Rubin, DESC and LSST-France news

Responsable scientifique : Johan Bregeon (LPSC)

Responsable technique : Fabio Hernandez (CC-IN2P3)

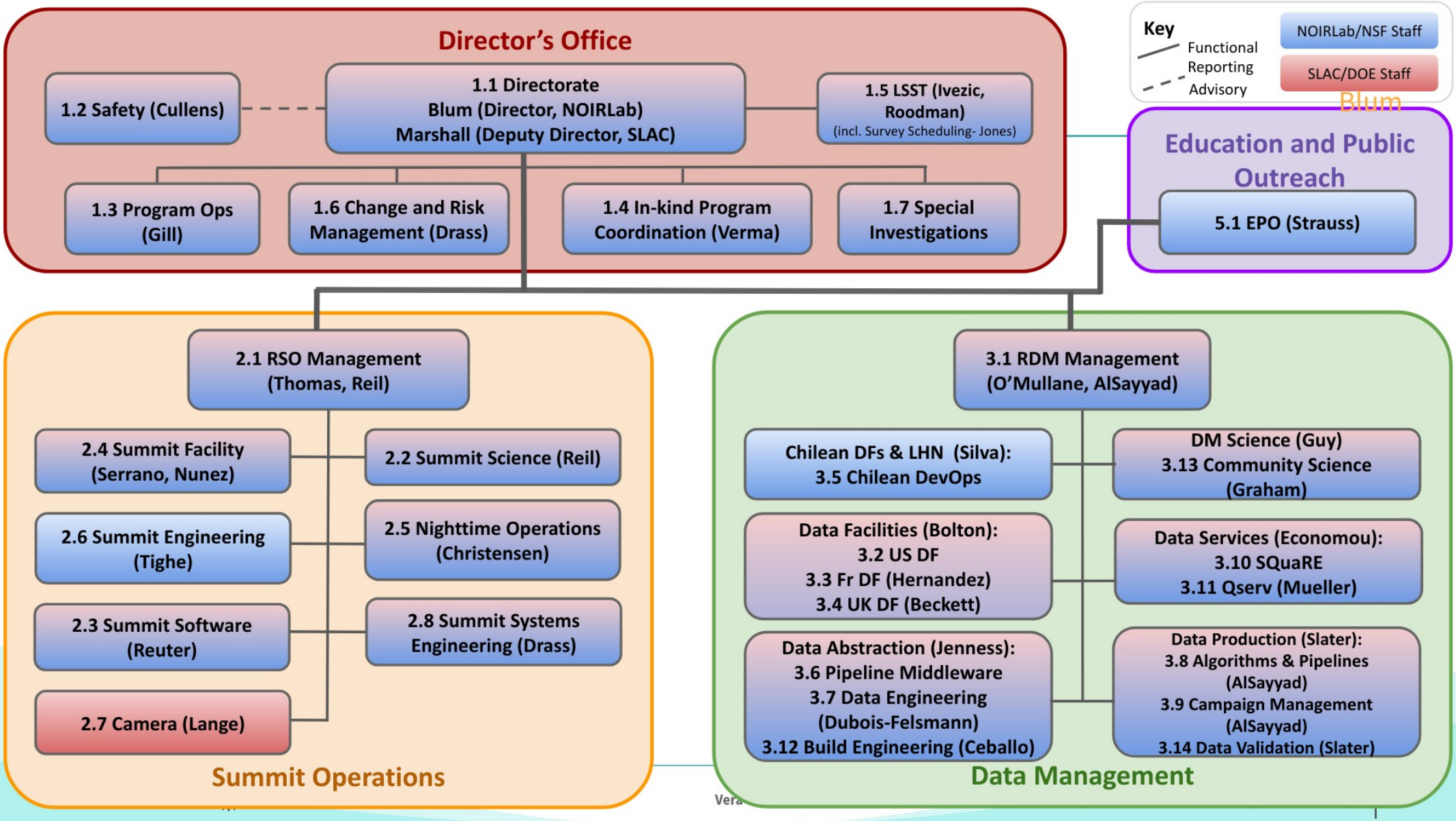
18/05/2026

NSF–DOE Rubin Observatory/NOIRLab/
SLAC/AURA/P. Lago

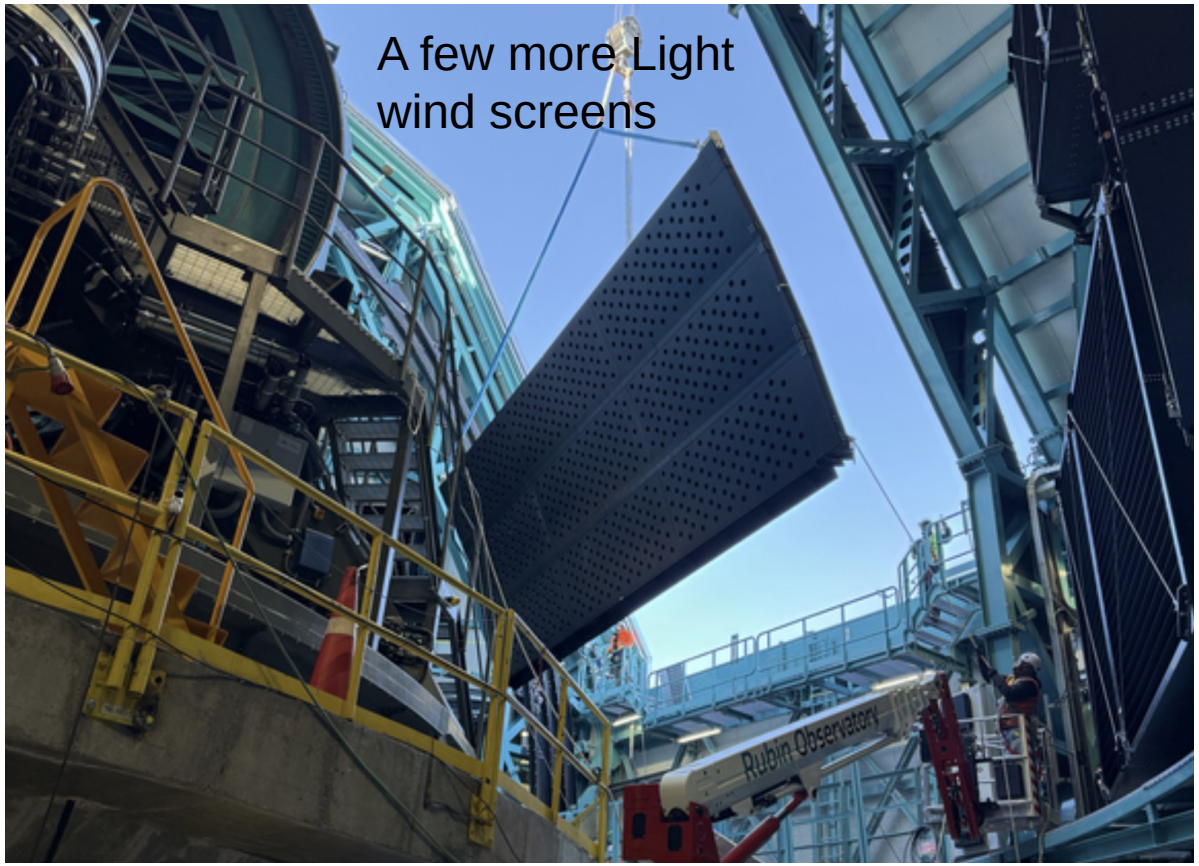
Content

- Rubin project update
  - pre--LSST operations and start of the LSST (Image quality)
  - Camera (leak, AC), Mirrors (thermal), TMA (louvers, baffle) and Dome (LWS)
  - AuxTèl: TCBP, Prisme
  - DP1, DP2 and DR1 ?
- DESC news
- LSST--France news
  - Inclusion within the Rubin project
  - Welcome to our new colleagues from INSU
  - EDIM and Communication
  - Reorganization

