2 ➔ 10,700 deg^2

Photo-z's better-understood

... from 2SLAQ



... and from BOSS



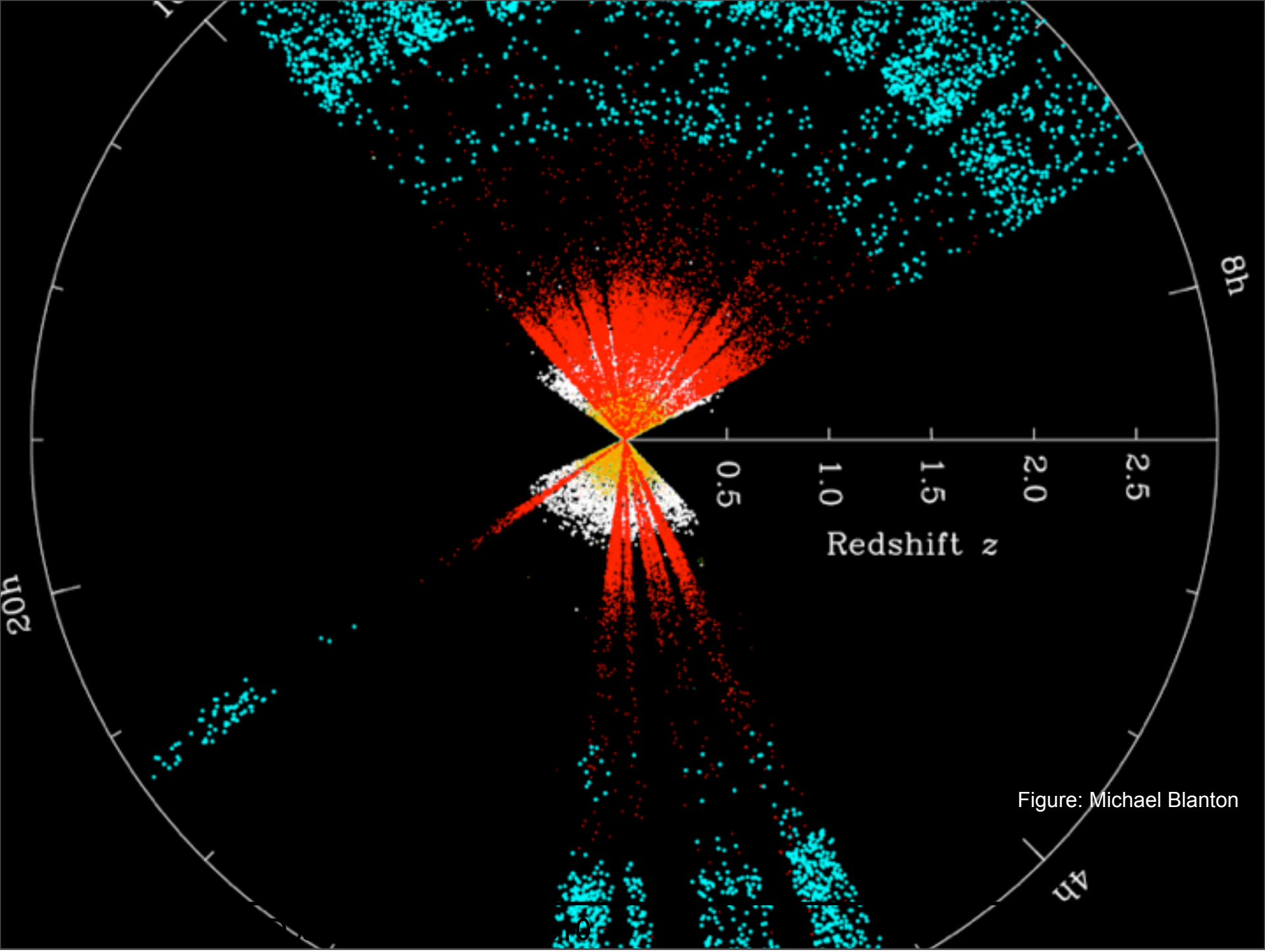


Figure: Michael Blanton

BOSS is an imaging + spectroscopic survey

Aug 28, 2009 - On-sky
Sep 14 - "First light" on galaxies + QSOs
Oct - Both spectrographs (500 → 1000 fibers)
Dec 4 - Optical coma fixed in r1 camera
These data "survey quality"
Feb 2010 - Telescope guider fixes
Survey speed improvement
March- Elex readouts, stray light masks, cameras shimmed
July 5 - **Year 1: 208,000 spectra, 15,000 z>2 QSOs**
July - Fix small coma in b1,b2,r2
Sep 1, - Year 2 begins
Sep 8 - Washers installed on QSO holes
Sep 15 - **244,000 spectra**

... 2,000,000 spectra by June 30, 2014

BOSS is an imaging + spectroscopic survey

First results from galaxy + QSO surveys

Year 1 data (really only Dec-July):

105,000 galaxies
15,000 z>2.1 QSOs

v5_4_14 reductions (Aug 2010)
z success >95%
catastrophic failures < 1%
Deep plate 3851 (L. Anderson)

Every QSO inspected by at least 2 Frenchmen
(But can they keep up now?)
➔ FPG Value-Added catalog

