VERA C. RUBIN OBSERVATORY

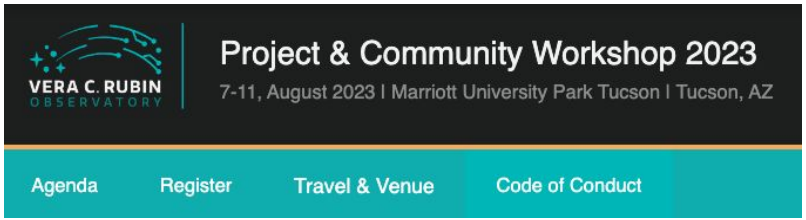
# Operations Updates

Tuesday 9:00-10:30 AM

Bob Blum, Rubin Observatory Director of Operations

NSF NOIR Lab AURA SLAC U.S. DEPARTMENT OF ENERGY

# Reminder - Code of Conduct




Harassment and unprofessional conduct (including the use of offensive language) of any kind is not permitted at any time and should be reported to:

- Andrew Connolly (ajc@astro.washington.edu),
- John Franklin Crenshaw (jfc20@uw.edu), and/or
- Alysha Shugart (ashugart@lsst.org).

full code of conduct

Rubin Observatory adheres to the principles of kindness, trust, respect, diversity, and inclusiveness in order to provide a learning environment that produces rigor and excellence.


Check name-tags for these contact comfort level stickers.

Wear a mask if you want to!

Use the confidential email rubin2023-covid@lists.lsst.org to request a test, report your test results, or ask questions.


If someone is wearing a pin like this, and it indicates a low social battery, please give them their space or offer to restart the conversation at a later time.

If you feel unsafe at any time send an email to rubin2023-helpline@lists.lsst.org

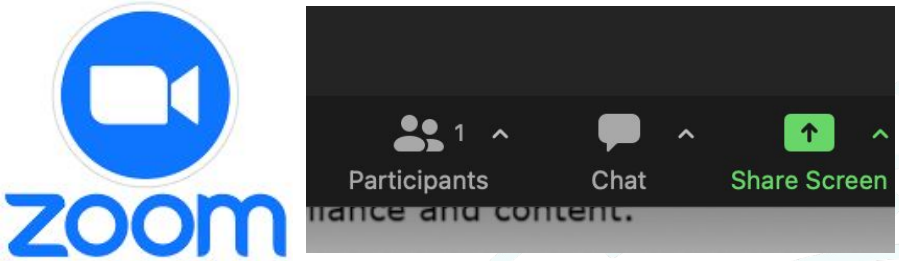
# Reminder - Virtual Participation

Virtual participants should be muted when they're not speaking.

In-person participants should speak into the room microphone(s), or the chair should repeat all questions into the microphone, so that the virtual participants can hear what is said.

In the Rubin2023_PCW Slack Space, all participants can use the session's channel for Q&A and discussion.

The channel name convention is, e.g.: #day1-mon-slot3a-intro-to-rubin




In Zoom, use the chat to:
- request to unmute to ask a question, or
- type your question so someone can speak it aloud.

The Zoom "raise hand" feature is generally harder for moderators to track, and is not preferred, but may be used at the discretion of the session chair.

# Welcome!

9:00 to 9:45 Rubin Observatory Operations status (30 min + 15 QA)

9:45 to 10:00 NSF and DOE funding opportunities for research and other updates

10:00 to 10:30 LSSTC Student presentations

Mission: Produce an unprecedented astronomical data set for studies of the deep and dynamic universe, make the data widely accessible to a diverse community of scientists, and engage the public to explore the Universe with us.