Rubin Operations leadership

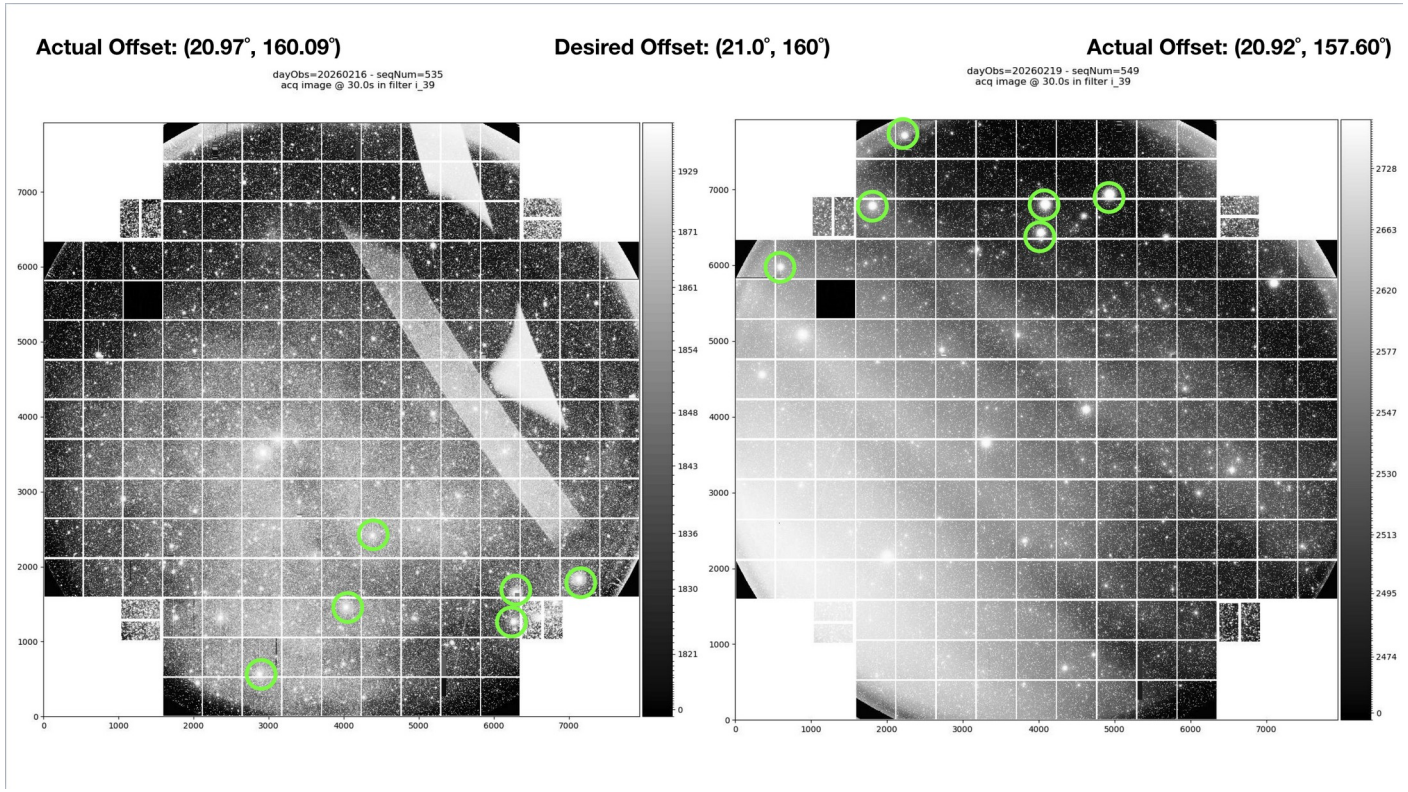


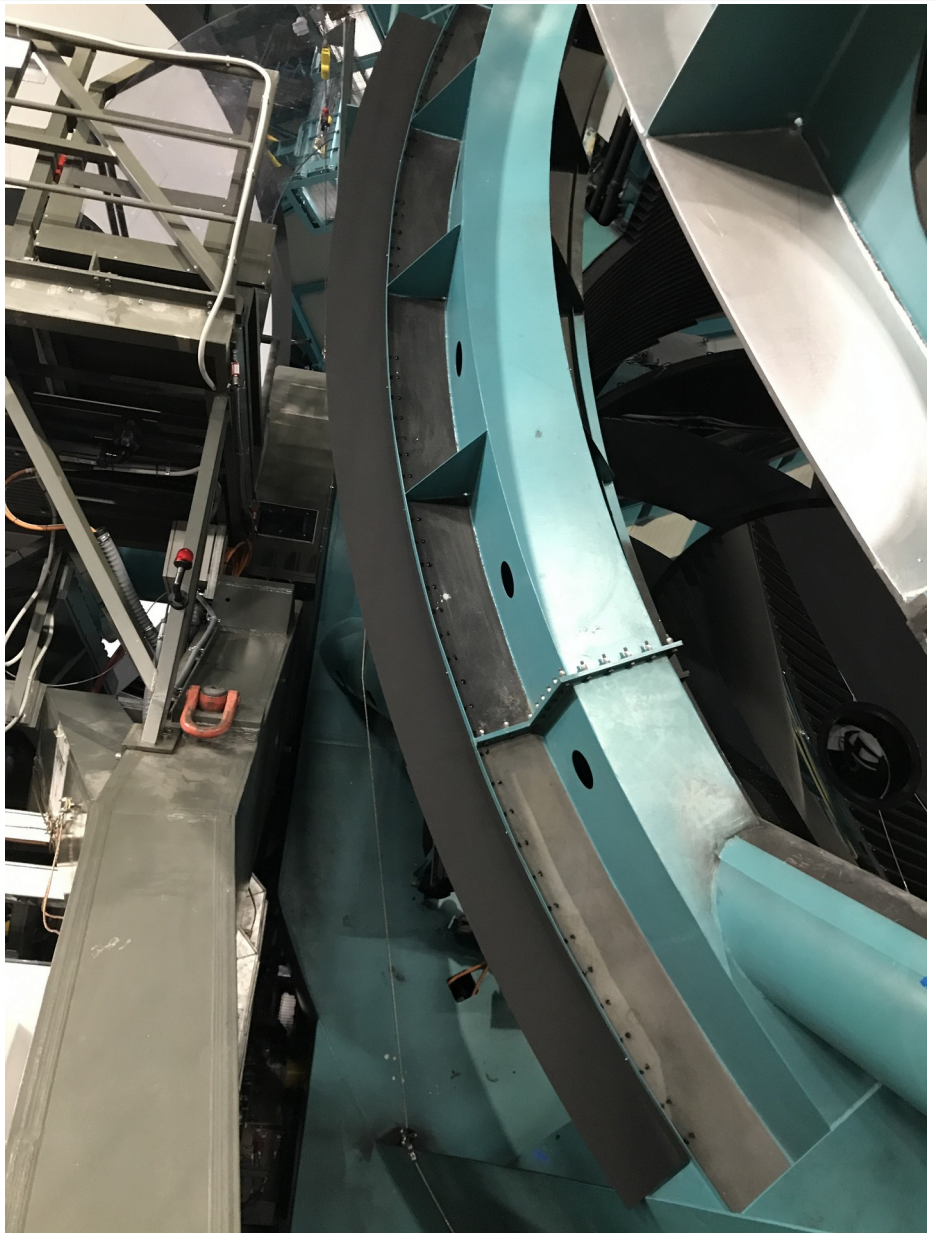
Last construction items moving on : louvers, light wind screen...



And baffle extension

A. Drilka-Wagner et al

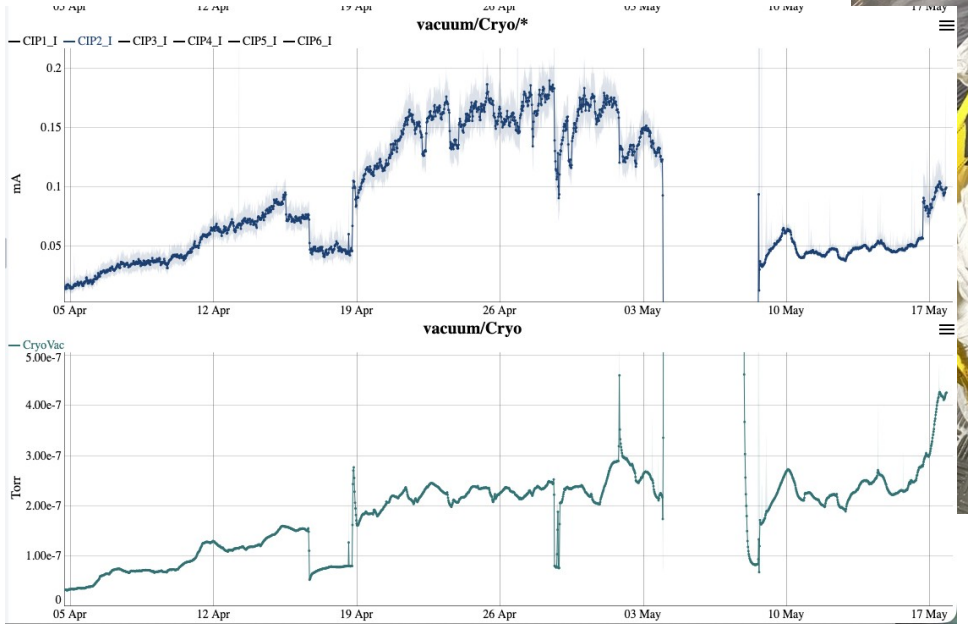


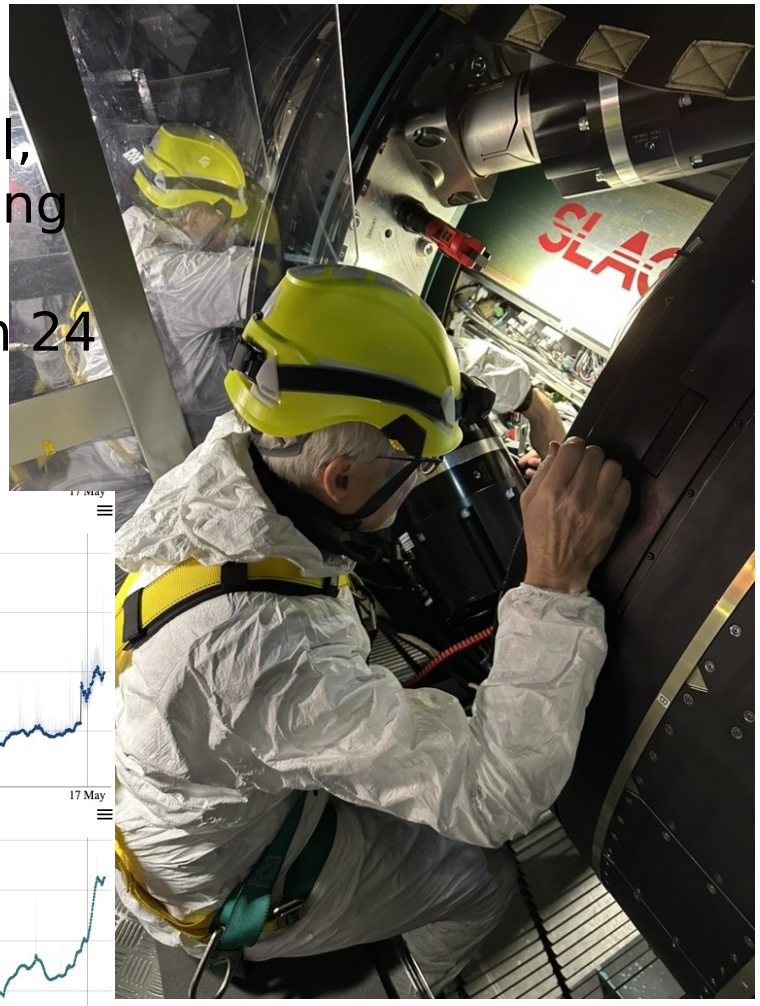


Camera cooling symphony

- Dynalene and glycol circuits
  - Work going on for robustness
- Cryogenic system: 6 of them, but rarely all working, need 3 or 4 to cool down the camera
  - Not working best when too hot or too cold
  - *Winter is coming*

- Very complex system overall, hard to find the stable working point
- Vaccum leak on feedthrough 24 is back



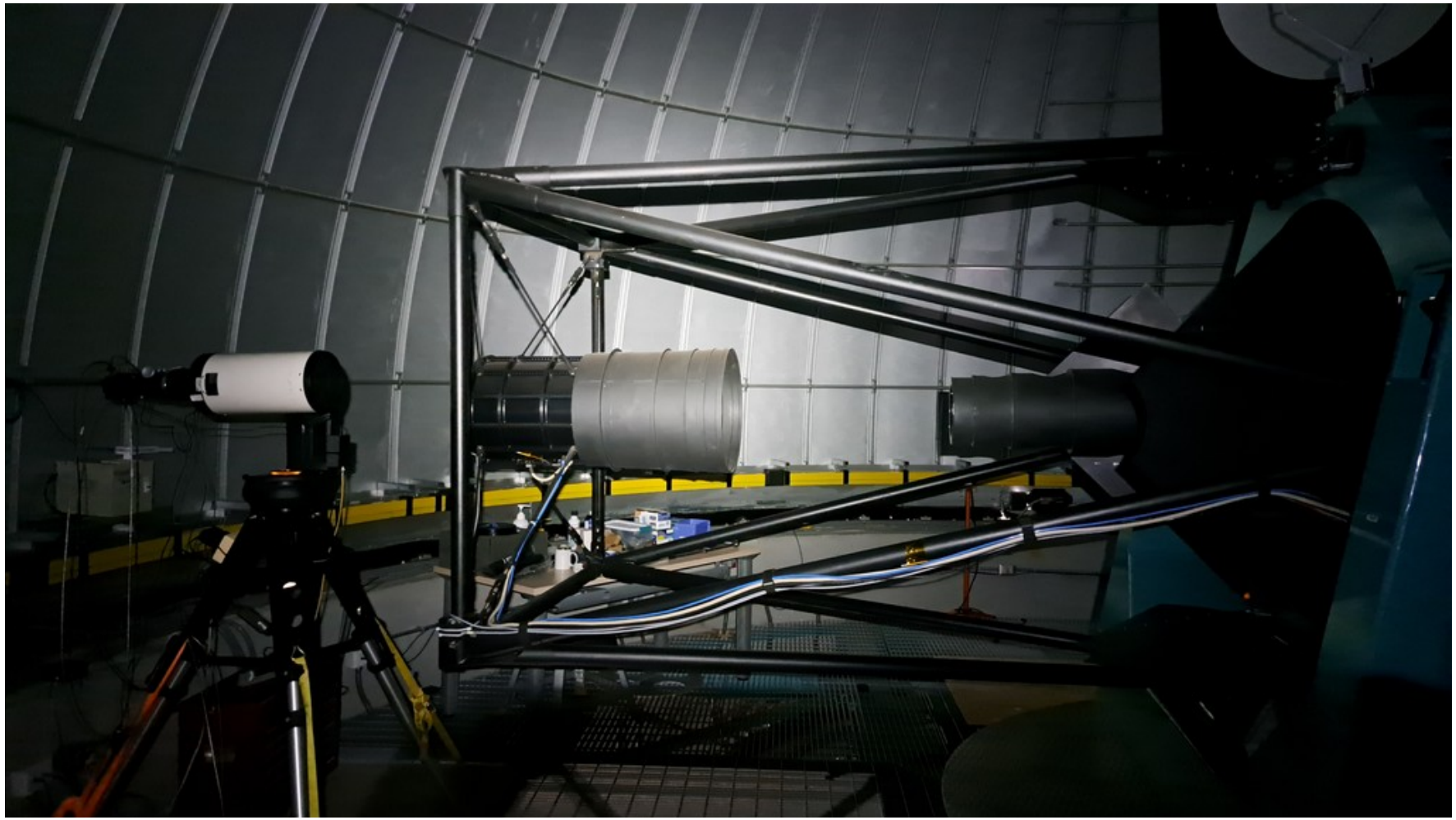


Work on Camera **Auto-Changer 2**

- Patrick **Breugnon**, Aurélién **Marini**, Téo **Weicherding** et Antoine **Bernard** spent 3 weeks on summit in March 2026
  - Rewiring of AC2 latches with shorter cables
  - Validation of Front and Rear electronic spare boxes
  - Various debugging and improvements (including FCS)
  - Training of summit teams to swap Front and Rear boxes
- AutoChanger 2 is basically ready to be put into the camera if needed.