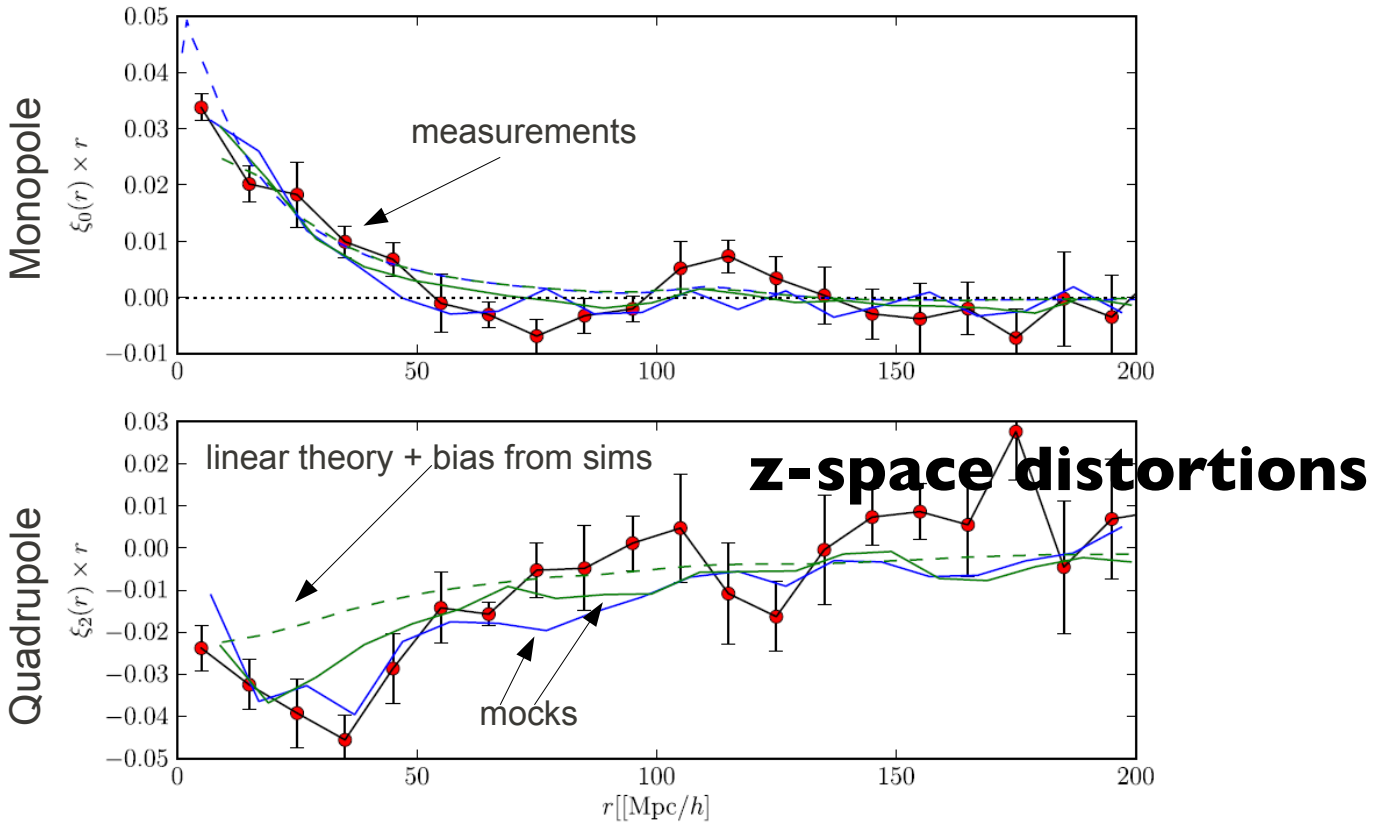
QSO targeting + LyA results to be presented by Nic Ross

Galaxy wp / P(k) results every day this week!
Eyal Kazil
Martin White

Anze Slosar

"...We are a factor of 10 off from seeing BAO, but even with the present data I think we can do a factor of a few better...."