Credit: Y. AlSayyad/Rubin Obs/NSF/Princeton

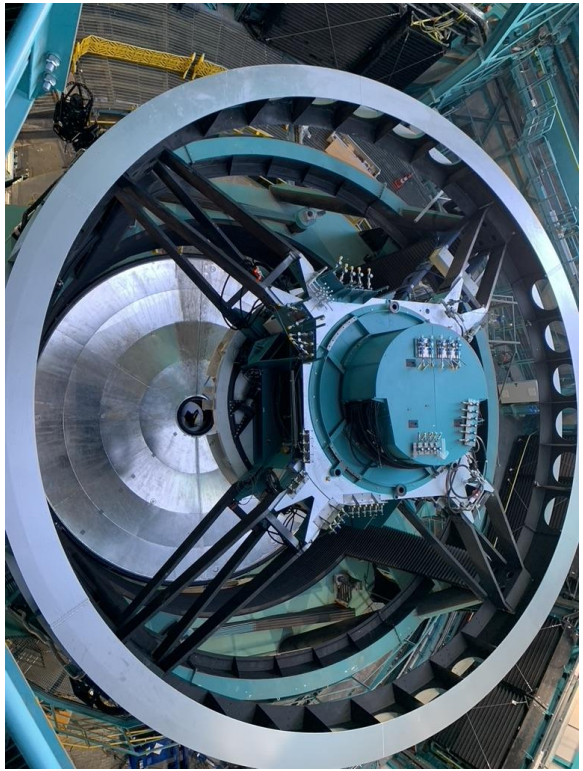
# Highlights

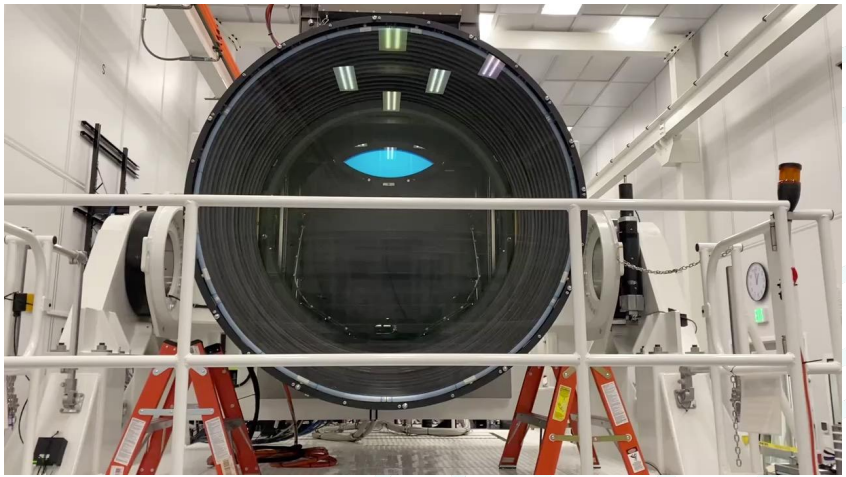
- Research Inclusion
- Operations Status and Progress
- Schedule and plans update
- In-Kind Program
- Rubin-Euclid
- Satellites
- Rubin Observatory Sustainability
- Education and Public Outreach
- Committees

# Rubin Research Inclusion

- Research Inclusion is a key goal for Rubin Observatory
- LSST is ideal for expanding world best research opportunities to our fellow community members who have not been able to participate in the past. Or who have not been invited to.
- We support travel to PCW to raise inclusion within this cohort
- We hope to provide other forms of support in collaboration with LSST Discovery Alliance.
- We are working hard now to bring in folks in to the DP0 opportunity. Interested, know someone who is?

