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WORKSHOP TALKS



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The Kavli Institute for Cosmological Physics (KICP) at the University of Chicago will host The Dark Energy Spectrometer workshop on May 30-31 to discuss DESpec, a conceptual next generation dark energy project to enable massive spectroscopic surveys in the southern hemisphere. It would naturally synergize with the Dark Energy Survey (DES), which will start taking data later this year, and with LSST in the longer term. The goal of this meeting is to review past and present work on DESpec and to make plans for how to proceed. We will briefly review the current state of the instrument design and then identify the next steps in the project, including describing the R&D necessary to proceed with theory, survey strategy, and instrument definition. The goal of the workshop will be to begin to assemble the DESpec team, define the project's mission statement, and plan how to proceed in the coming year.

Organizing Committee

Darren DePoy
Texas A&M University

H. Thomas Diehl
Fermilab

Brenna Flaugher
Fermilab

Joshua Frieman
University of Chicago/KICP

Michael Gladders
University of Chicago/KICP

Craig Hogan
U. Chicago/Fermilab

Stephen Kent
Fermilab

Richard Kron
University of Chicago/KICP

Ofer Lahav
University College London

Jennifer Marshall
Texas A&M University

1. **Jeremy R Allington-Smith**, Durham University
Talk: Fibre systems for cosmology

May 31, 2012 (2:30 PM - 2:50 PM)

Co-authors: Graham Murray

2. **David Brooks**, University College London
Talk: Design and Manufacture of the Optics

May 31, 2012 (3:30 PM - 3:50 PM)

3. **Yanchuan Cai**, Durham University
Talk: Combining photo-z and spec-z surveys: Constraint on linear growth

May 30, 2012 (2:30 PM - 3:00 PM)

Co-authors: Gary Bernstein

Redshift space distortion is a powerful way of measuring the growth of structure and testing General Relativity, but it is limited by cosmic variance and the degeneracy between the galaxy bias b and the growth rate factor f . The cross-correlation of lensing shear with the galaxy density field can measure b in a manner free from cosmic variance limits, breaking the $f - b$ degeneracy and allowing inference of the matter power spectrum from the galaxy survey. Constraint on the linear growth of structure may benefit from combining a weak-lensing photo- z survey with a spectroscopic galaxy redshift survey.

4. **Francisco J Castander**, ICE, IEEC/CSIC, Barcelona
Talk: DESpec Science: Cross-correlation of spectroscopic and photometric surveys

May 30, 2012 (2:00 PM - 2:30 PM)

Co-authors: Gaztanaga, Eriksen, Crocce, Fosalba, Marti, Miquel, Cabre

We will present the science reach of cross-correlating spectroscopic and photometric surveys.

5. **Carlos Cunha**, Kavli Institute for Particle Astrophysics and Cosmology, Stanford University
Talk: N-body-spectro-photometric simulations for DES and DESpec

May 30, 2012 (11:50 AM - 12:10 PM)

6. **Darren L. DePoy**, Texas A&M University
Talk: Instrument design of DESpec as informed by DESpec science

May 30, 2012 (10:20 AM - 10:40 AM)

7. **H. Thomas Diehl**, Fermilab
Talk: DESpec overview

May 31, 2012 (1:30 PM - 1:50 PM)

8. **Jennifer Helsby**, Kavli Institute for Cosmological Physics, University of Chicago
Talk: Photometric Redshifts, DES, and DESpec

May 30, 2012 (11:35 AM - 11:50 AM)

9. **Craig Hogan**, U. Chicago/Fermilab
Talk: DESpec in the landscape of large spectroscopic surveys

May 30, 2012 (9:00 AM - 9:30 AM)

10. **Stephanie Jouvel**, ICE/CSIC
Talk: Target Selection for DESpec: Mocks, Strategy and Future Steps

May 31, 2012 (10:40 AM - 11:20 AM)

Co-authors: Filipe Abdalla

11. **Stephen M Kent**, Fermilab
Talk: DESpec optical design overview

May 31, 2012 (3:10 PM - 3:30 PM)

12. **Donnacha Kirk**, Imperial College London
Talk: DES/DESPEC WGL & RSDs on the same sky

May 30, 2012 (3:30 PM - 4:00 PM)

I will present forecasts for DES + DESpec, concentrating on cosmic shear from DES & galaxy clustering including RSDs for DESpec with particular attention on the issue of cross-correlations when the survey areas overlap.

13. **Richard G. Kron**, University of Chicago/KICP
Talk: Allocating fibers to other classes of sources

May 31, 2012 (11:20 AM - 11:40 AM)

14. **Ofer Lahav**, University College London
Talk: DESpec science: prospects and challenges

May 30, 2012 (9:30 AM - 10:00 AM)

15. **Huan Lin**, Fermilab
Talk: Photometric Redshifts, DES, and DESpec

May 30, 2012 (11:20 AM - 11:35 AM)

Calibration of photometric redshifts with DES and DESpec.