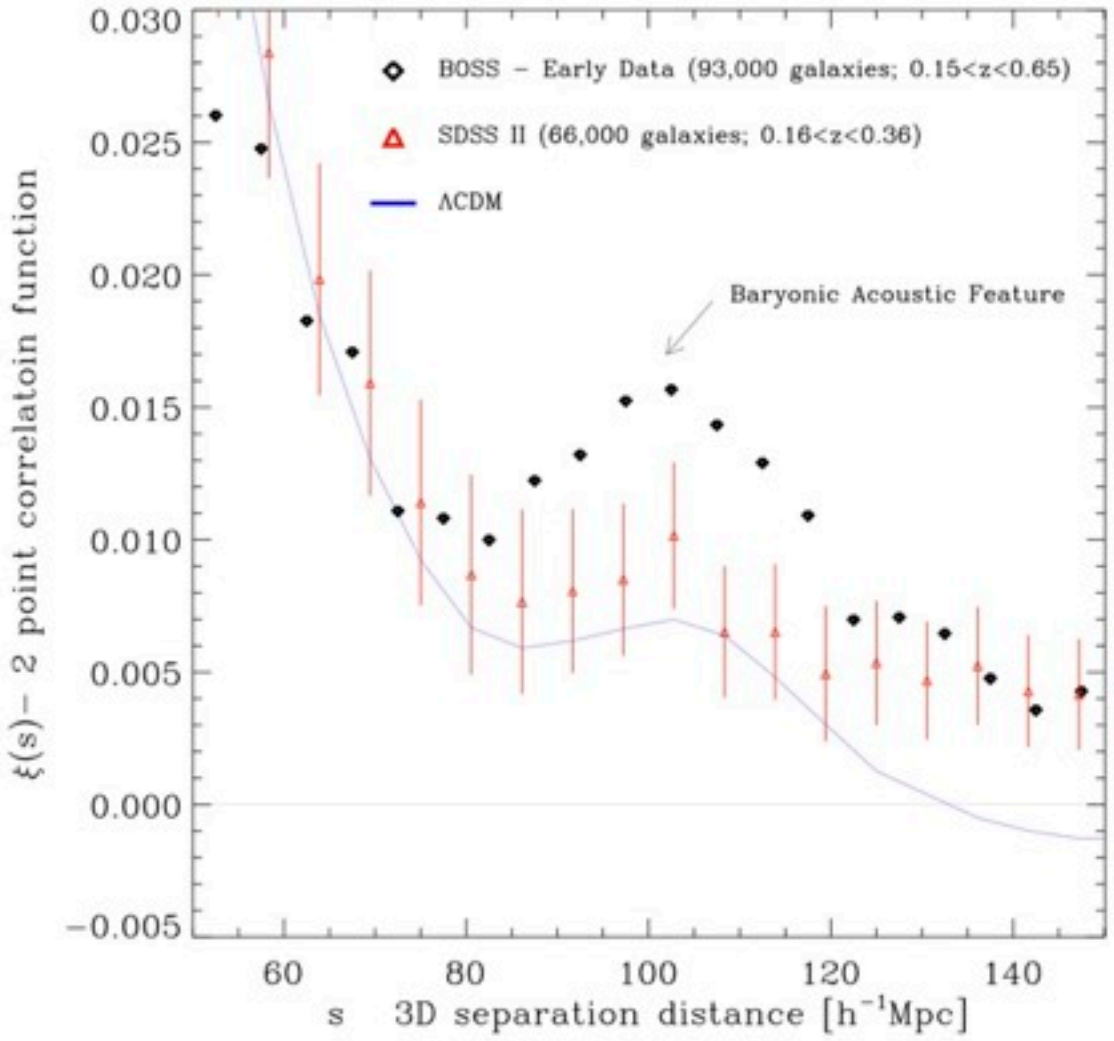
3D Lyman-α flux correlation function



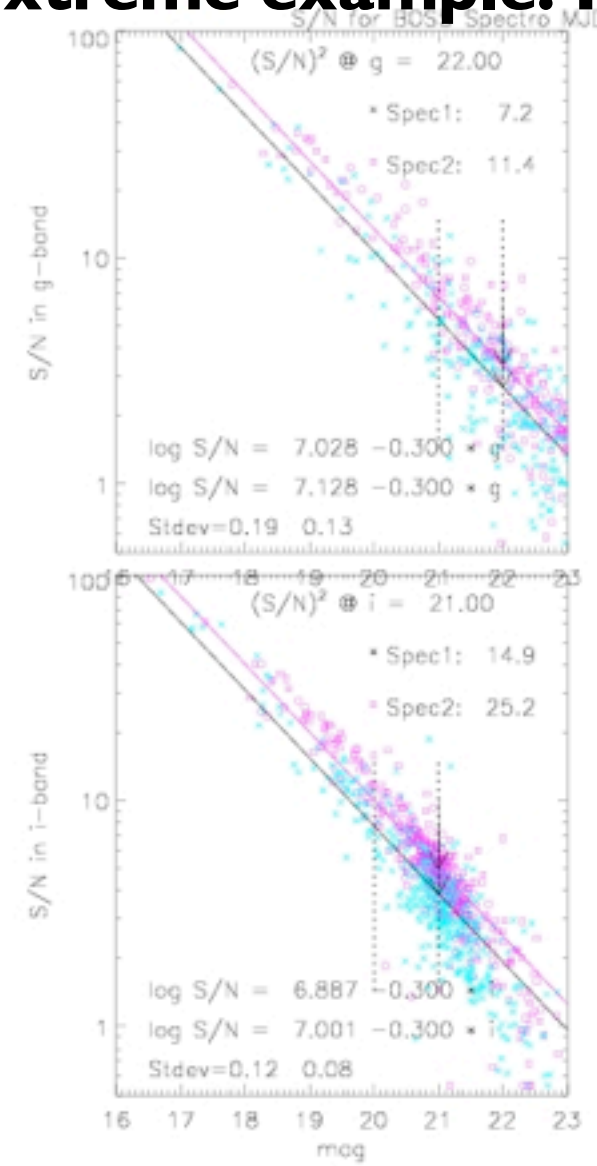
Flux correlation and redshift-space distortions detected to 50 Mpc/h.

