

DECam futures (the sky is the limit) Arjun Dey NOAO



What's Next with DECam?

- DES and DECaLS end in 2018B (we hope ...)
- LSST Science Verification begins ~2021/22



DECam Community Science Workshop 2018 May 21-22



road/Intermediate-band DECam urveys

- Finish the sky to dec~+30! Epoch 0 for LSST
- u-band of existing survey regions
- Solar-system surveys for moving objects (and planets 9,10,...)
 - pick best cadence do the dec<+30 sky twice in VR
 - ~1000 deg²/night => 20,000 deg² in 20 nights x 2 x 2 well spent!
- Variability/Transient surveys
 - in the Galactic Plane (or towards MCs)
 - Characterizing extragalactic transients (high-latitude surveys of the faint sky)
 - Combine science cases (e.g., LMC variables with Paralensing Surveys)
- Special intermediate bands
 - Washington / DDO filters for giant/dwarf sep fainter than Gaia
 - Metallicity sensitive filters



Narrow-band Surveys with DECam





Narrow-band Surveys with DECam

iffuse Ionized Gas in the ISM

- Ha/[OIII] maps of the sky to identify photoionized
- gas (cirrus, SNRs, outflows, etc.)
- Side benefit better sky subtraction for broadband g/r images





DECam Polarization Survey

1ap of the Galactic Magnetic Field

-4 linear polarizers mounted with similar filters (VR?)
ber-calibration to beat down systematics



DECam Transient Discovery/Follow-up***

- Deep Surveys to characterize the faint transient population
 - Range of cadences / bands
 - Enable transient detection in CP and auto-publication
- Enable automated response to external triggers
 - LIGO, ZTF, etc.
- Enable moving object detection in CP and auto-publication
 - Discovery of solar system objects, very high PM faint stars, etc.

* Tom Matheson's talk

Maximizing Science in the Era of LSST"

Najita et al. 2017



NOAO

	Capability	
		3–5 m
ntified Blanco/DECam as a Key Capability required to "maximize ence"	Optical Imager (Wide-field)	~2.5 yrs with Blanco/DECam for Solar System science case
report at https://www.noao.edu/meetings/lsst-oir-study/files/ ximizing_Science_in_LSST_era.pdf		~ 3 yrs for Stars science case

DECam is Necessary in the LSST Era

- Flexibly scheduled / more nimble
- PI-driven
- Different filters (λ , $\Delta\lambda$; polarization? objective prisms?)
- Different cadences (not tied to LSST observing patterns)
- Different sky regions (can access up to dec=+30)



2019-2022 - B.L.

- Start of the transient era
 - ZTF, LIGO, etc.
- LSST precursor missions
- Solar System Surveys
- Complete map of Southern Sky (dec < +30)
- Prepare for DESI2 (narrow-band surveys?)



2023-2028 – A.L.

Projects which cannot / will not be done by LSST

- Narrow-band / Polarization maps of the sky
- Very high / different cadence surveys
- Surveys of sky areas not covered by LSST
- LSST-supporting science
 - Photometric / astrometric follow-up observations
 - Imaging with different cadence or different filters
 - Narrow-band observations to remove contamination from LSST broad-band observations



Other Future Options (with \$\$)

- Automate operations / scheduling
 - Enables more flexible scheduling options, trigger response, etc.
- New detectors
 - More blue sensitive?
 - Extend to 1.6 microns?
- Upgrade optics
 - Objective prism for spectroscopy? (instant SED for LSST)
 - ADC?
- Upgrade other hardware
 - Faster shutter for << 1-sec exposures (micro shutters?)
- **Repurpose Corrector**
 - DESpec-like MOS (~1500-2500 fibers, DESI spectrographs, ADC?)
- Move DECam to (or duplicate for) Northern Hemisphere

Science with DECam

pretty much everything!)

- Census / orbits of Solar System denizens
- Formation of galaxies
 - Structure of the Milky Way & nearby galaxies
 - Low surface brightness structures in the univers
 - Large scale structure
 - Galaxies at reionization
- Nature of dark matter
 - Contribution of IMBH
 - Dwarf galaxies
 - Halo substructure
- Nature of dark energy
 - Weak lensing, Sne, clusters, etc.

.... And just add spectroscopy!