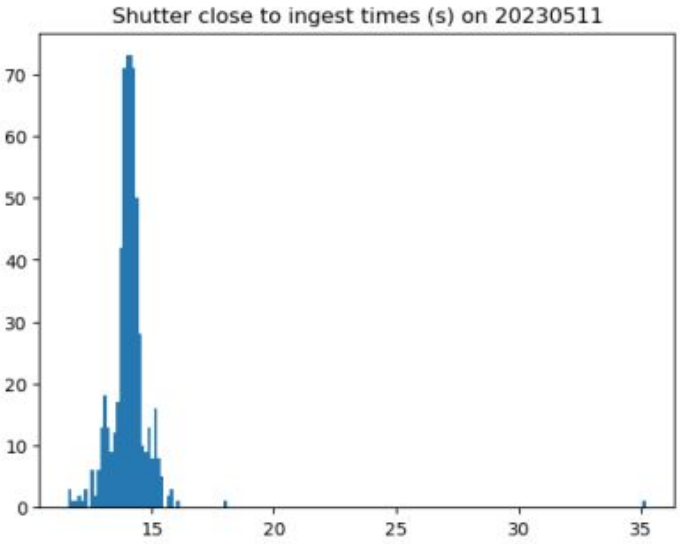
# Yeah!





# USDF is Operational!

- Auto transfer and process AuxTel data from summit
  - Routine processing is happening; available for analysis in Rubin science platform
  - “Long Haul Network” between Summit and SLAC in use - combo of leased lines + ESNet
- Hybrid model
  - Contract in place with Google (IDF->US DAC)
  - Production Qserv running with DC2 catalog; access from Google cloud demonstrated [DC2: DESC Data Challenge simulation]
- Supporting ~300 staff and commissioners
- Supporting Full Camera Testing in IR2
- Multi site Data Release Processing (FrDF, UKDF) being implemented now.



# Rubin Timeline (https://dmtn-232.lsst.io/)

***2023, a key year** for full system integration and commissioning!*

TMA Handoff to Rubin

LSSTCam testing, *now*

*November 2023* : Arrival of LSSTCam on the summit

TMA nighttime testing *now*; Mirrors I&T on TMA

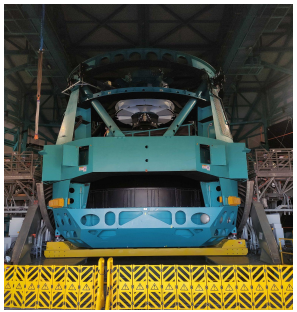
System First Photons ~ End July 2024.

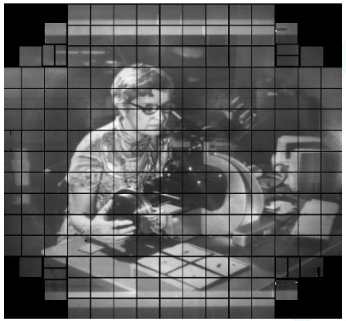
System First Light ~ November 2024.

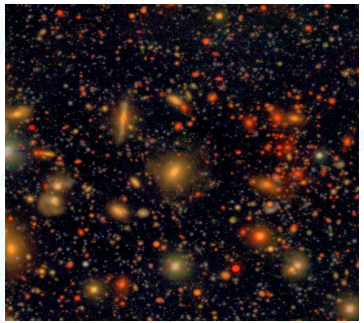
Dec: Final pipeline delivery

LSST starts FY25

**2023** **2024** **2025**







The COSMOS field seen by Hyper Suprime-Cam, courtesy of the HSC Collaboration, R. Lupton, and N. Lust.

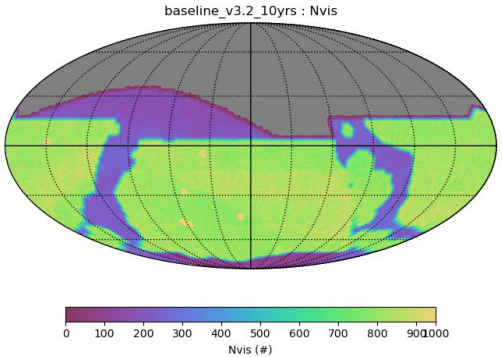
# Rubin Operations Status Update

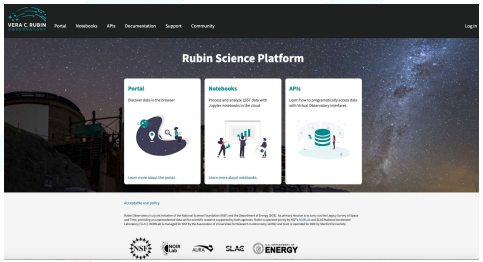
**December 2022,** initial survey cadence updated, v3 baseline