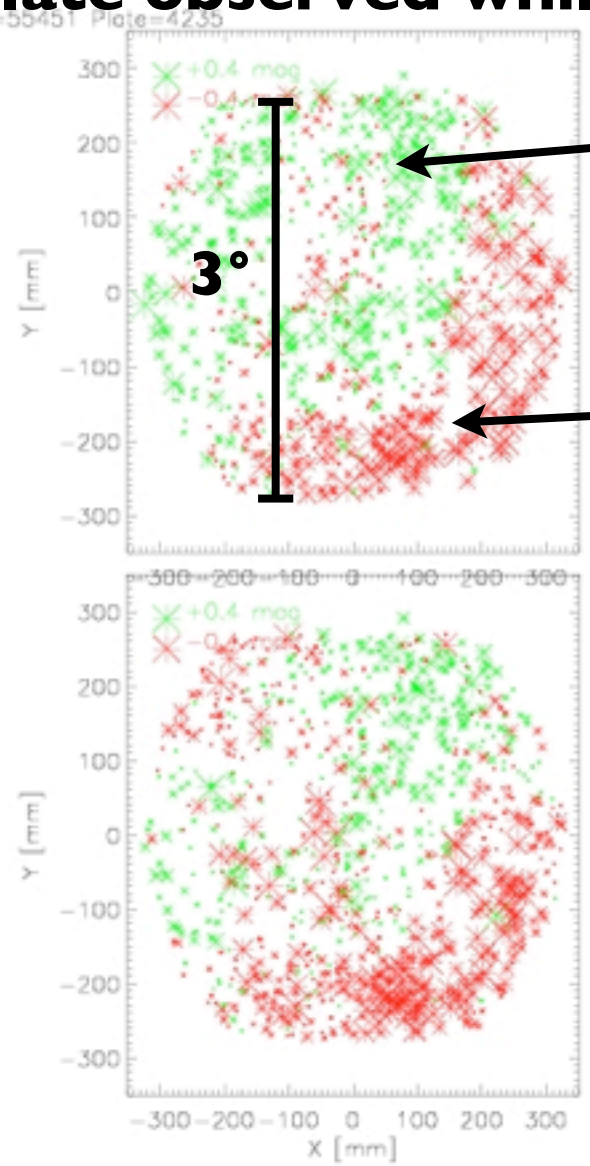
Eyal Kazin

First posting of ξ(s) or P(k) from Year 1
Not including incompleteness corrections, ...



Why do we care about incompleteness corrections?
Extreme example: Plate observed while tilted