Travelling Collimated Beam Projector on AuxTèl

- **Jérémy Neveu**, Enya van den Abeele, Angelo Lamure-Fontanini, Louise Mousset and Eduardo Sepulveda
- 4 months stay on summit: April to July 2026
- AuxTèl absolute calibration with the TCBP
- LSST Telescope calibration planned as well!
- M. Moniez successfully tested a prism to improve spectra measurements!



DP1: a very small dataset (~1 hr of LSST) but many science papers are appearing on arXiv!

See ls.st/rtn-095

RUBIN DP1 Overview Data products Data processing Tutorials **How to cite Data Preview 1** More

How to cite Data Preview 1

How to cite Rubin Observatory.

When citing this data release please reference the data release paper: **NSF-DOE Vera C. Rubin Observatory** (2025); The Vera C. Rubin Observatory Data Preview 1 https://doi.org/10.71929/rubin/2570536.

For AAS publications please refer to the facility as "Rubin:Simonyi" and for DP1 use "Rubin:Simonyi (LSSTComCam)". The Minor Planet Center has allocated the telescope code X05.

arXiv > astro-ph > arXiv:2507.00192

Astrophysics > Astrophysics of Galaxies

[Submitted on 30 Jun 2025]

An outer-disk SX Phe variable star in Rubin Data Preview 1

Jeffrey L. Carlin, Peter S. Ferguson, A. Katherina Vivas, Neven Caplar, Konstantin Malanchev

We report the discovery of an SX Phoenicis-type pulsating variable star via 217 epochs of time-series photometry from the Vera C. Rubin Observatory's Data Preview 1. The star, designated LSST-DP1-O- 614435753623041404 (or LSST-C25_var1 for short), has mean magnitudes of $(\langle g \rangle, \langle r \rangle) = (18.65, 18.63)$, with pulsation amplitudes of (0.60, 0.38)~mag in these bands. Its period is 0.0767 days (1.841 hours), typical of SX Phe pulsators. We derive a distance to the star of 16.6 kpc based on an SX Phe period-luminosity relation. Its position ~ 5 kpc from the Galactic plane, in the outer Milky Way disk at a Galactocentric distance of ~ 22 kpc, and its proper motion suggest that LSST-C25_var1 is part of the Monoceros Ring structure. This star is presented as a small taste of the many thousands of variable stars expected in Rubin/LSST data.

arXiv > astro-ph > arXiv:2506.23955

Astrophysics > Instrumentation and Methods for Astrophysics

[Submitted on 30 Jun 2025]

Variability-finding in Rubin Data Preview 1 with LSDB

Konstantin Malanchev, Melissa DeLucchi, Neven Caplar, Alex I. Malz, Wilson Beebe, Doug Branton, Sandro Campos, Andrew Connolly, Mi Dai, Jeremy Kubica, Olivia Lynn, Rachel Mandelbaum, Sean McGuire, Eric Aubourg, Robert David Blum, Jeffrey L. Carlin, Francisco Delgado, Emmanuel Gangler, Buell T. Jannuzi, Tim Jenness, Yijung Kang, Arun Kannawadi, Marc Moniez, Andrés A. Plazas Malagón, Wouter van Reeven, David Sanmartim, Elana K. Urbach, W. M. Wood-

n advance of the upcoming Legacy Survey of Space and Time (LSST), which will enable boundless ovides an ideal sandbox for validating innovative data analysis approaches for the LSST mission, whose te presents a pair of such pipelines for variability-finding using powerful software infrastructure suited rmat and the LSDB framework, developed by the LSST Interdisciplinary Network for Collaboration and ability-finding pipelines built on LSDB, the HATS catalog of DP1 data, and preliminary results of

arXiv > astro-ph > arXiv:2507.03228

Astrophysics > Astrophysics of Galaxies

[Submitted on 4 Jul 2025]

Crowded Field Photometry with Rubin: Exploring 47 Tucanae with Data Preview 1

Tobin M. Wainer, James R. A. Davenport, Eric C. Bellm, Yuankun (David)Wang, Neven Caplar, Elliott S. Burdett, Nora Shipp, John K. Parejko, Gray Thoron, Eric Butler, Maya Salwa, Erin Leigh Howard, Brianna Marie Smart, Wilson Beebe, Ishan F. Ghosh-Coutinho, Bob Abel, Željko Ivezić

We analyze imaging from Data Preview 1 of the Vera C. Rubin Observatory to explore the performance of early LSST pipelines in the 47 Tucanae field. The coadd-\texttt{object} catalog demonstrates the depth and precision possible with Rubin, recovering well-defined color magnitude diagrams for 47 Tuc Small Magellanic Cloud. Unfortunately, the existing pipelines fail to recover sources within ~28 pc of the cluster center, due to the extreme source density. Using Rubin's forced photometry on stars identified via Difference Imaging, we can recover sources down to ~14 pc from the cluster center, and find 14744 potential cluster members with this extended dataset. While this forced photometry has significant systematics, our analysis showcases the potential for detailed structural studies of crowded fields with the Rubin Observatory.

arXiv > astro-ph > arXiv:2507.01343

Astrophysics > Solar and Stellar Astrophysics

[Submitted on 2 Jul 2025]

47 Tuc in Rubin Data Preview 1: Exploring Early LSST Data and Science Potentia

Yumi Choi, Knut A. G. Olsen, Jeffrey L. Carlin, Yuankun (David)Wang, Fred Moolekamp, Abi Saha, Ian Sullivan, Colin T. Slate Adair, Peter S. Ferguson, Yijung Kang, Karla Peña Ramírez, Markus Rabus

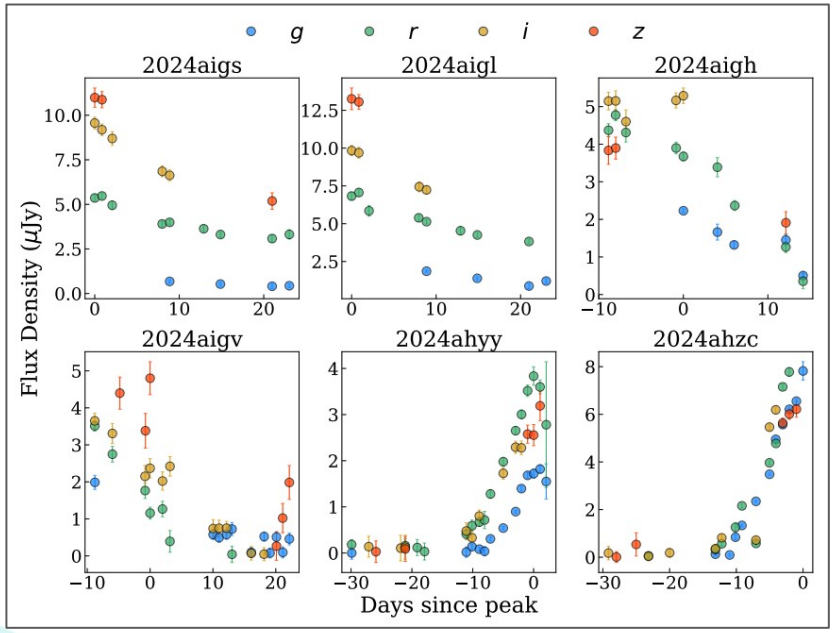
We present analyses of the early data from Rubin Observatory's Data Preview 1 (DP1) for the globular cluster 47 Tuc field. The DP1 dataset for 47 Tuc includes four nights of observations from the Rubin Commissioning Camera (LSSTComCam), covering multiple bands (ugriy). We address challenges of crowding near the cluster core and toward the SMC in DP1, and demonstrate improved star-galaxy separation by fitting fifth-degree polynomials to the stellar loci in color-color diagrams and applying multi-dimensional sigma clipping. We compile a catalog of 3,576 probable 47 Tuc member stars selected via a combination of isochrone, Gaia proper-motion, and color-color space matched filtering. We explore the sources of photometric scatter in the 47 Tuc color-color sequence, evaluating contributions from various potential sources, including differential extinction within the cluster. Finally, we recover five known variable stars, including three RR Lyrae and two eclipsing binaries. Although the DP1 lightcurves have sparse temporal sampling, they appear to follow the patterns of densely-sampled literature lightcurves well. Despite some data limitations for crowded-field stellar analysis, DP1 demonstrates the promising scientific potential for future LSST data releases.

E.g Rubin Comet Catchers: the first Citizen Science project!
~5,000 volunteers, with ~4 million classifications!

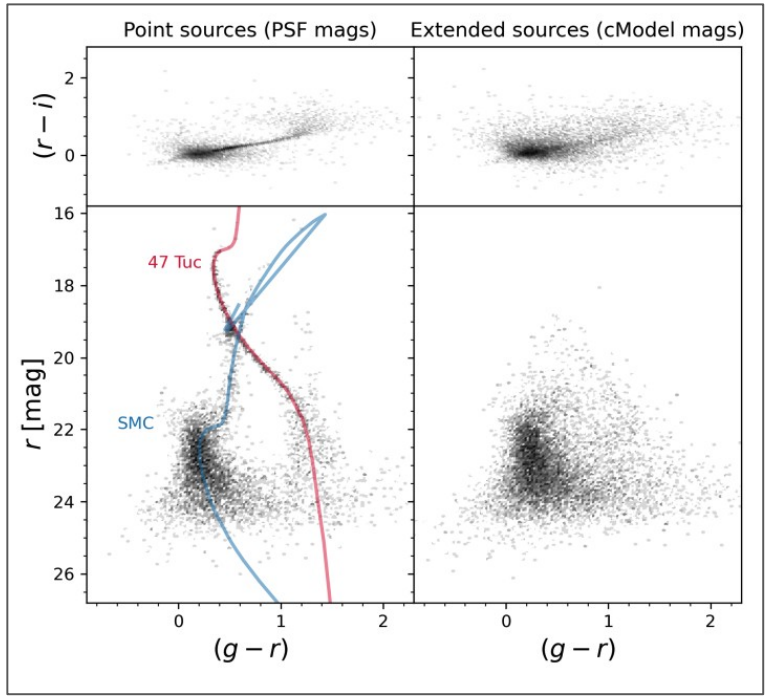
Rubin Comet Catchers

First results from Rubin's Data Preview 1

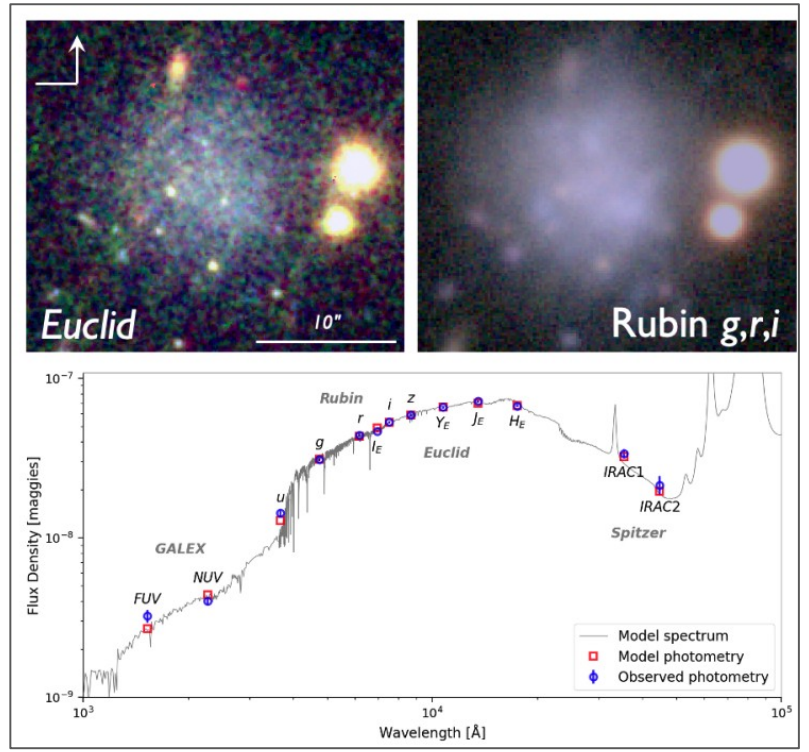
Three example figures from the earliest DP1-based papers.



