



Extragalactic Wide-field MOS Landscape

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Outline

- Wide-field Imaging landscape and photo-z's
- MOS now and soon
- Space MOS
- WFMOS: Control of costs



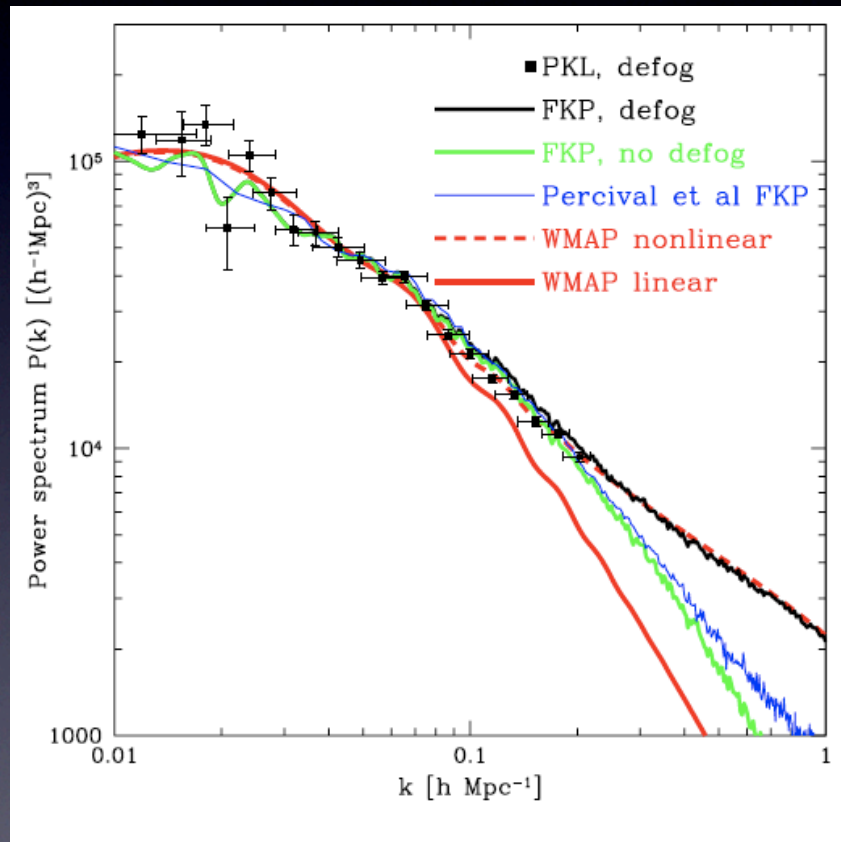
(Optical) Wide-field Imaging landscape

- SDSS has provided digital map of northern sky (SDSS-III has imaged ~ 2000 deg² in south). UKIDSS+2MASS have provided IR complement
- VST+VISTA (VIKING, VHS, ATLAS), NEWFIRM, PanSTARRS, Skymapper
- ODI, DES, HSC, LSST, PAU, PS4

~ billion dollar industry

Photo-z's

(Will they ever be good enough?)



Tegmark et al. (2006)

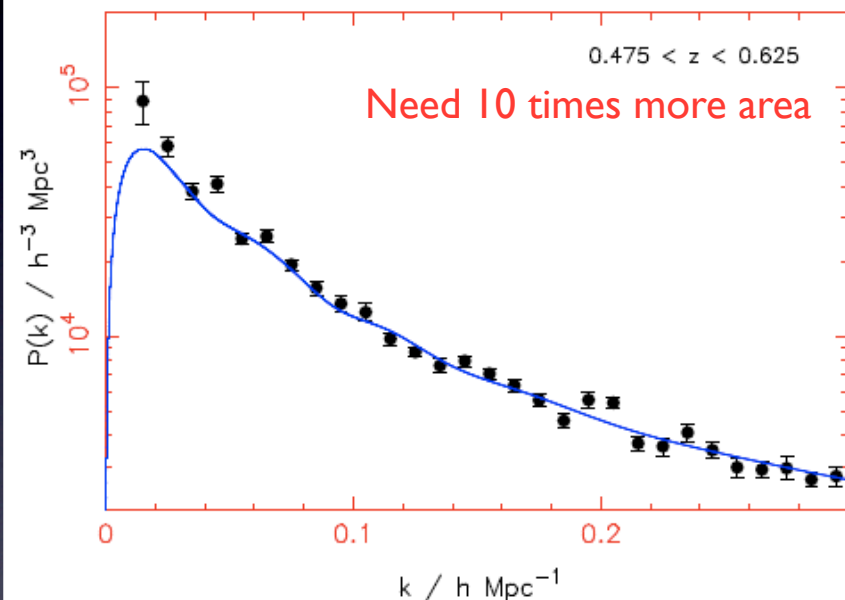


Figure 23. The spatial power spectrum of the photo-z catalogue in a wide redshift slice $\Delta z = 0.15$ such that Fourier modes with $k_x \neq 0$ are utilized in the analysis. The agreement is good with the model power spectrum corresponding to the best-fitting cosmological parameters for the angular clustering measurements (the solid line).