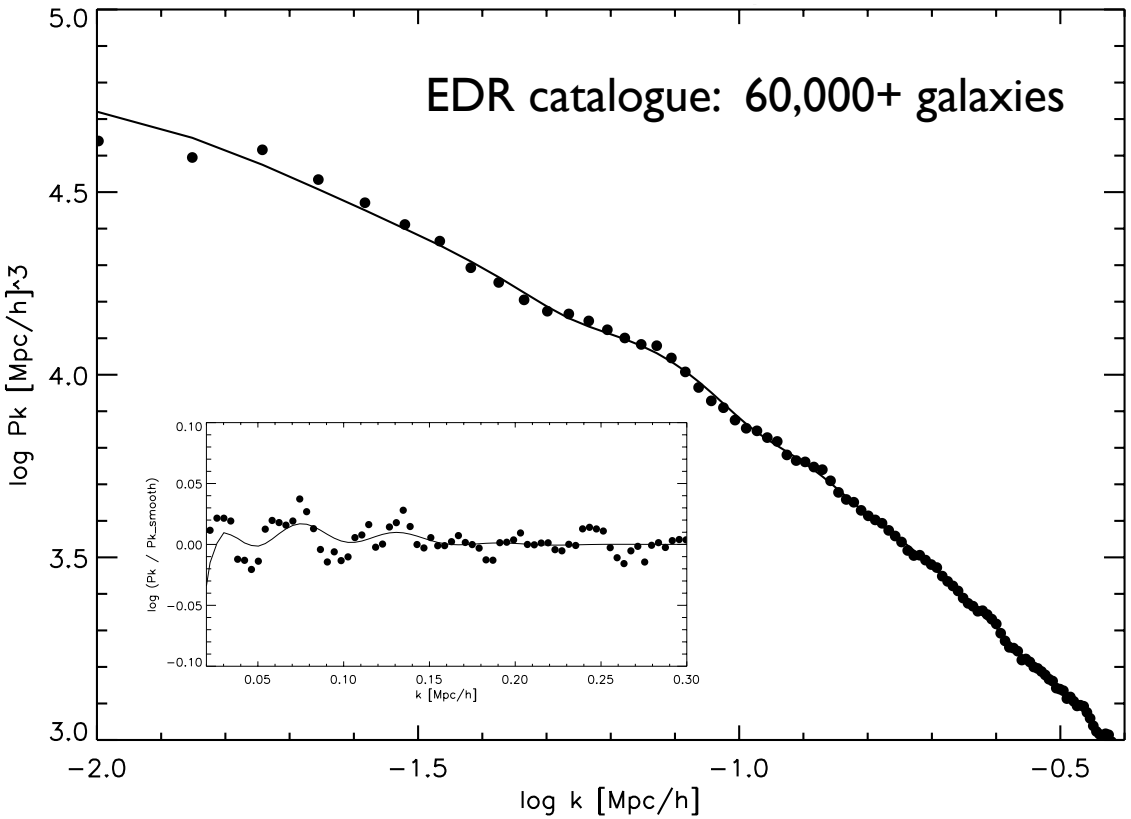


Good S/N

Poor S/N: More incomplete z's

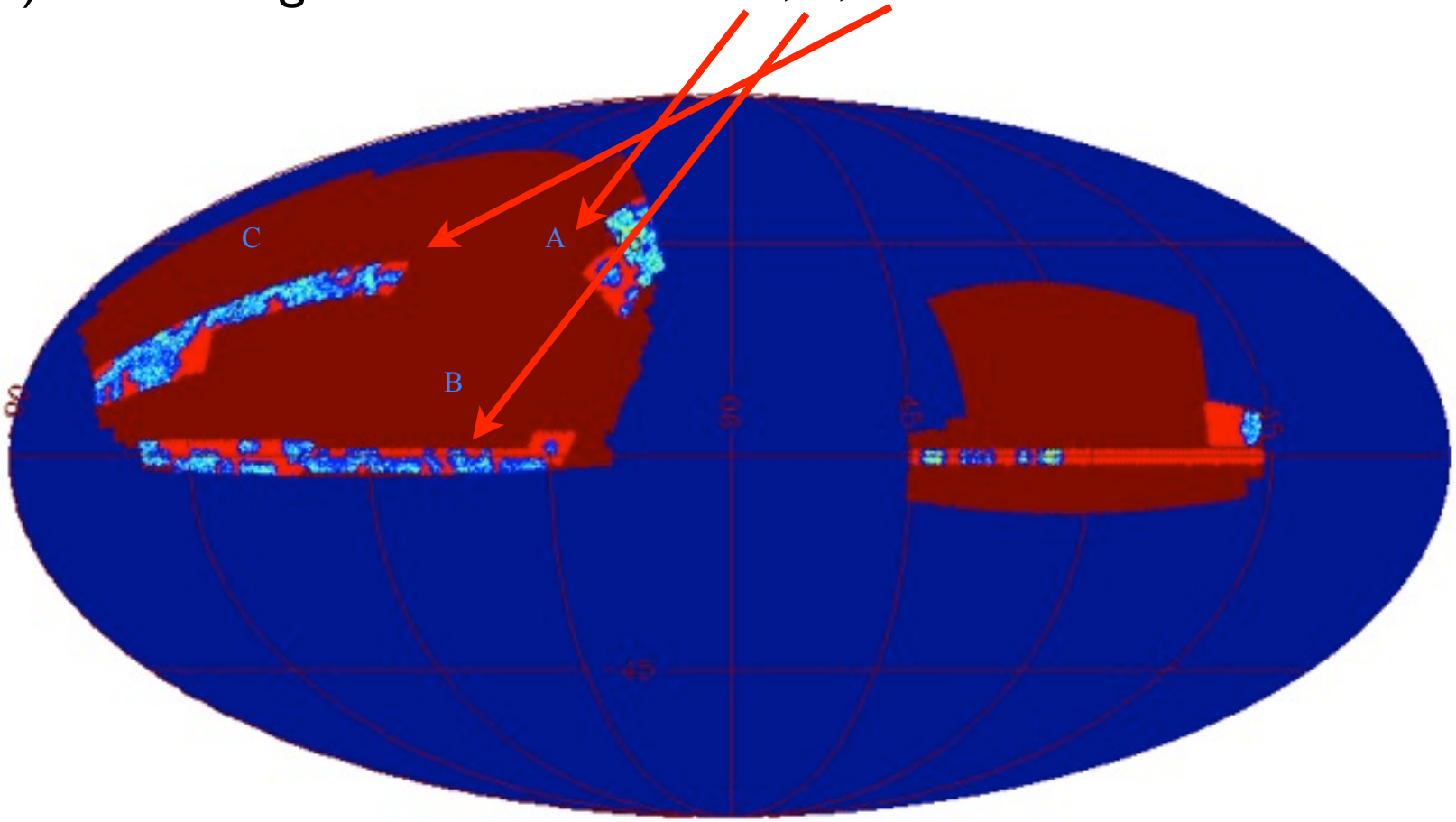
Rita Tojeiro + Will Percival

- **EDR catalogue (60,000+ galaxies)**
- **Pk computed using the method of Feldman et al. 1994, and implemented by Percival et al. 2007, 2009.**
- **Data fitted by spline x BAO model and convolved by the window function, with BAO model fixed by WMAP7 cosmology.**
- **Amplitude of the oscillations in the data low compared to the model - correlated errors or BAO? Most likely the former for now.**
- **Need: mock catalogues for covariance matrices.**