Extragalactic transients in DP1.
Freeburn et al. 2025



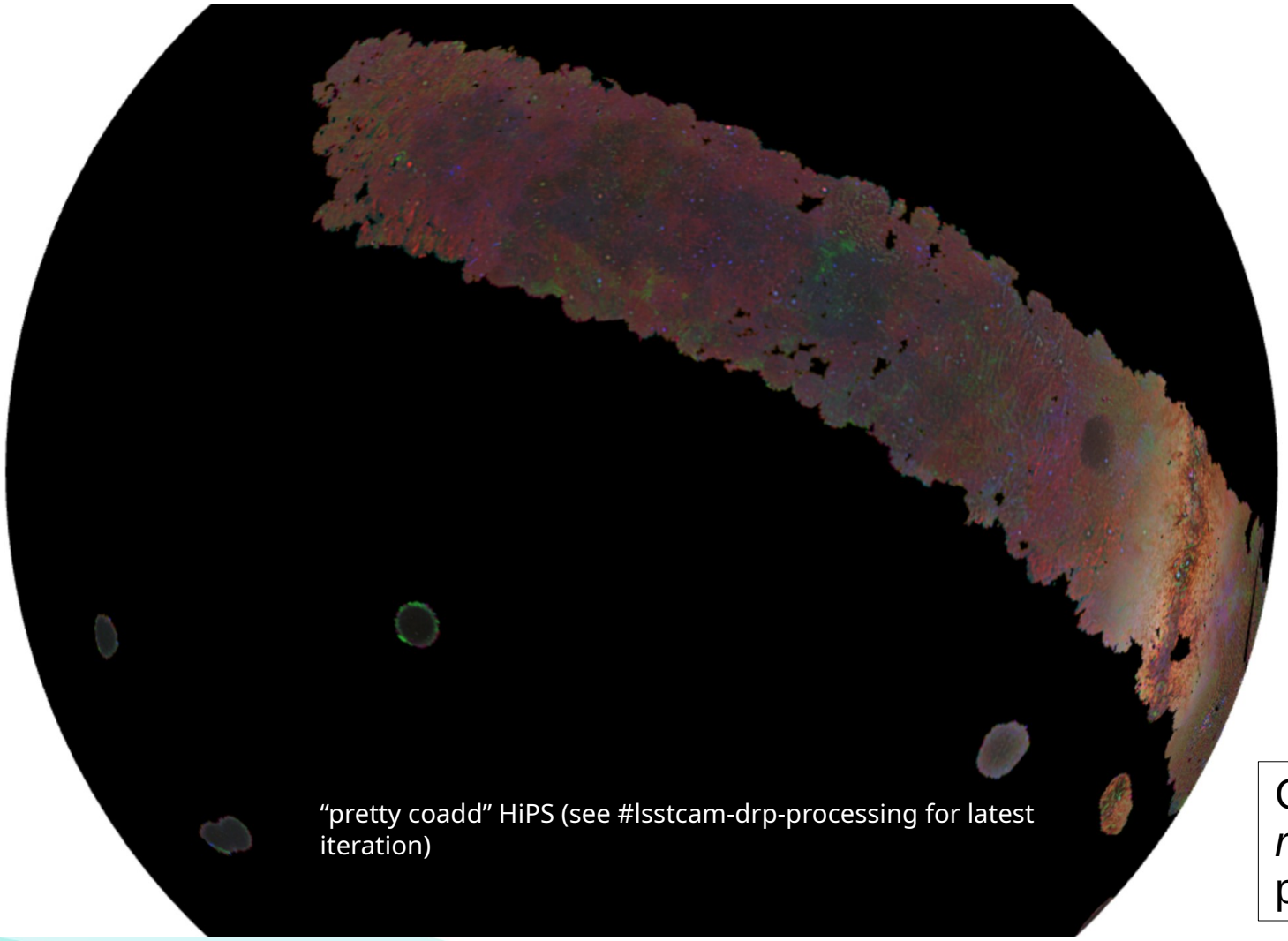
Stellar isochrones for 47 Tuc.
Choi et al. 2025



Ultra-diffuse galaxy in Euclid+Rubin.
Romanowsky et al. 2025

and Abell 360 coming soon!

DP2 Processing is Complete



"pretty coadd" HiPS (see #lsstcam-drp-processing for latest iteration)

Mantra has been: DP2 fast, DR1 good

Big thank you to everyone in data management for going above and beyond over the last 18 months.

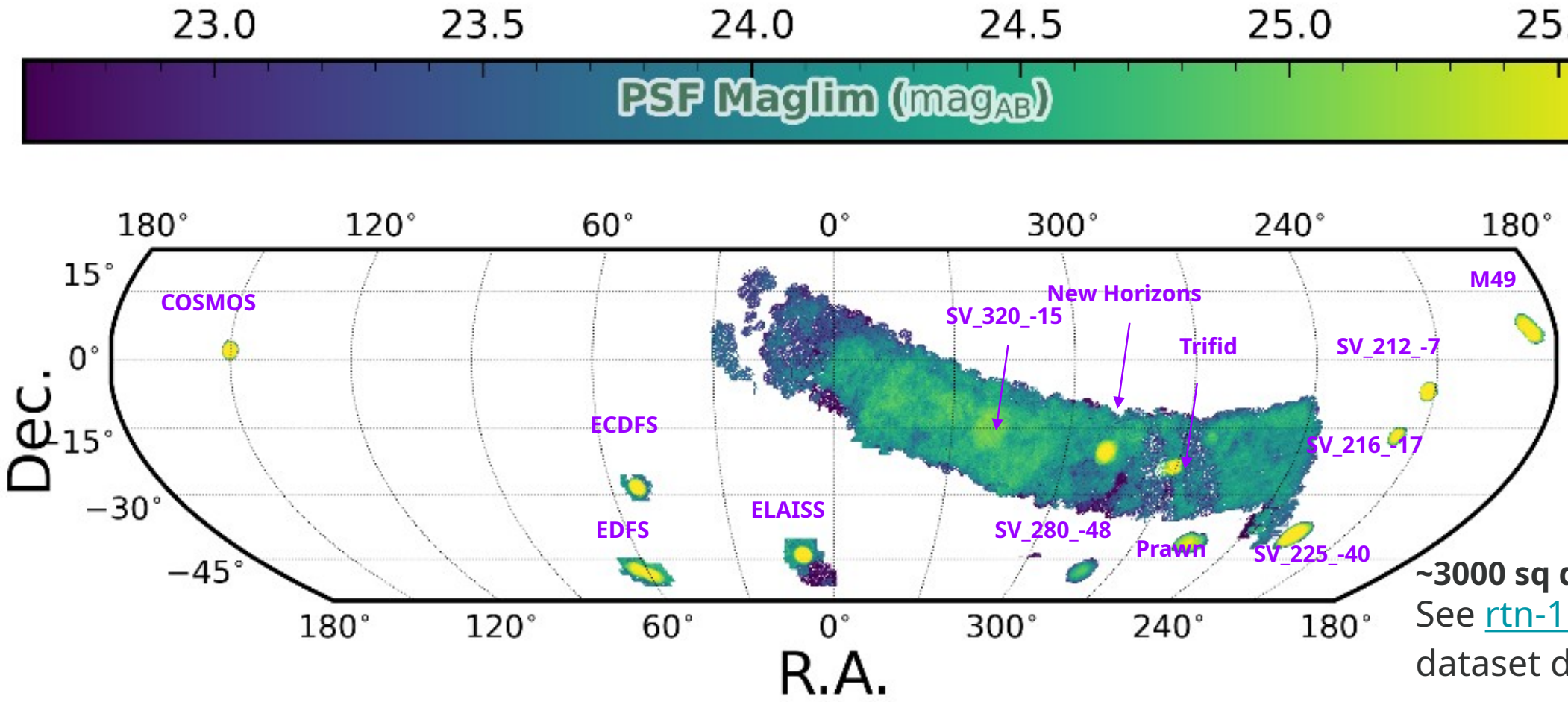
~30,000 'science' visits 20250424 - 20260106

90 day processing campaign: Data Management is now hard at work serving it

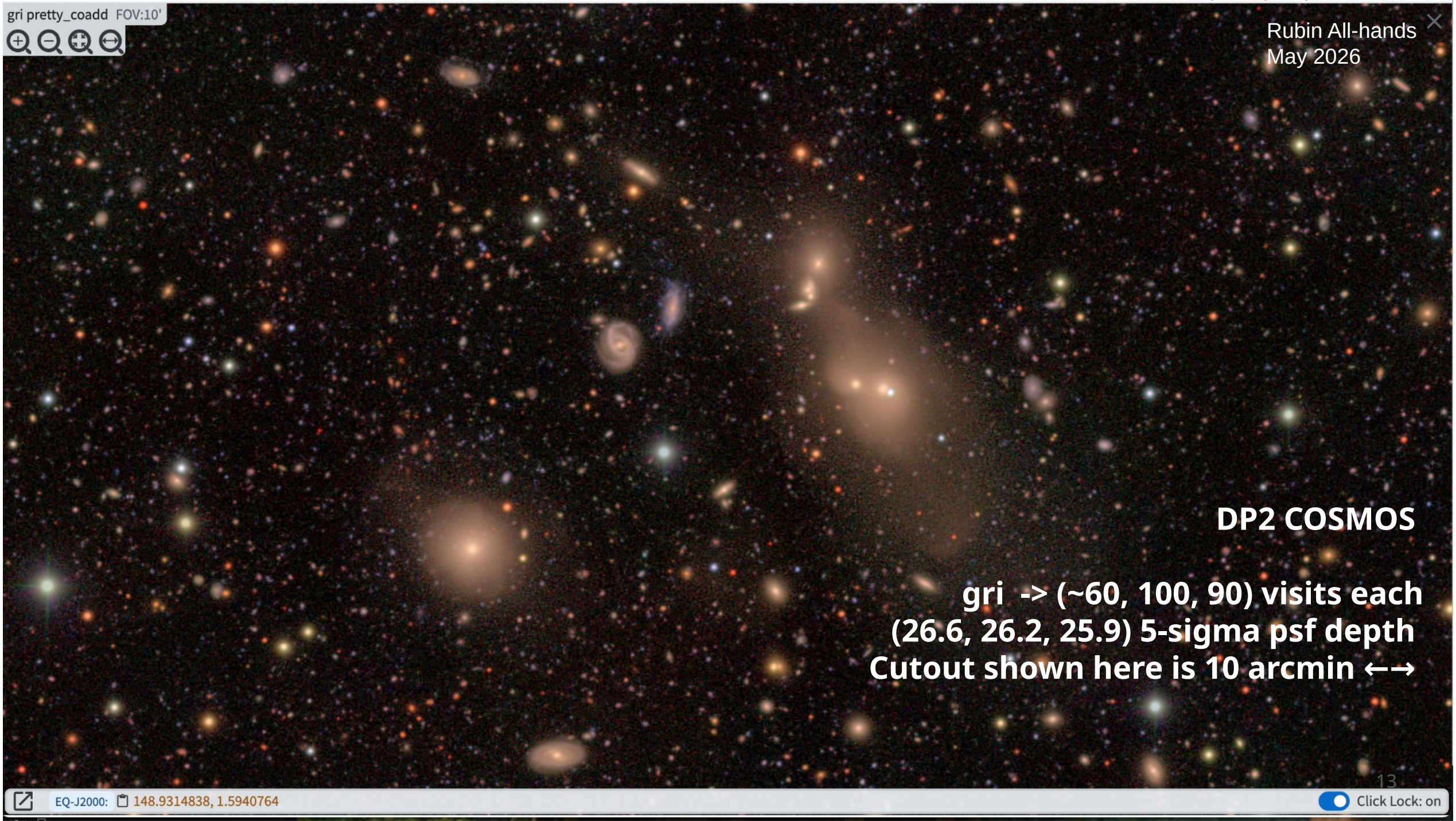
... along with prompt visit images and the Prompt Products DB

CC-IN2P3 contribution to DRP through *pilot runs* that help validating and optimizing the pipelines.