16. **Jennifer L Marshall**, Texas A&M University
Talk: The DESpec spectrographs as an evolution of VIRUS

May 31, 2012 (4:10 PM - 4:30 PM)

17. **Jeffrey A Newman**, U. Pittsburgh / Pitt-PACC
Talk: Photometric Redshift Calibration with Wide-Area Surveys

May 30, 2012 (11:00 AM - 11:20 AM)

Co-authors: Daniel J. Matthews

Many of the cosmological measurements to be performed with future wide-area photometric surveys such as DES and LSST will require extremely well-characterized photometric redshifts. A conventional approach is to calibrate these photo-z's using large sets of spectroscopic redshifts; however, even for objects 1.5 magnitudes brighter than DES will reach, current surveys on 8-10m telescopes only obtain secure redshifts for 40-70% of targeted objects. As a further complication, in most surveys the majority of these secure redshifts are in categories with a ~5% failure rate, significantly degrading their use for precision calibration. A powerful alternative approach is to exploit the clustering of galaxies. Measuring the two-point angular cross-correlation between objects in a photometric redshift bin and objects with known spectroscopic redshift, as a function of the spectroscopic z, allows the true redshift distribution of a photometric sample to be reconstructed in detail, even if it includes objects too faint for spectroscopy or if spectroscopic samples are highly incomplete (and only the most secure redshifts are utilized). A wide-area survey with ~100k objects within a 500-1000 square degree region would be more than sufficient to calibrate photometric redshifts for DES or LSST. Combining photometric and wide-area spectroscopic surveys in the same region of sky will be a powerful tool for future cosmological experiments.

18. **Bob Nichol**, ICG Portsmouth
Remote talk: The latest from BOSS and eBOSS

May 31, 2012 (9:00 AM - 9:30 AM)

Co-authors: The BOSS collaboration

The BOSS collaboration is making great progress and has just released the first significant cosmology results (see Anderson et al. 2012). I will review the highlights of this on-going survey including plans for the next generation of dark energy surveys with SDSS e.g. eBOSS. I can also give a brief overview of WEAVE which is a UK-led multi-object spectroscopic survey using the WHT.

19. **Aaron Roodman**, KIPAC, SLAC National Accelerator Laboratory
Talk: BigBOSS

May 31, 2012 (9:50 AM - 10:10 AM)

20. **Will Saunders**, Australian Astronomical Observatory
Talk: Mohawk - a 4000-fiber positioner for DESpec

May 31, 2012 (1:50 PM - 2:10 PM)

Co-authors: Greg Smith, Rolf Muller, Jurek Brzeski, Lew Waller, Stan Miziarski, Tony Farrell, James Gilbert

All Australian Astronomical Observatory

DESpec requires a 4000-fiber positioner, with a pitch under 7mm, and a curved focal plane. We have carried out a feasibility study into adapting existing AAO 'tilting spine' designs to this geometry, and no show-stoppers have been identified. The proposed design is also simpler and more modular than previous designs.

21. **Will Saunders**, Australian Astronomical Observatory
Talk: A fast new reflective design for fiber-fed spectrographs

May 31, 2012 (4:30 PM - 4:50 PM)

A new design is presented for fibre-fed optical spectrographs. The design is a Schmidt/Maksutov variant, but with the focal plane close to the spectrograph pupil. This means it is possible to hide the detector package almost entirely within the shadow of the top end obstruction of the telescope. This allowing a very high efficiency, competitive with transmissive designs. The optics are superb, as least as good as classic Schmidt designs, allowing f/1.2 or faster cameras. For DESpec, this means the entire wavelength range can be accommodated on a single 4Kx4K detector at the required resolution.

22. **Michael Seiffert**, Jet Propulsion Laboratory
Talk: The Subaru Prime Focus Spectrograph (PFS)

May 31, 2012 (2:10 PM - 2:30 PM)

Co-authors: on behalf of the PFS collaboration

The Prime Focus Spectrograph (PFS) is a fiber fed multi-object spectrograph for the Subaru Telescope that will conduct targeted surveys for studies of dark energy, galaxy evolution, and galactic archaeology. I will discuss the planned surveys, the top-level instrument requirements, and the baseline instrument design. The key to the instrument is a high-density array of 2400 fiber positioners placed at the prime focus of the Subaru Telescope. The fiber positioners cover a 1.3 degree field of view and feed a set of 4 spectrographs covering 400 nm to 1.3 microns. PFS will comprise a system with an unprecedented combination of high-multiplex factor, observing efficiency, and aperture on the Subaru telescope.

23. **Michael A Strauss**, Princeton University
Talk: Sumire and LSST

May 31, 2012 (9:30 AM - 9:50 AM)

I will discuss two projects that have the potential to be strongly synergistic with DESpec. SuMIRe (Subaru Measurements of Images and Redshifts) will use the Hyper SuprimeCam, a 1.7 deg² imaging camera on the Subaru 8.2m telescope, to carry out a layered survey of the sky to study weak lensing and galaxy evolution. The Prime Focus Spectrograph (PFS) will have 2400 fibers over 1.3 deg², and wavelength coverage from 0.38 to 1.3 microns to measure galaxy redshifts from $z=0$ to $z=7$ with no gaps. The Large Synoptic Survey Telescope (LSST), a 6.7-meter telescope with a 9.6 deg² field of view, will be dedicated to a ten-year survey of the sky starting in 2021, reaching to $r=27.5$ over 20,000 deg² of the Southern sky.

24. **Molly Swanson**, Harvard CfA
Talk: Probing Dark Energy with Weak Lensing and Redshift Space Distortions

May 30, 2012 (4:00 PM - 4:30 PM)

I will discuss ideas on science projects to distinguish between dark energy and modified gravity using a combination of weak lensing data from DES and redshift space distortions from DESpec.

25. **Daniel Thomas**, Institute of Cosmology and Gravitation, University of Portsmouth
Remote talk: Non-DE science with DESpec

May 30, 2012 (10:00 AM - 10:20 AM)

26. **David Weinberg**, Ohio State University
Talk: Why Joint Imaging and Spectroscopic Surveys are Good

May 30, 2012 (1:30 PM - 2:00 PM)