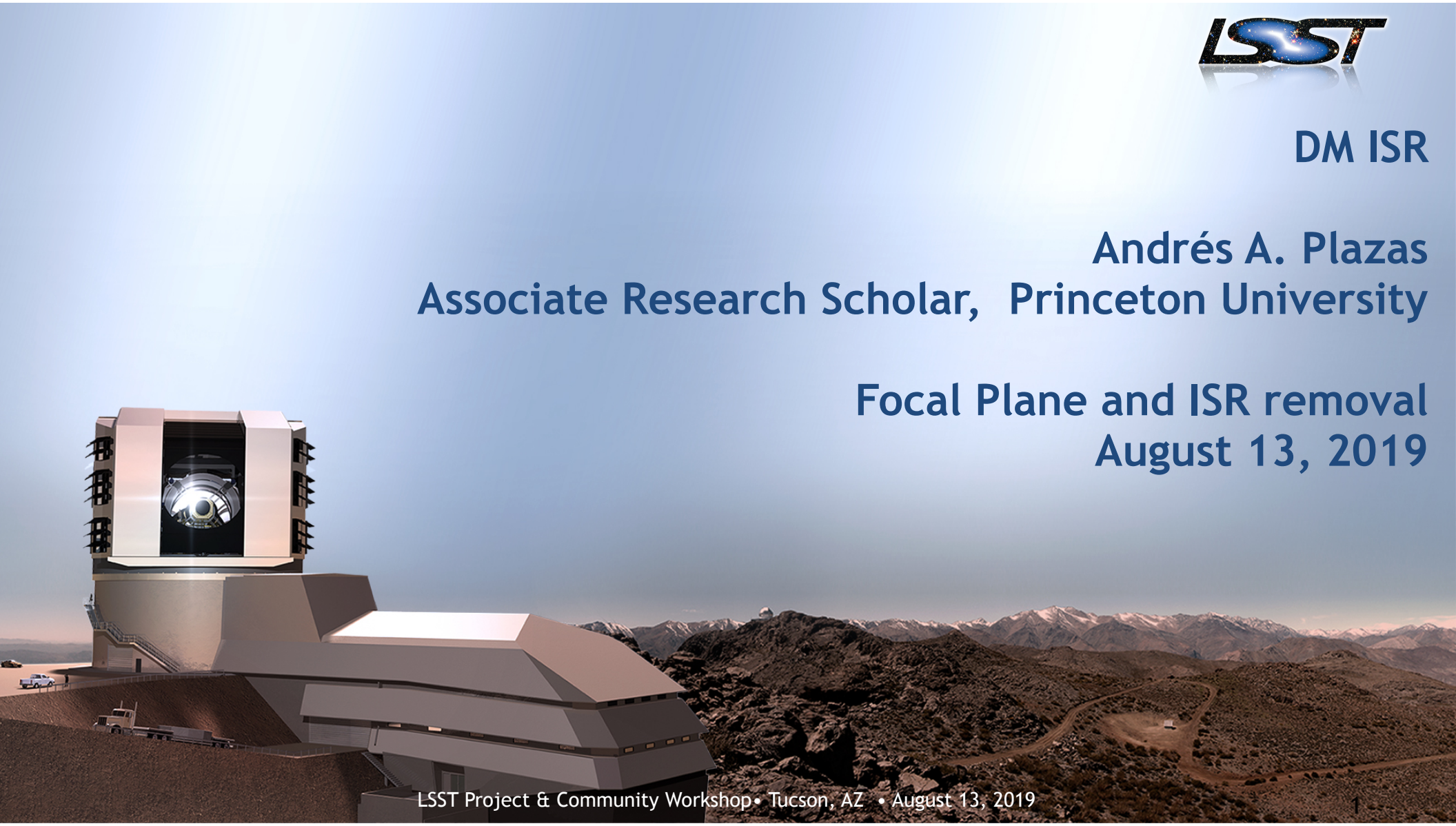


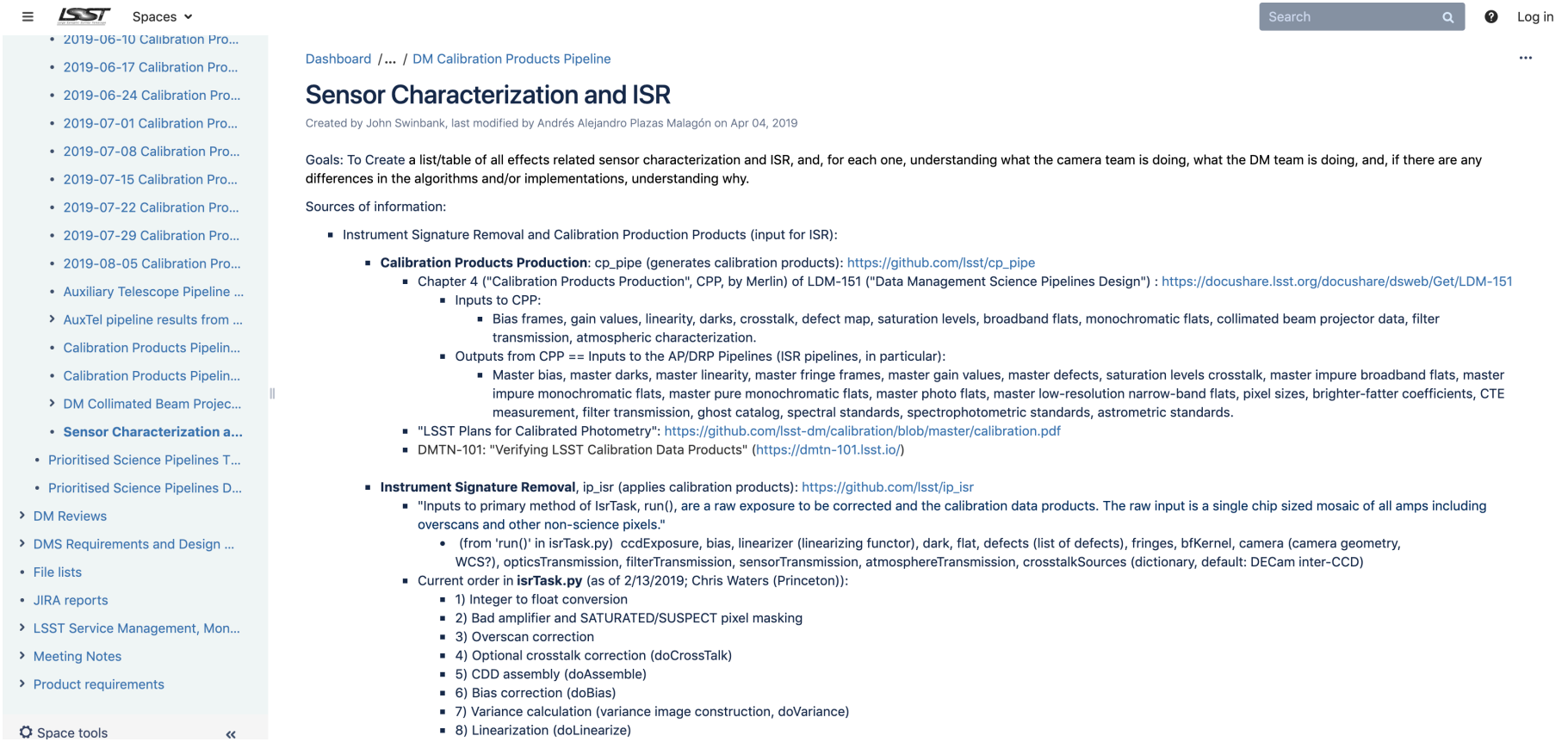
DM ISR

Andrés A. Plazas
Associate Research Scholar, Princeton University

Focal Plane and ISR removal
August 13, 2019

Sensor Characterization and ISR

https://confluence.lsstcorp.org/display/DM/Sensor+Characterization+and+ISR#/



Spaces

Search

Log in

- 2019-06-10 Calibration Pro...
- 2019-06-17 Calibration Pro...
- 2019-06-24 Calibration Pro...
- 2019-07-01 Calibration Pro...
- 2019-07-08 Calibration Pro...
- 2019-07-15 Calibration Pro...
- 2019-07-22 Calibration Pro...
- 2019-07-29 Calibration Pro...
- 2019-08-05 Calibration Pro...
- Auxiliary Telescope Pipeline ...
- AuxTel pipeline results from ...
- Calibration Products Pipelin...
- Calibration Products Pipelin...
- DM Collimated Beam Projec...
- **Sensor Characterization a...**
- Prioritised Science Pipelines T...
- Prioritised Science Pipelines D...

- DM Reviews
- DMS Requirements and Design ...
- File lists
- JIRA reports
- LSST Service Management, Mon...
- Meeting Notes
- Product requirements

Space tools

Dashboard / ... / DM Calibration Products Pipeline

Sensor Characterization and ISR

Created by John Swinbank, last modified by Andrés Alejandro Plazas Malagón on Apr 04, 2019

Goals: To Create a list/table of all effects related sensor characterization and ISR, and, for each one, understanding what the camera team is doing, what the DM team is doing, and, if there are any differences in the algorithms and/or implementations, understanding why.