Actual i-band coadd depth of DP2



~3000 sq deg coadded
See rtn-111.lsst.io for dataset definition

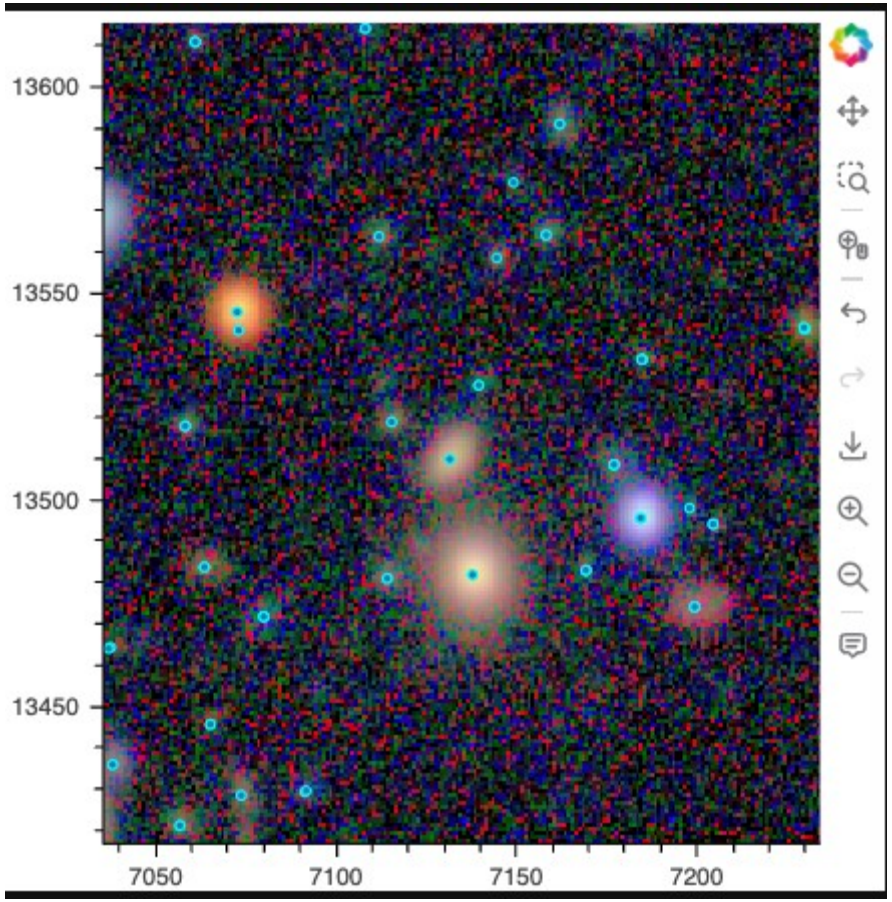

gri pretty_coadd FOV:10'
Rubin All-hands
May 2026
DP2 COSMOS
gri -> (~60, 100, 90) visits each
(26.6, 26.2, 25.9) 5-sigma psf depth
Cutout shown here is 10 arcmin ←→
EQ-J2000: 148.9314838, 1.5940764
Click Lock: on


gri pretty_coadd FOV:10'
Rubin All-hands
May 2026
DP2 SV225
gri -> (212, 165,210) visits each
(27.0, 26.6, 26.1 5-sigma psf depth
Cutout shown here is 10 arcmin ←→
EQ-J2000: 225.3929790, -38.0102397
Click Lock: on

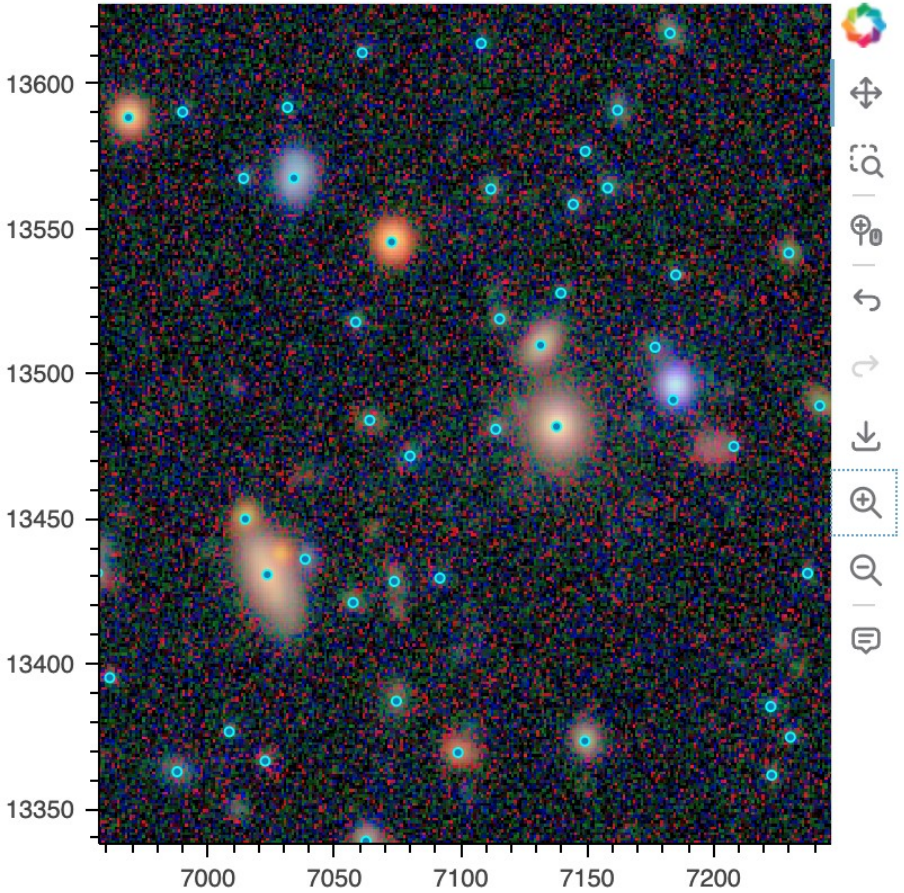
DP2 Validation example

- Source detection at cells boundaries… Cyrille’s awk eyes at work!

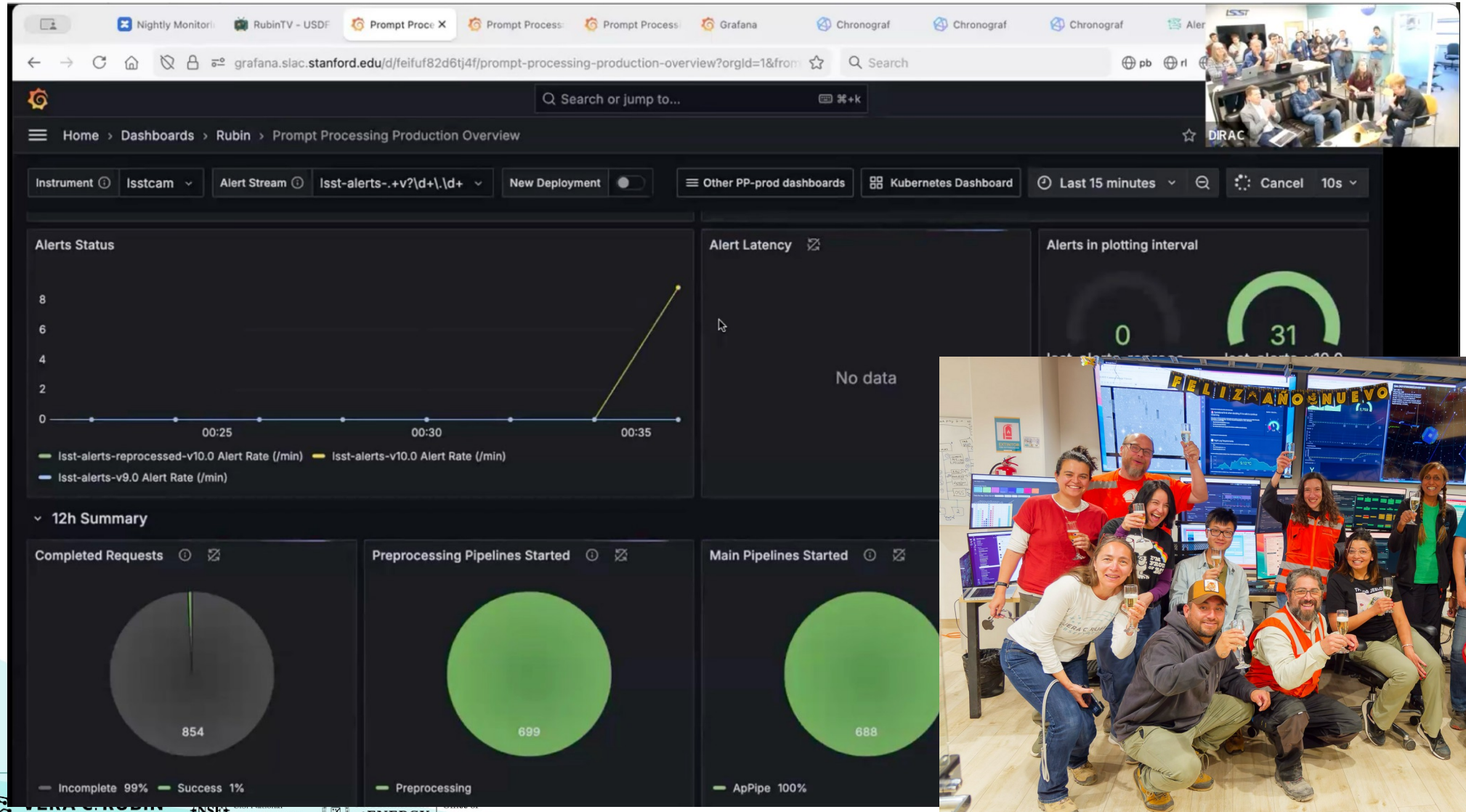
Bad



Good!



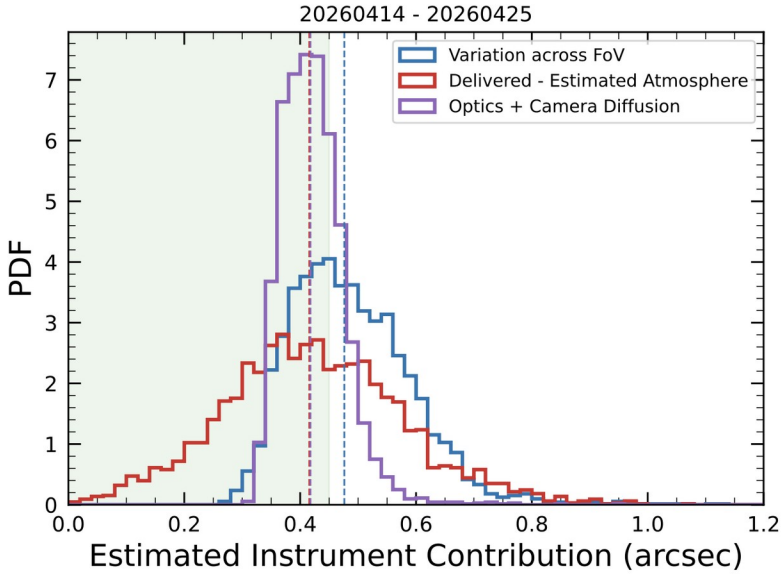
Rubin alerts are live since February 24th!