**March 2023,** successful joint agency review 2023

> "**The team has shown remarkable progress in their organization, planning and deliverables over the past year.**
>
> **We were impressed with the synergy between the NOIRLab and SLAC teams.**"

**August 2023, DP0.3**

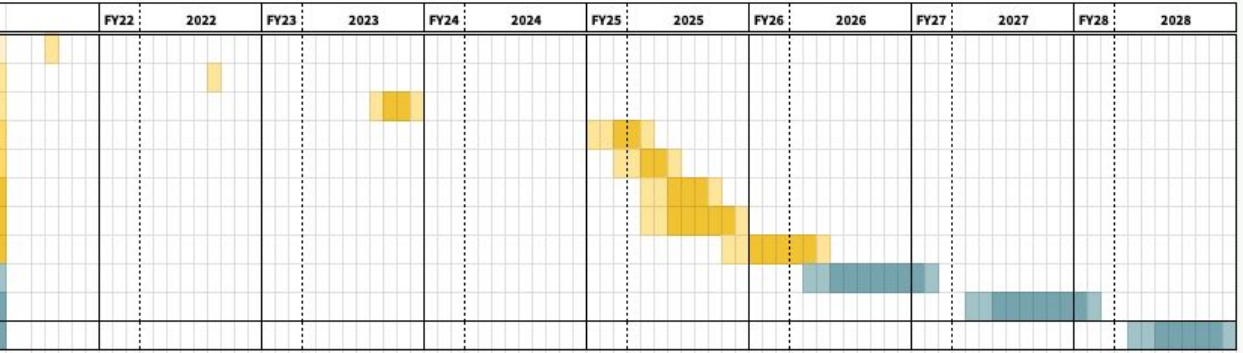
# Schedule Update

- New forecast finish. As of April this year, February, 2025. Planning for ~5 months contingency on project. Expect Operations phase begins in “mid 2025.”
- Start of Full/Survey Operations planning date: June 01, 2025 (not the start of LSST!)
- LSST start = Project forecast+schedule contingency+Operations contingency
- This gives the following timeline for Operations and data releases

**Rubin Operations Survey and Data Release Timeline**

Nominal LSST Survey Start Date: June 2025

| Event | | Date | Milestone Date |
|---|---|---|---|
| DP0.1 | DC2 Simulated Sky Survey | June 2021 | 2021-06-30 |
| DP0.2 | Reprocessed DC2 Survey | June 2022 | 2022-06-30 |
| DP0.3 | Solar System PPDB Simulation | Jun 2023 - Sep 2023 | 2023-07-31 |
| FL | System First Light | Oct 2024 - Feb 2025 | 2024-12-23 |
| DP1 | First Light LSSTCam Data | Dec 2024 - Apr 2025 | 2025-02-22 |
| OPS | Start of Operations | Feb 2025 - Jul 2025 | 2025-06-01 |
| SVY | Start of Survey | Feb 2025 - Sep 2025 | 2025-06-27 |
| DP2 | LSSTCam Science Validation Data | Aug 2025 - Mar 2026 | 2025-11-26 |
| DR1 | LSST First 6 Months Data | Feb 2026 - Nov 2026 | 2026-06-27 |
| DR2 | LSST Year 1 Data | Feb 2027 - Nov 2027 | 2027-06-27 |
| DR3 | LSST Year 2 Data | Feb 2028 - Sep 2028 | 2028-06-27 |