Sources of information:

- Instrument Signature Removal and Calibration Production Products (input for ISR):
  - **Calibration Products Production**: cp_pipe (generates calibration products): https://github.com/lsst/cp_pipe
    - Chapter 4 ("Calibration Products Production", CPP, by Merlin) of LDM-151 ("Data Management Science Pipelines Design") : https://docushare.lsst.org/docushare/dsweb/Get/LDM-151
      - Inputs to CPP:
        - Bias frames, gain values, linearity, darks, crosstalk, defect map, saturation levels, broadband flats, monochromatic flats, collimated beam projector data, filter transmission, atmospheric characterization.
      - Outputs from CPP == Inputs to the AP/DRP Pipelines (ISR pipelines, in particular):
        - Master bias, master darks, master linearity, master fringe frames, master gain values, master defects, saturation levels crosstalk, master impure broadband flats, master impure monochromatic flats, master pure monochromatic flats, master photo flats, master low-resolution narrow-band flats, pixel sizes, brighter-fatter coefficients, CTE measurement, filter transmission, ghost catalog, spectral standards, spectrophotometric standards, astrometric standards.
    - "LSST Plans for Calibrated Photometry": https://github.com/lsst-dm/calibration/blob/master/calibration.pdf
    - DMTN-101: "Verifying LSST Calibration Data Products" (https://dmtn-101.lsst.io/)
  - **Instrument Signature Removal**, ip_isr (applies calibration products): https://github.com/lsst/ip_isr
    - "Inputs to primary method of IsrTask, run(), are a raw exposure to be corrected and the calibration data products. The raw input is a single chip sized mosaic of all amps including overscans and other non-science pixels."
      - (from 'run()' in isrTask.py) ccdExposure, bias, linearizer (linearizing functor), dark, flat, defects (list of defects), fringes, bfKernel, camera (camera geometry, WCS?), opticsTransmission, filterTransmission, sensorTransmission, atmosphereTransmission, crosstalkSources (dictionary, default: DECam inter-CCD)
    - Current order in **isrTask.py** (as of 2/13/2019; Chris Waters (Princeton)):
      - 1) Integer to float conversion
      - 2) Bad amplifier and SATURATED/SUSPECT pixel masking
      - 3) Overscan correction
      - 4) Optional crosstalk correction (doCrossTalk)
      - 5) CDD assembly (doAssemble)
      - 6) Bias correction (doBias)
      - 7) Variance calculation (variance image construction, doVariance)
      - 8) Linearization (doLinearize)

Sensor Characterization and ISR

Robert Lupton's slides on physical motivations for ISR order: isr.pdf

https://confluence.lsstcorp.org/display/DM/Sensor+Characterization+and+ISR#/

Instrumental Signature Removal

Robert Lupton, Princeton University

2018-12-19

Instrument Signature Removal

ip_isr, https://github.com/lsst/ip_isr

1) Integer to float conversion
2) Bad amplifier and SATURATED/SUSPECT pixel masking
3) Overscan correction
4) Optional crosstalk correction
5) CDD assembly
6) Bias correction
7) Variance calculation (variance image construction)
8) Linearization
9) Crosstalk
10) Saturation trail widening (HSC)
11) Brighter-Fatter correction
12) Dark
13) Optional fringe correction
14) Straylight
15) Flat/gain normalization
16) Defect masking and interpolation
17) Fringe
18) Bad pixel/camera specific masking
19) Attach vignette model (HSC), transmission curves, and distortion model

1) Integer to float conversion
2) Bad amplifier and SATURATED/SUSPECT pixel masking
3) Overscan correction
4) CCD Assembly
5) Bias correction
6) Crosstalk correction
7) Linearization
8) Charge transfer correction (not currently implemented)
9) Dark
10) Saturation trail widening (HSC)
11) Brighter-Fatter correction
12) Variance calculation
13) Straylight
14) Flat/gain normalization
15) Defect masking and interpolation
16) Fringe
17) Bad pixel/camera specific masking

- Algorithms: What could be added? What is needed? What should be prioritized?
  - Examples:
    - BFE:
      - Craig: tests on correction of BFE (> 90%)
      - Pierre^2: covs, models in “The Shape of the PTC in CCDs”
    - CTI: not currently implemented in ISR
      - High, low flux models: Adam
      - Thoughts by Pierre (DESC meeting at Berkeley)
    - Focal Plane Electro-Optical testing
      - Comparisons to what is in DM
      - Should any algorithm or analysis be implemented in the stack?
      - Eric’s code
    - On-sky data:
      - HSC, DEcam, comCam, auxTel

Large Synoptic Survey Telescope

Thank you!