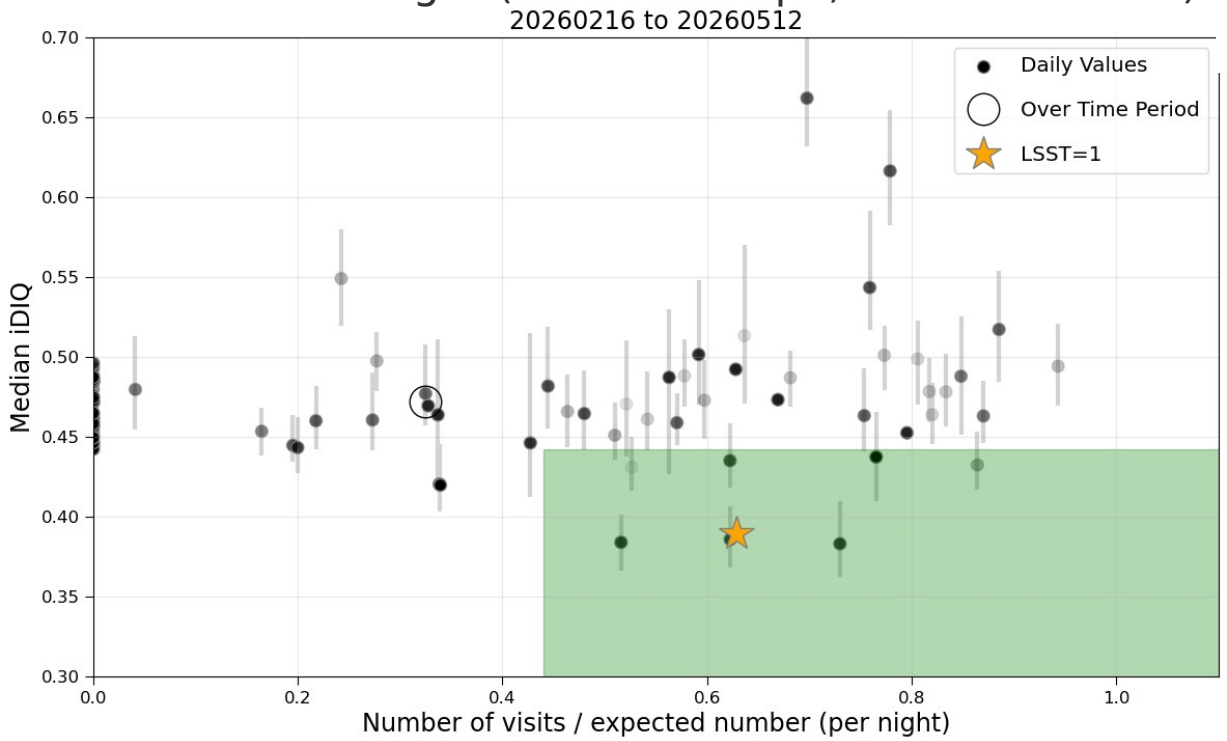


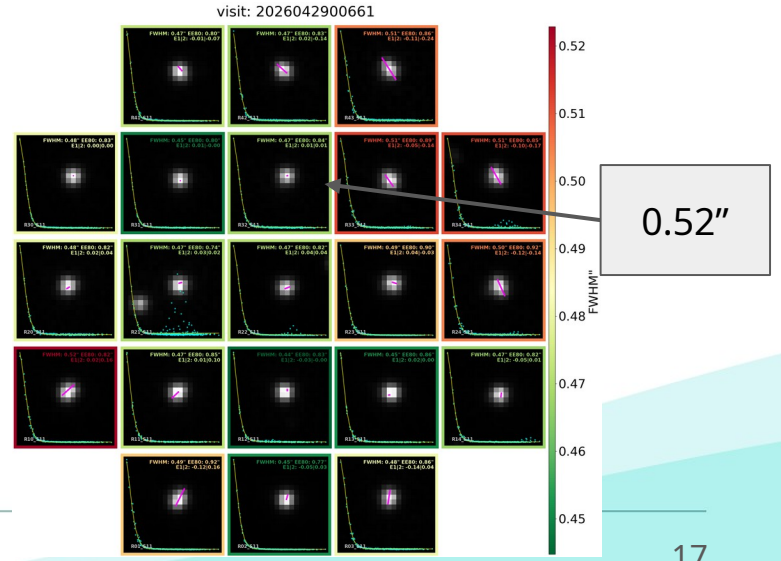
See Julien's talk on **FINK** next!

Starting the LSST

- Start of LSST Board (Zeljko is chair) will recommend to Director when to begin.
- Engaging Rubin Science Advisory Committee, SC Chairs, and science experts on input.
- Fulfill criteria in RTN-093. In practice we will satisfy some criteria during year 1.
- We are taking a lot of really good data.
- Final perf gains will take a bit longer (detailed shape, thermal control)



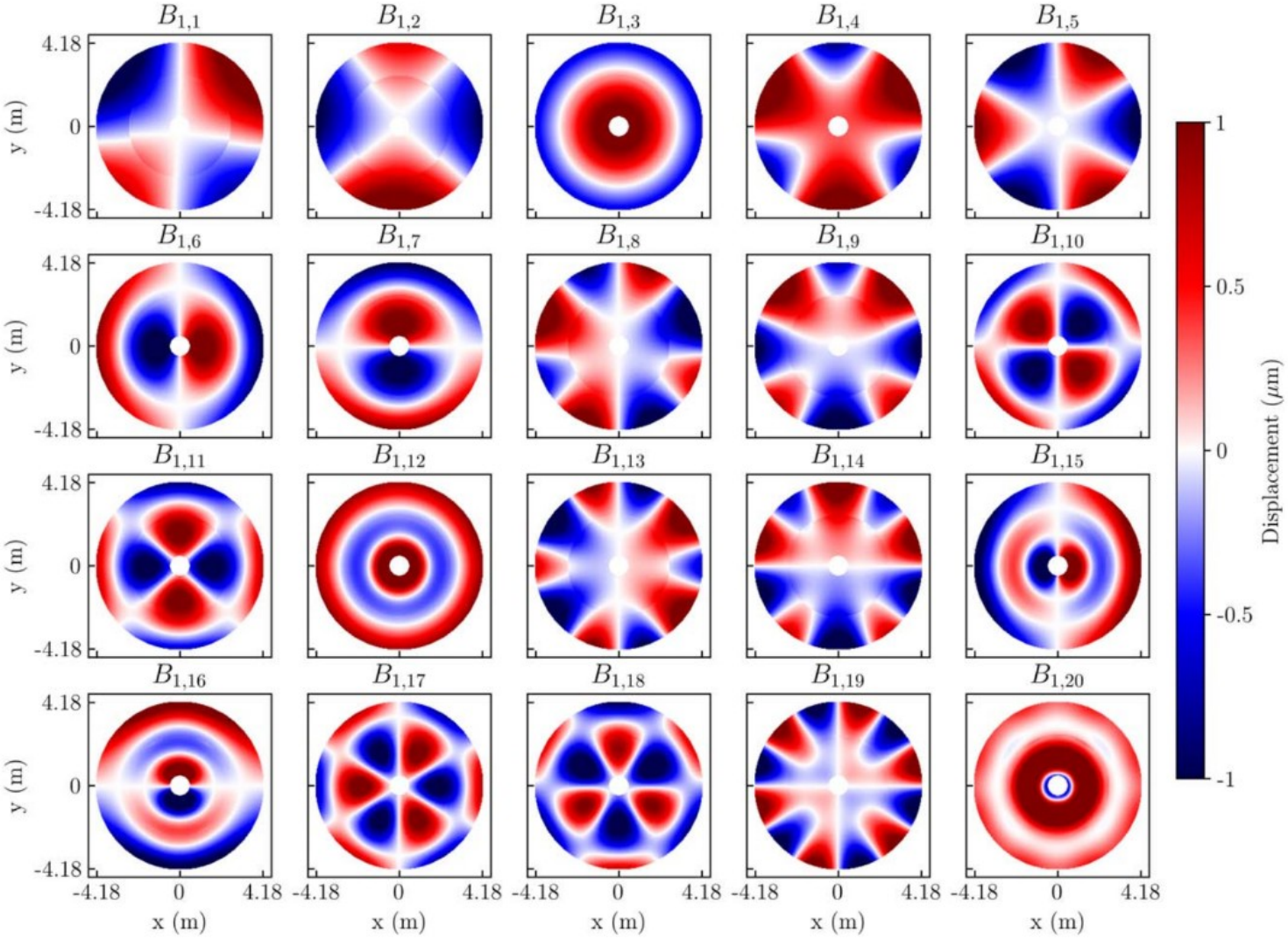




Active Optics System

(Megias et al, 2024)

- M1M3 has 156 force actuators
- M2 has 76 actuators and stands on hexapods
- Camera is on hexapods
- 20 bending modes are taken into account in the AOS
- and more things count
  - M1M3 thermal homogeneity and stability
  - in-dome seeing
  - atmosphere and wind!



Delivered Image Quality: Areas of Active Development

- Image Quality Assessment and Development of Metrics
- Optical State Retrieval from Corner Wavefront Sensors
- Intrinsic Wavefront, Look-up Tables, Biases and Double Zernike Control
- Active Optics System Control Loop
- Connection between measured wavefront and delivered PSF
- In-dome Environment Control

Resources:

- Image Quality Improvement Plan (draft in progress)
- Report from Recent (April-May) AOS Analyses (advanced draft, RSO-217)
- AOS Progress and Status (slides presented by Aaron Roodman at 13 May 2026 Image Quality meeting)
- Image Quality Workshop February 2026

Calendar and data releases - RTN-011 - today

Rubin Operations Survey and Data Release Timeline

Event	Date or Date Range
Data Preview 0.1/2/3 (DP0)	2023-06-30
Rubin First Light (RFL)	2025-06-23
Data Preview 1 (DP1)	2025-06-30
Start of Operations (OPS)	2025-10-25
Rubin First Alerts (RFA)	2026-02-24
PPDB Release (PPDB)	Jun – Sep 2026
Nightly PVIs & Direct-Image Catalogs (NPC)	Jun – Sep 2026
Data Preview 2 (DP2)	Jul – Sep 2026
Start of LSST (SVY)	TBD
Data Release 1 (DR1)	TBD