Martin White

ξ(s) from 3 regions in Year 1 data: A, B, C



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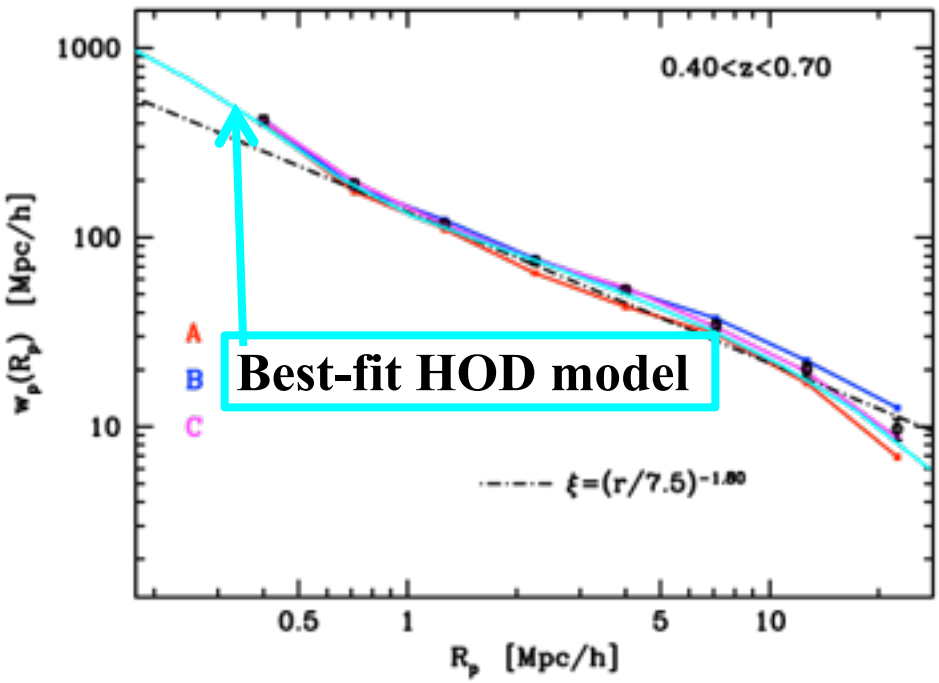
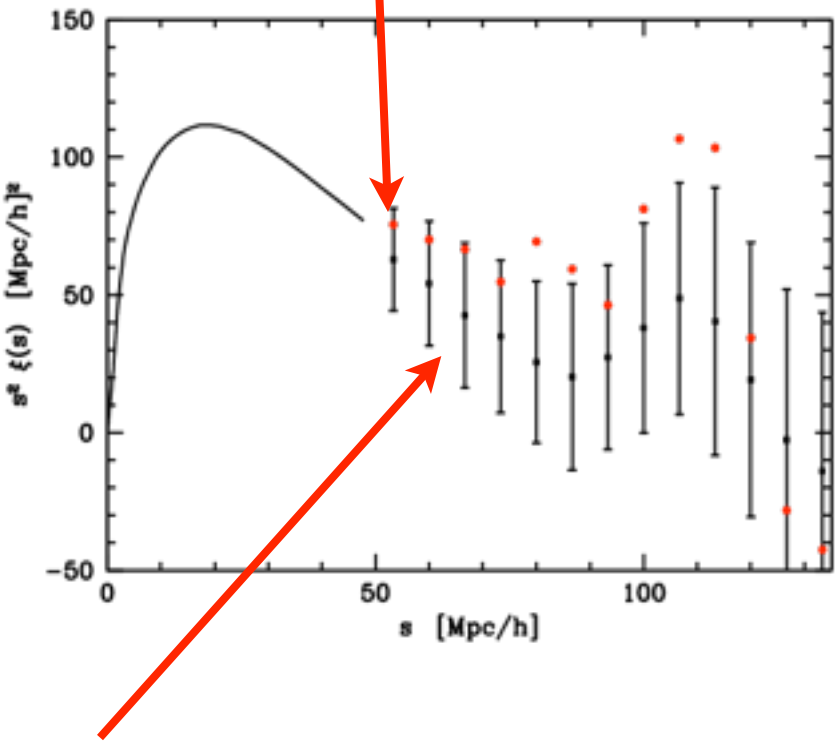