Blake et al. (2007)

Astrophysics

- Eight of the top 10 cited SDSS papers (excluding data release and technical) use spectral information, e.g., Tremonti et al. 2004
- Not just numbers but quality and accessibility to data
- Spectra are more time-consuming so need highly efficient systems

TABLE 1
HIGH-IMPACT OBSERVATORIES

Rank	Facility	Citations	Participation
1	SDSS	1892	14.3%
2	Swift	1523	11.5%
3	HST	1078	8.2%
4	ESO	813	6.1%
5	Keck	572	4.3%
6	CFHT	521	3.9%
7	Spitzer	469	3.5%
8	Chandra	381	2.9%
9	Boomerang	376	2.8%
10	HESS	297	2.2%

Madrid & Machetto 2009

Wide-field MOS now

- SDSS-III re-fit with 1000 fibers (2") over 7 deg² fov, R=2400 (on sky this Autumn)
BOSS, SEGUE2
- AAOmega provides 392 fibers (2") over 3 deg² fov, R=1300-10000 *WiggleZ, GAMA*
- VIMOS provides hundreds multi-slit spectra over ~0.06 deg² with R~200-2500
VVDS, zCOSMOS, VIPERS
 - ▶ Call now for ~200nts large spectroscopic survey (FLAMES, VIMOS, FORSI)
 - ▶ Upgrade to VIMOS with red-sensitive chips, lower fringing (Q2 2010)

Wide-field MOS now

- IMACS, DEIMOS, 6dF, **FMOS**
- LAMOST
 - ▶ 4m effective aperture with 5 deg fov
 - ▶ 4000 fibers (3.3") to 16 spectrographs
 - ▶ 370 - 900 nms
 - ▶ $R = 1000$ to 10000
 - ▶ 5 years surveys starting 2010
 - 10000 deg^2 to $r < 18.8$
 - LRGs and QSOs surveys

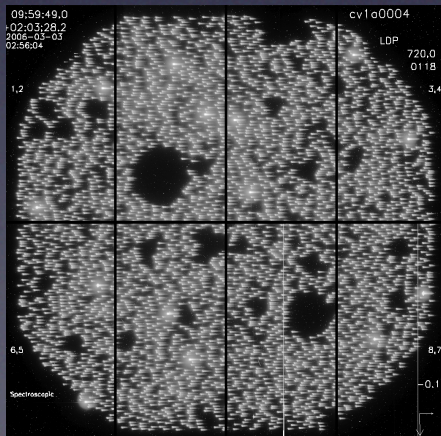
Wide-field MOS soon

- HETDEX with 150 VIRUS spectrographs
 - ▶ New corrector gives 0.25deg^2 $R=800$ covering 350 to 580 nms. Surveys start 2010 for 3 years
- ESO call for new MOS
 - ▶ multiplex >500 , at least $20'$ fov , resolution 1000 to 40000, 350 to 1700 nms, no change to VLT

Wide-field MOS maybe

- BigBOSS (Schlegel et al. astro-ph/0904.0468)
 - ▶ 4000 fiber system for NOAO 4-m with 7 deg² R~5000 and 340 to 1100 nms. Planned 8 3-arm spectrographs and 10 year all-sky survey using Mayall & Blanco

Primus



- Durham extreme MOS (Content & Shanks astroph/0808.2367)
 - ▶ VXMS on VISTA ~12000 slits over 3 deg² with 12 spectrographs R~600
 - ▶ NGIdF/XMS on AAT/Calar Alto prime focus with 4000 slits over 3deg² low cost with limited resolution and wavelength coverage. Hundreds of nights available

Wide-field MOS maybe

- WFMOS on Subaru (2 teams)
 - ▶ AAO team with 3000 fibers/spines over $\sim 1.7 \text{ deg}^2$ feeding 10 SDSS clone spectrographs. 4 high res spectrographs as well.
 - ▶ JPL team with similar science requirements and multiple spectrographs
 - ▶ JPL team won and then Gemini cancelled WFMOS!

Space Wide-field MOS

- ESA Euclid design will do a 20,000 deg² BAO survey
 - ▶ Now NIR slitless design with R~400 with expected ~40 million redshifts to z~2
 - ▶ SPACE DMD option is still possible and will be discussed in Yellow Book
 - ▶ IDECS could come back next year

Conclusions

- We now have instruments with ~ 1000 fibers/slits that can produce surveys of 10^5 - 10^6 objects
- FMOS, AAOmega, VIMOS, SDSS are working, so *“make hay while the sun shines”*
- Next few years will see systems with ~ 5000 fibers which will allow large-area surveys of 10^6 - 10^7 objects
- WFMOS reminds us to control costs!