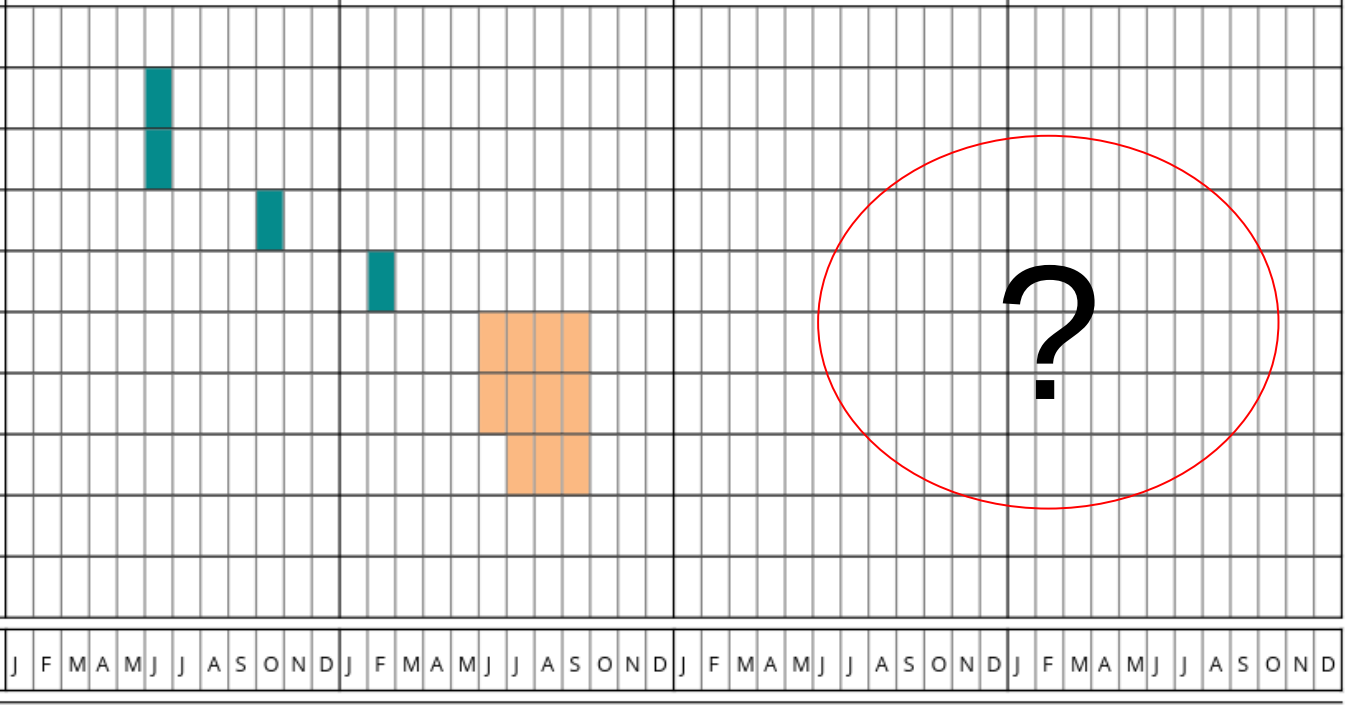


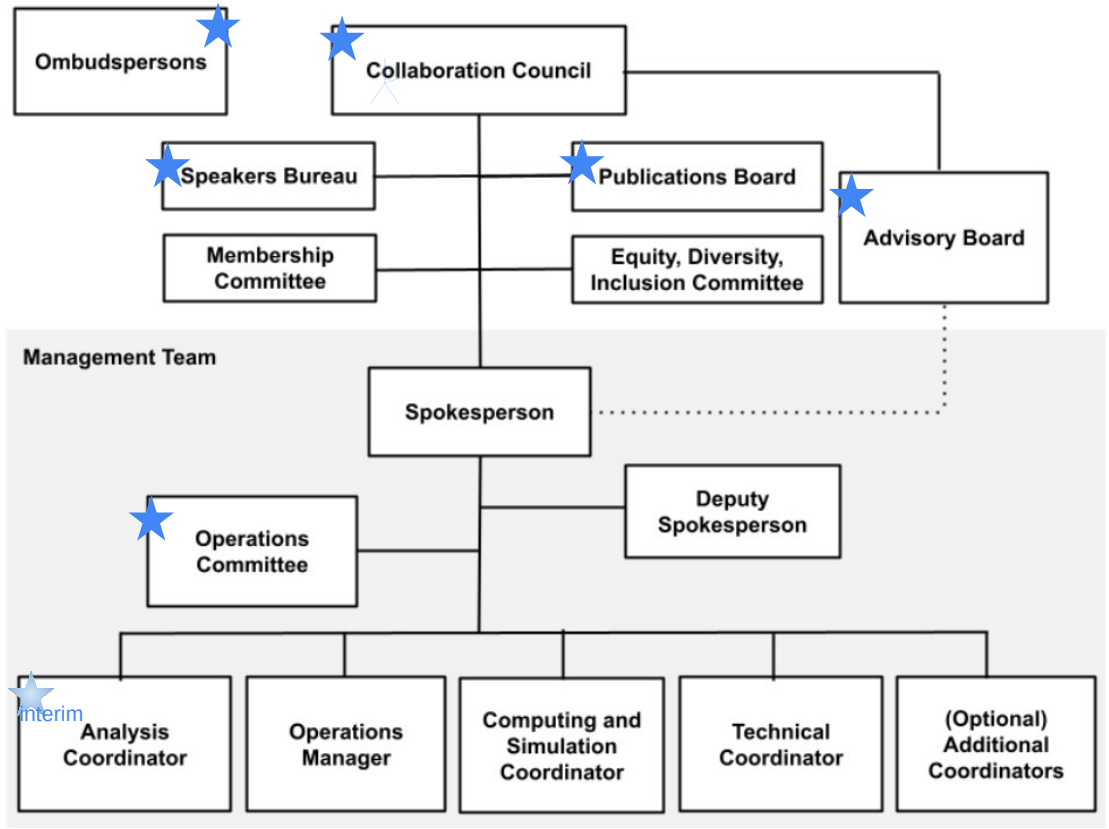
Table 7: Rubin Operations Key Milestones for Early Science

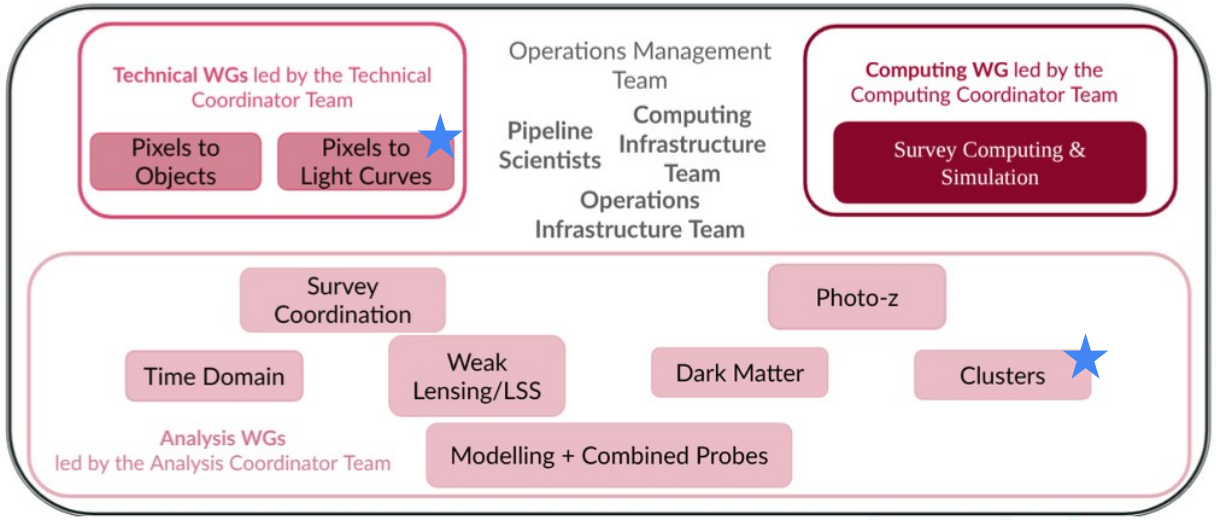
DESC news

- French positions in the DESC
- Publications
- DP2 and Key Projects

Current LSST-France presence in DESC organisation/leadership

(committee members, WG conveners, TT leads)





\+ Co-leads of several topical teams ! bayesian pipelines, CLMM, stellar streams, MaLTS, beyond wCDM

Don't hesitate to self-nominate!

Thanks Céline!

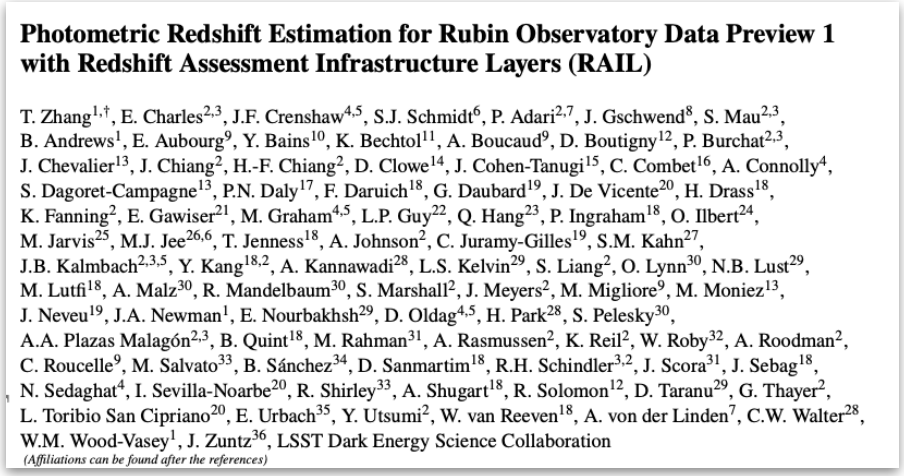
Some DESC highlights in the last few months…

~30 DESC papers submitted/published since last December

evolution: 10 (2022), 21 (2023), 14 (2024), 27 (2025)

→ the pace is picking up…

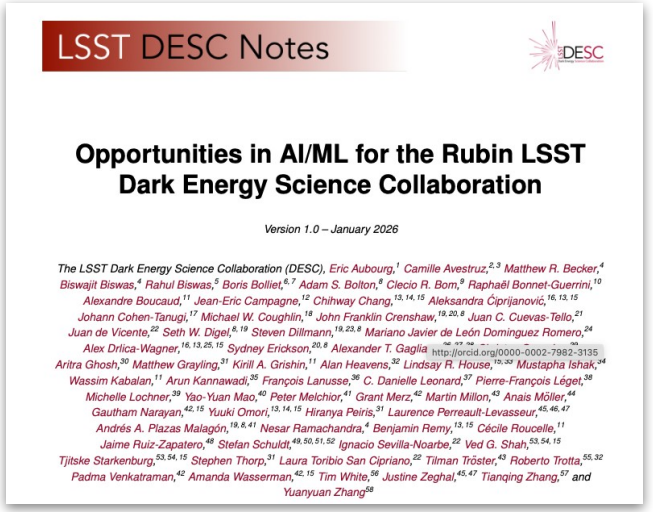
- Fully photometric SNeIa analysis on LSST sims (Mitra+ 2026), submitted
- Paper on analysis choices and cosmic shear (Robertson+ 2026), submitted
- Paper on beyond the standard model with combined probes (Raghunathan+ 2026) submitted
- Validating DESC forecasting (Augur) (Rogozenski+ 2026) submitted
- Paper on measuring cluster ellipticity with WL multipoles (Fu, Srinivasan+), submitted
- DP1 Abell 360 paper (von der Linden+) near completion…
- …



Photometric Redshift Estimation for Rubin Observatory Data Preview 1 with Redshift Assessment Infrastructure Layers (RAIL)

T. Zhang[1,†], E. Charles[2,3], J.F. Crenshaw[4,5], S.J. Schmidt[6], P. Adari[2,7], J. Gschwend[8], S. Mau[2,3], B. Andrews[1], E. Aubourg[9], Y. Bains[10], K. Bechtol[11], A. Boucaud[9], D. Boutigny[12], P. Burchat[2,3], J. Chevalier[13], J. Chiang[2], H.-F. Chiang[2], D. Clowe[14], J. Cohen-Tanugi[15], C. Combet[16], A. Connolly[4], S. Dagoret-Campagne[13], P.N. Daly[17], F. Daruich[18], G. Daubard[19], J. De Vicente[20], H. Drass[18], K. Fanning[2], E. Gawiser[21], M. Graham[4,5], L.P. Guy[22], Q. Hang[23], P. Ingraham[18], O. Ilbert[24], M. Jarvis[25], M.J. Jee[26,6], T. Jenness[18], A. Johnson[2], C. Juramy-Gilles[19], S.M. Kahn[27], J.B. Kalmbach[2,3,5], Y. Kang[18,2], A. Kannawadi[28], L.S. Kelvin[29], S. Liang[2], O. Lynn[30], N.B. Lust[29], M. Lutfi[18], A. Malz[30], R. Mandelbaum[30], S. Marshall[2], J. Meyers[2], M. Migliore[9], M. Moniez[13], J. Neveu[19], J.A. Newman[1], E. Nourbakhsh[29], D. Oldag[4,5], H. Park[28], S. Pelesky[30], A.A. Plazas Malagón[2,3], B. Quint[18], M. Rahman[31], A. Rasmussen[2], K. Reil[2], W. Roby[32], A. Roodman[2], C. Roucelle[9], M. Salvato[33], B. Sánchez[34], D. Sanmartim[18], R.H. Schindler[3,2], J. Scora[31], J. Sebag[18], N. Sedaghat[4], I. Sevilla-Noarbe[20], R. Shirley[33], A. Shugart[18], R. Solomon[12], D. Taranu[29], G. Thayer[2], L. Toribio San Cipriano[20], E. Urbach[35], Y. Utsumi[2], W. van Reeven[18], A. von der Linden[7], C.W. Walter[28], W.M. Wood-Vasey[1], J. Zuntz[36], LSST Dark Energy Science Collaboration

(Affiliations can be found after the references)



LSST DESC Notes

Opportunities in AI/ML for the Rubin LSST Dark Energy Science Collaboration

Version 1.0 – January 2026

The LSST Dark Energy Science Collaboration (DESC), Eric Aubourg,[1] Camille Avestruz,[2,3] Matthew R. Becker,[4] Biswajit Biswas,[4] Rahul Biswas,[5] Boris Bolliet,[6,7] Adam S. Bolton,[8] Clecio R. Bom,[9] Raphaël Bonnet-Guerrini,[10] Alexandre Boucaud,[11] Jean-Eric Campagne,[12] Chihway Chang,[13,14,15] Aleksandra Ćiprijanović,[16,13,15] Johann Cohen-Tanugi,[17] Michael W. Coughlin,[18] John Franklin Crenshaw,[19,20,8] Juan C. Cuevas-Tello,[21] Juan de Vicente,[22] Seth W. Digel,[8,19] Steven Dillmann,[19,23,8] Mariano Javier de León Dominguez Romero,[24] Alex Drlica-Wagner,[16,13,25,15] Sydney Erickson,[20,8] Alexander T. Gaglia,[26,27,28] Aritra Ghosh,[30] Matthew Grayling,[31] Kirill A. Grishin,[11] Alan Heavens,[32] Lindsay R. House,[19,33] Mustapha Ishak,[34] Wassim Kabalan,[11] Arun Kannawadi,[35] François Lanusse,[36] C. Danielle Leonard,[37] Pierre-François Léget,[38] Michelle Lochner,[39] Yao-Yuan Mao,[40] Peter Melchior,[41] Grant Merz,[42] Martin Millon,[43] Anais Möller,[44] Gautham Narayan,[42,15] Yuuki Omori,[13,14,15] Hiranya Peiris,[31] Laurence Perreault-Levasseur,[45,46,47] Andrés A. Plazas Malagón,[19,8,41] Nesar Ramachandra,[4] Benjamin Remy,[13,15] Cécile Roucelle,[11] Jaime Ruiz-Zapatero,[48] Stefan Schuldt,[49,50,51,52] Ignacio Sevilla-Noarbe,[22] Ved G. Shah,[53,54,15] Tjitske Starkenburg,[53,54,15] Stephen Thorp,[31] Laura Toribio San Cipriano,[22] Tilman Tröster,[43] Roberto Trotta,[55,32] Padma Venkatraman,[42] Amanda Wasserman,[42,15] Tim White,[56] Justine Zeghal,[45,47] Tianqing Zhang,[57] and Yuanyuan Zhang[58]

http://orcid.org/0000-0002-7982-3135

Thanks Céline!