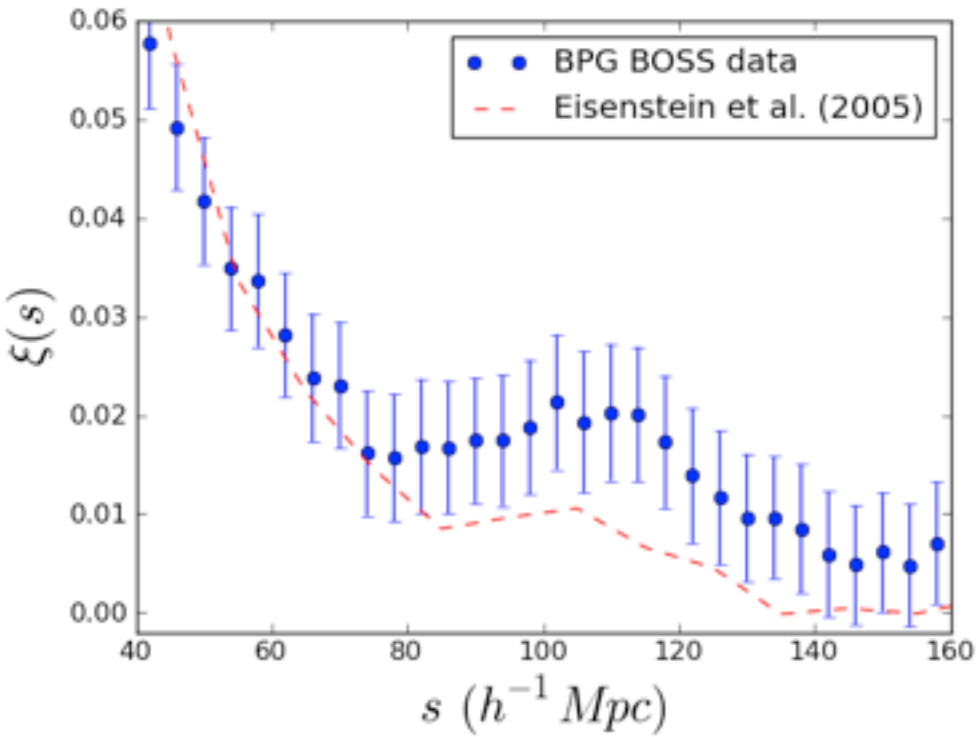
Current BOSS data

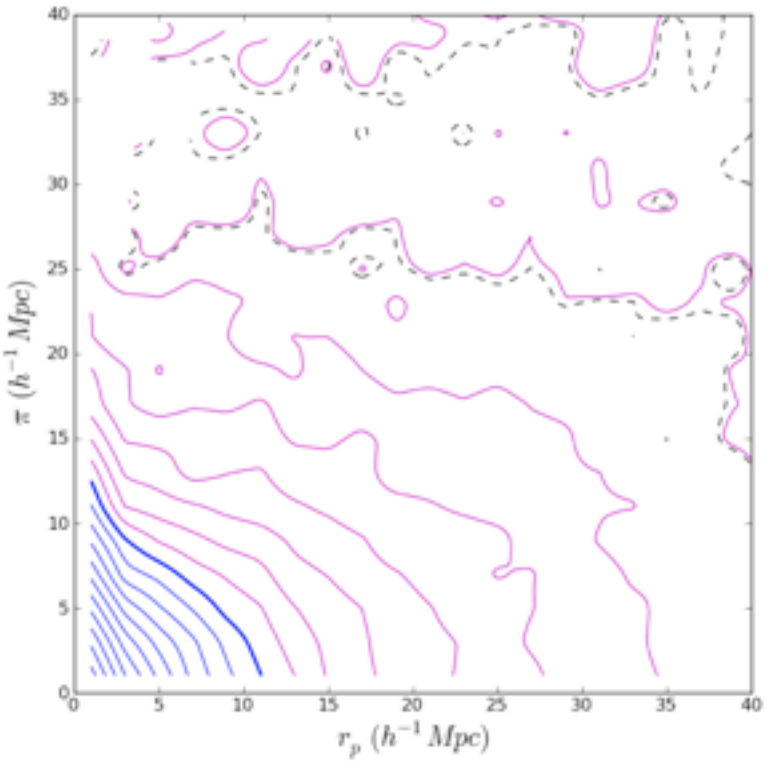


Variance from 14 0 simulations w/ same mask

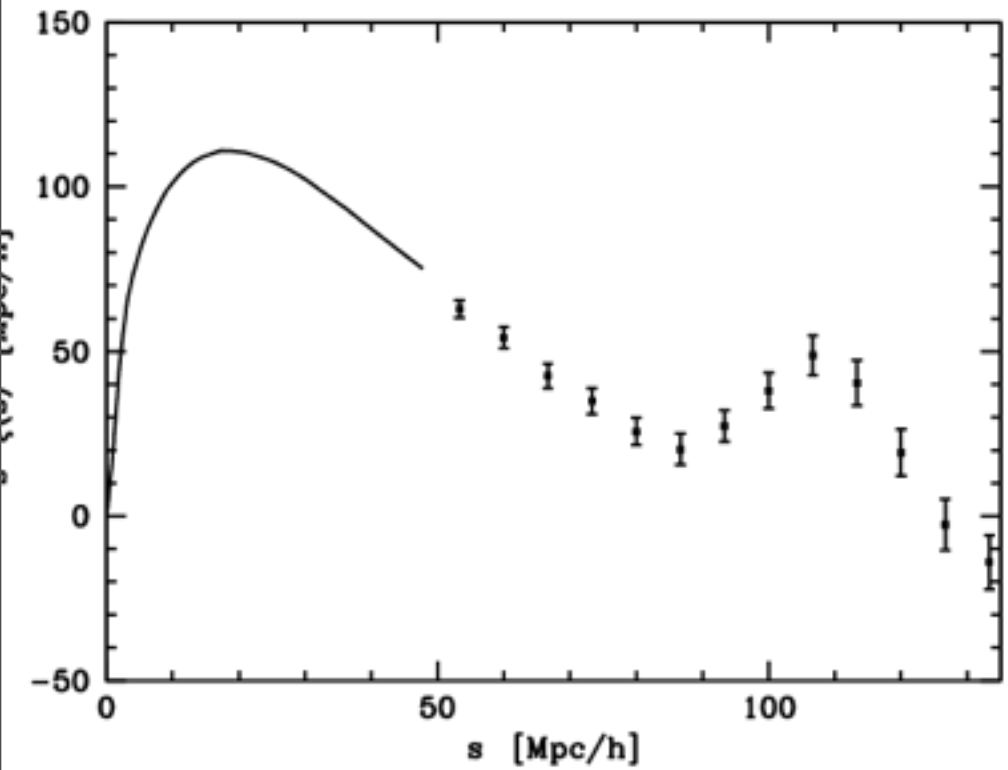
Fernando de Simoni + Brazil Participation Group