# Schedule Update and Data Availability

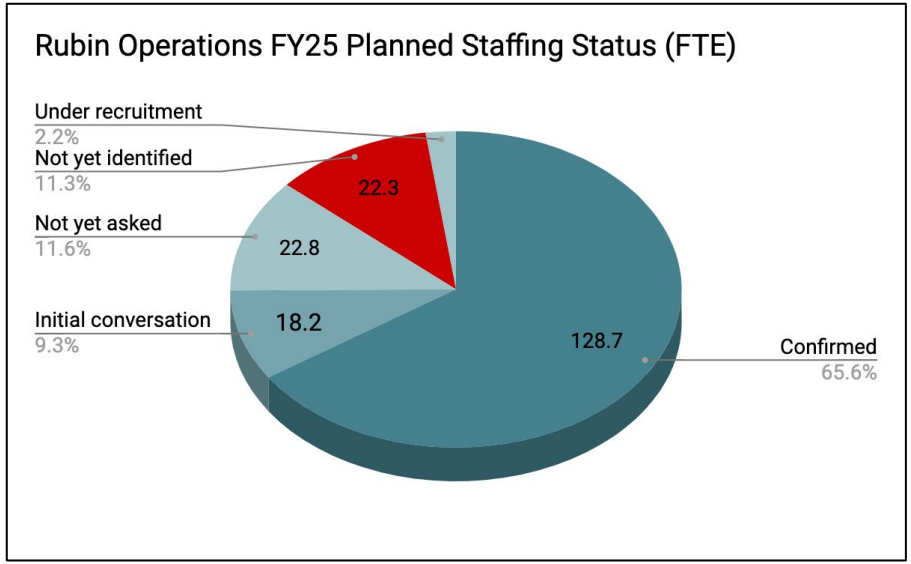
- Context (assume)
  - FL Oct 2024 - Feb 2025, MS=late Dec 2024
  - LSST Feb 2025 - Sep 2025, MS=late Jun 2025
- Data Releases
  - **DP1** Dec 2024 - Apr 2025, MS=late Feb 2025
  - **DP2** Aug 2025 - Mar 2026, MS=late Nov 2025
  - **DR1** Feb 2026 - Nov 2026, MS=late Jun 2026
  - **DR2 - DR11** annually through Jun 2036
- Prompt data (Alert generation session Today)
  - Precursor alerts based on DP0.2 late 2023
  - Greater Latency commissioning through early Operations for alert stream (i.e. thru DR1)
  - Brokers will have access to latent stream before end of commissioning/SV
- Prompt cont'd
  - World public alerts asap end of SV into OPS
  - Prompt DB's avail before DP2
  - Processed Visit Images and other products TBD in first 6 mo. of LSST
- Who gets data when (Early Science session Today)
  - Data Release, DR holders at release via US DAC, UK DAC, Chile DAC
  - Alerts, real time in steady state, world public via brokers.
  - Prompt images, DR holders 80 hr after acquisition
  - Other Prompt data products, DR holders, real time via US DAC RSP
  - Public data releases, World public,2 yr following a DR. Access model TBD