Defining DESC DP2 Key Projects/Papers

DP2 (750 sq deg) is the best opportunity to stress test DESC infrastructure, and identify and fix issues before DR1 (~18,000 sq deg).

Many discussions…

DP2 Key Project Planning + ESTF Response (May 2025)
DP2 Key Project Discussion (May 2025)
DP2 Town Hall with link to CC Feedback Form (Febuary 2026)
Initial Multi-Probe Cosmology in DR1 (Febuary 2026)
DR1 Key Project Discussion (March 2026)
DESC DP2 Key Project - the initial list (May 2026)

The current list of DP2 KPs

- Rubin DP2 SN Ia Pipeline Validation [confirmed]
- Galaxy–Galaxy Lensing Measurement around DESI Spectroscopic Galaxies with Rubin DP2 [confirmed]
- Cosmic shear detection with Rubin DP2 [confirmed]
- Rubin DP2 weak lensing mass calibration of known clusters [project definition ongoing]
- …?

Each will be supplemented by several **enabling papers (non-alphabetical, mostly led by ECS)**

Thanks Céline!

LSST France news

- Inclusion within the Rubin project
- Welcome to new colleagues from INSU
- EDIM
- Communication
- Reorganization

Inclusion within the Rubin project - status

- Our Activities within **Rubin**
  - Camera
  - Calibration
  - Computing (DRP+)
  - Commissioning, Survey cadence, Pipelines...
- Difficulties
  - Working within the Rubin project has not been as smooth as it should
  - Hard for ideas to be considered
  - Long time for the code to be accepted
  - Absence of the management

Inclusion within the Rubin project - actions

- Discussions started a few month ago within an extended-board
- Actions taken
  - Re-assess our goal within Rubin and explore options
  - Discussion with SLAC (A. Roodman, P. Marshall, S. Digel) in late April
    - Expose our issues to work within the project
    - Propose improvements
      - Reorganize French contributions
      - Take **co-responsibility** for **Calibration** (P. Antilogus)
      - French Program Manager to become *Deputy of the LSST*
- Next step
  - Review the French Rubin Staffing plan and Statement of Work
  - Discuss with the project (B. Blum, P. Marshall) to make it real

Welcome to our new colleagues from INSU

- IN2P3 and INSU have reach a new agreement on sharing Data Rights to the LSST
  - INSU contributes to the “Infrastructure de Recherche” **IR-LSST**
  - IN2P3 gives INSU around 40 LSST PI Tickets
  - ~20 new PIs plus ~10 Junior Associates **joined** us in April !
- Today : 35 PIs and 15 Junior Associates are now part of LSST France
  - Cosmic web, cosmic dipole, field-level inference, intrinsic alignment, photometric redshift, dwarfs
  - Galaxy formation, Milkyway bar, local group, gas flows, low surface brightness
  - Transients: GRBs, microlensing, host galaxies, Cepheids, Supernovae, variables stars
  - Solar system : asteroids, small bodies, proto-planets

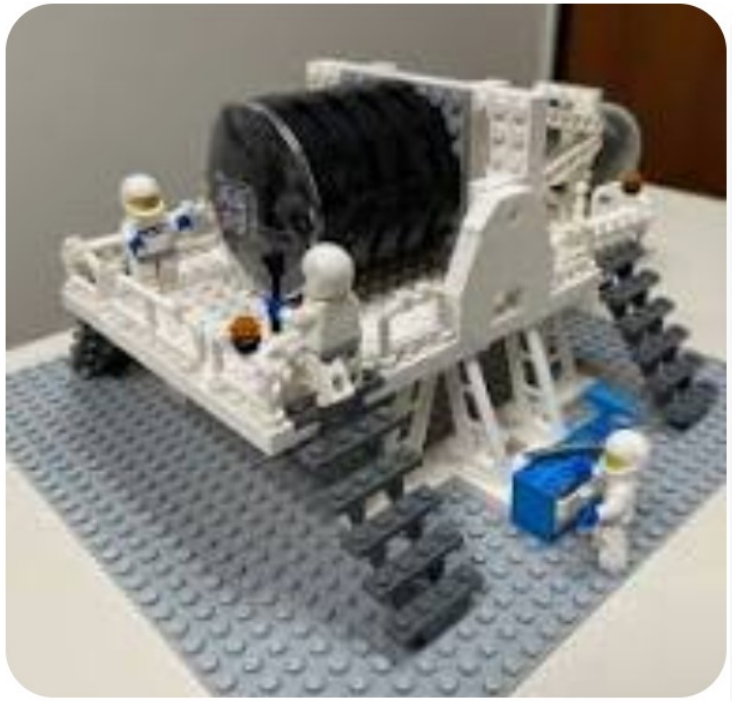
Equity, Diversity and Inclusion in LSST France

- Recommendation from C. Déplantes study to remove mediation of the EDIM group
  - **Proposal**
    - EDIM becomes EDI, remove mediation: **only tasked with promoting EDI** within LSST France
    - Appoint 1 (or 2) ombud for LSST France (people can still call DESC ombuds)
  - **How to**
    - appoint a group of 4: myself, current EDIM, one more
    - rewrite LSST France status for EDIM organization
    - discuss and approve by the board

Communication

- **Start of the LSST** : big event planned, but we don’t know when !
- **Rencontres du Ciel et de l’Espace – November 13-15, 2026**
  - Association Française des Astronomes Amateurs
  - Public : astronomers and families
  - We have nices images to show, may be a live alert stream and first results !
  - Join the team on the LSST France Slack **#francecommunication**

Communication and outreach



And there is a big version of 22000 pieces, with rotating dome and TMA...

LSST-France Reorganization

- **A « new “ environment (different from construction)**
  - Rubin is in operation
  - We have real data
  - We have 40+ colleagues from INSU (including Junior Associates)
  - We are negotiating a stronger position in the Rubin project : calibration, commissioning, management.
- Shall the LSST France **goals** and **organization** evolve ?

LSST-France Reorganization

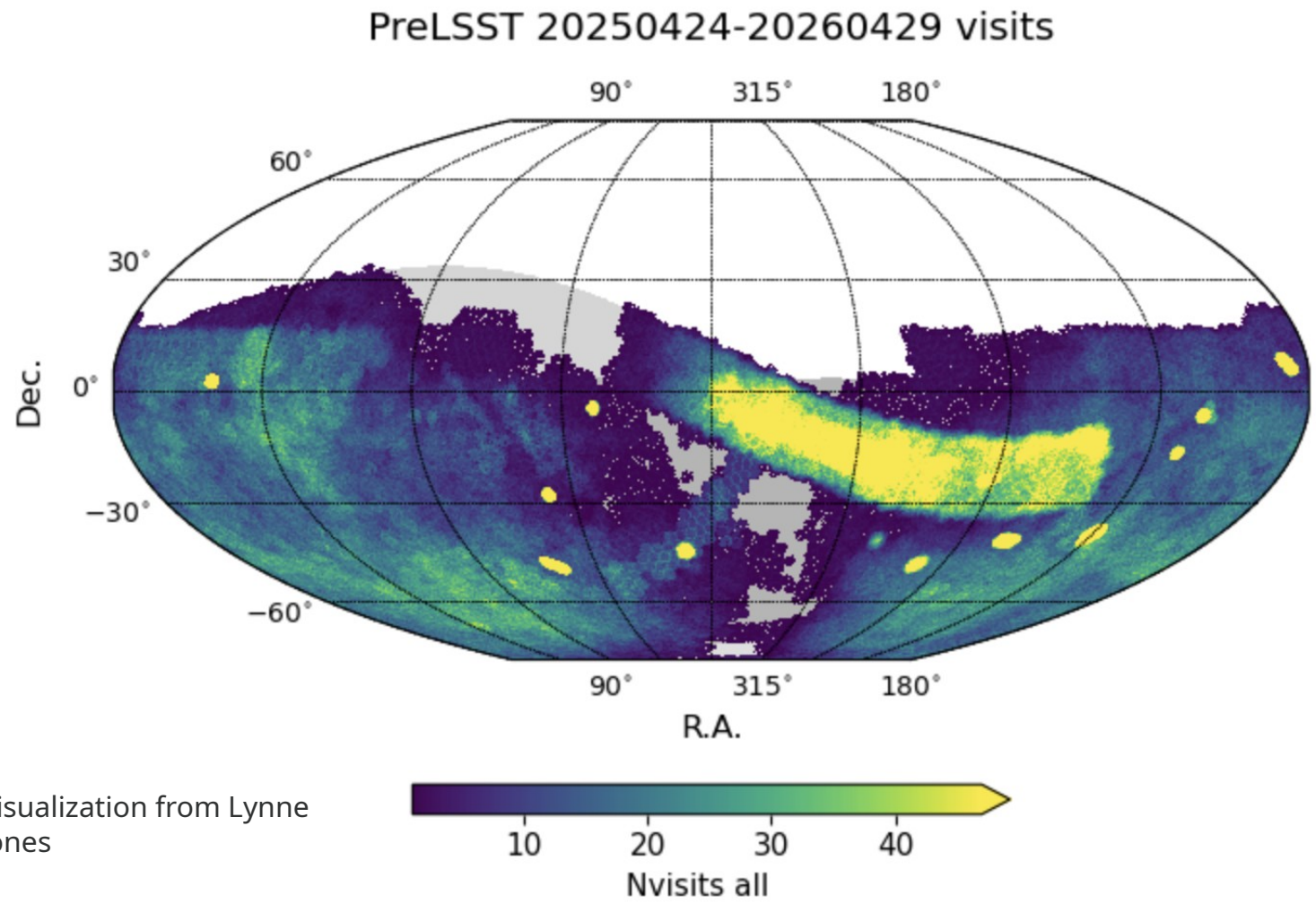
- Do we want more integrated contributions to Science Collaborations ?
  - More organization at the French level, take big bites of science, still closely working with SCs.
- Do you feel like LSST France is in your way when you want to get stuff done ?
  - Lighter coordination, fewer « French » meetings
  - Favor organization of International workshops and coding sprints
- How do we (IN2P3 and INSU) better work together now that administrative blockers have been removed ?
- Is the current French LSST Board representative of our collaboration ?
  - INSU colleagues, junior members, science topics diversity
- Are our general meetings useful ? Do we need 2 per year ?
  - keep one and leave time for topical workshops/coding sprints
- What about collaborations with other major science projects ?
  - Euclid, ZTF, DESY, DESY2, 4MOST, MUST, CMB experiments (SO, SPT, ...)
  - Multi-wavelength and Multi-messenger : Ligo/Virgo, CTAO, SKAO, SVOM, Fermi, X-rays, Gaïa, etc...

LSST France General Assembly

Tuesday Afternoon

Time to speak up !

Sky Coverage during First Year



Visualization from Lynne Jones

Rubin Observatory acquired **>50K science program visits** w/ LSSTCam during the first year on sky

(caveats: not uniformly distributed by band, not all visits of sufficient quality to be used for coadds in data releases, etc.)

Have a nice meeting!