ξ(s) from 3 regions in Year 1 data
z-space distortions





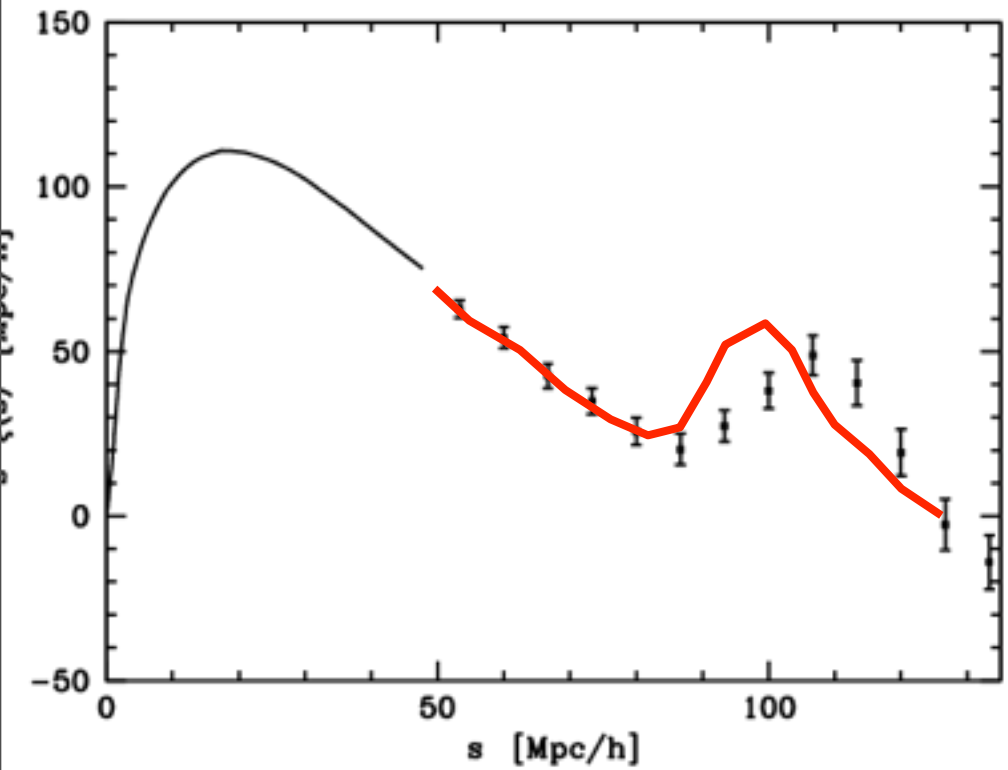
Martin White : What he hopes to find?



Even a worst-case scenario, where our geometry remains complicated, shows excellent detection of the BAO feature at z~0.5 from 10^4 sq. deg. of BOSS data. Reality will only be better than this!

Martin White : What he hopes to find?

... but we might actually learn something!



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BOSS is an imaging + spectroscopic survey

Many ancillary programs
Those on stripe 82 to be completed ~October
- SDSS SN hosts
- Variability-selected QSOs
- Brightest Cluster Galaxies

Dawson's proposals on the table at this meeting:
1. Define primary survey area Dec > -1.25 deg
2. Integrate to less S/N, still meet z-success
3. Drop faintest galaxies i_{fiber} < 21.7 → 21.5 for LRGs

Spectra inspection - is there some common interchange possible?
- spinspect file (Schlegel interface: "vi")
- SkyServer, U. Utah, Adrian Price-Whelan databases
- Scott Anderson's weird object page

SDSS-4 ?
Any use for the BOSS spectrographs?

Call for Pre-proposals: Future Observing Programs for Apache Point Observatory

The Astrophysical Research Consortium (ARC) is pleased to announce this solicitation for internal pre-proposals for new and/or continuing science programs, both for the 3.5-meter and 2.5-meter ARC telescopes at the Apache Point Observatory (APO) in the post-SDSS-III era. These proposals can consist of coherent scientific programs, such as surveys, or they could describe specific modes of operation. This solicitation is open to individuals and groups at all ARC and SDSS-III affiliated institutions. The proposals will be reviewed by the ARC Futures Steering Committee, which will try to form an integrated plan that eventually leads to a selection of programs that are authorized to raise funds under the name of ARC to carry out future science programs at Apache Point Observatory.

The ARC Board will meet in mid-November, so we have designated the **pre-proposal deadline as 22 October 2010**. Short pre-proposals should be submitted electronically to both Michael Shull (michael.shull@colorado.edu) and Bruce Gillespie (gillespi@apo.nmsu.edu). They should be in .pdf format and limited in length to five pages. Institutional endorsements are not required.

This announcement stems from an ongoing and broader discussion within ARC on how to best utilize and support the two telescopes in the post-2014 timeframe, following the completion of SDSS-III. Accordingly, ARC has formed a Futures Steering Committee (Daniel Eisenstein, Bruce Gillespie, Suzanne Hawley, Michael Shull, and Michael Strauss) charged with making recommendations to the ARC Board of Governors on matters of organization, operations, and science priorities to ensure the future viability and scientific effectiveness of APO.