*MS=Milestone*

# Readiness

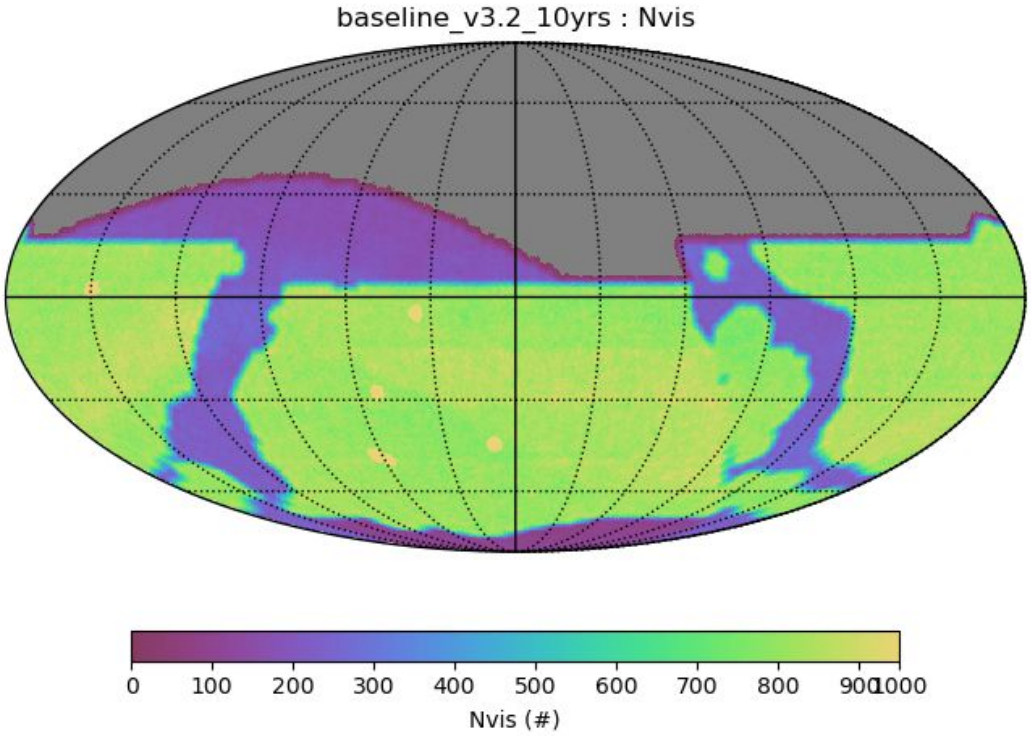
- Staffing is a key readiness element (including from LSST: UK for the UK Data Facility)
- We are making progress on filling roles with new hires and new recruits from NOIRLab/SLAC:




*Status March, 2023*

# Survey Cadence Optimization

- Phase 2 recommendation (V3.2 of baseline; see ls.st/pstn-055), released in December 2022.
- Optimization to continue throughout pre-Operations and LSST period
- There are 9 remaining important aspects of the cadence to resolve. SCOC is working on this now (the SCOC solicited and received further input from the community. Folding that in).
- See session on Wed by L. Jones, and F. Bianco.



# Remaining 9 items for SCOC

See ls.st/pstn-055

Some have been resolved since the release of PSTN-055:

FILTER SWAPPING: *u* and *y* will be swapped on the filter wheel based on lunation

Some will be resolved only during commissioning : e.g.

1x30 vs 2x15 EXPOSURES

REBALANCE FILTERS IN RESPONSE OF THROUGHPUT UPDATES

Others are being worked on now by the SCOC and the community including by three new task forces e.g.:

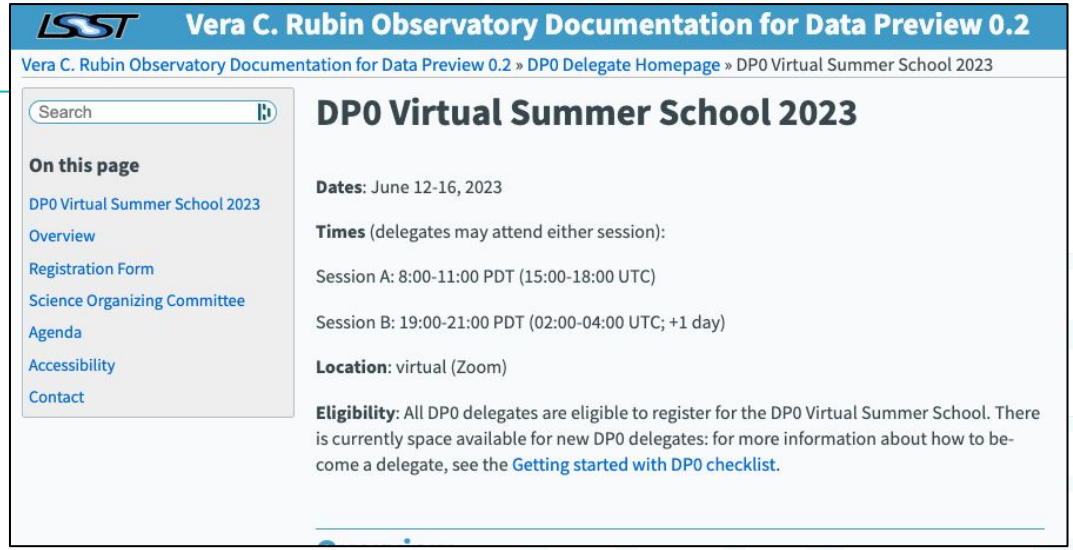
ROLLING CADENCE AND UNIFORMITY

GALACTIC PLANE FOOTPRINT AND FILTER BALANCE

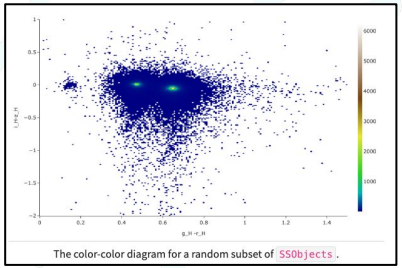
DDF CADENCE

# Data preview 0

- Continue to support DP0.2 with up to 900 delegates on Google Cloud deployment of the Rubin Science Platform.
- To join DP0, visit dp0-2.lsst.io and follow the getting started checklist
- Rubin DP0 Summer School based on DP0.2, June 12 - 16
- Expanding DP0 to include Solar System simulated object catalog, DP0.3 (new data product, not addition to DP0.2)




*DP0.3 is out! Expect DP0.3 focused delegate assembly August 18*


The color-color diagram for a random subset of SSObjects.

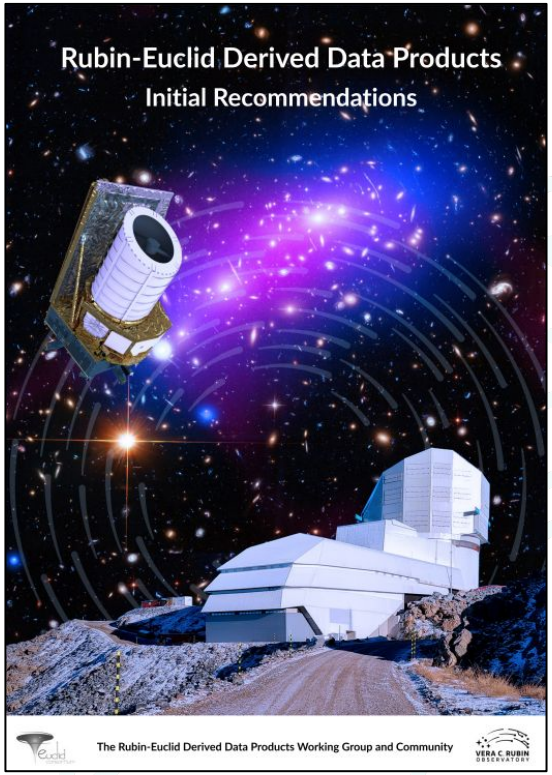
More info: Thursday 2pm - Canyon ABC Data Preview 0

# In-Kind Program

- Data Rights Agreements (DRA) now in production: AURA, SLAC and DOE have templates with common terms and conditions. Program Leads hearing shortly.
- Each Program subject to DRA with either SLAC or AURA. Several have contributions that require both flavors. Both have ~same terms and conditions.
- Major data processing contributions from UK:LSST and France (IN2P3) are subject to DOE level agreements (annex to existing international agreements).
- Developing plans for further In-Kind Program Contributions. Fundamentally based on: 1) current program active, manageable, delivering value; 2) what are we missing that the community wants?
- New contributions will be limited, competitive, and open to US and internationals
  Target: March 2024 in-kind program update. Collecting “resource needs” from Recipient groups now, for listing in September. Bids discussed in October onwards, US teams’ proposals supported in November.

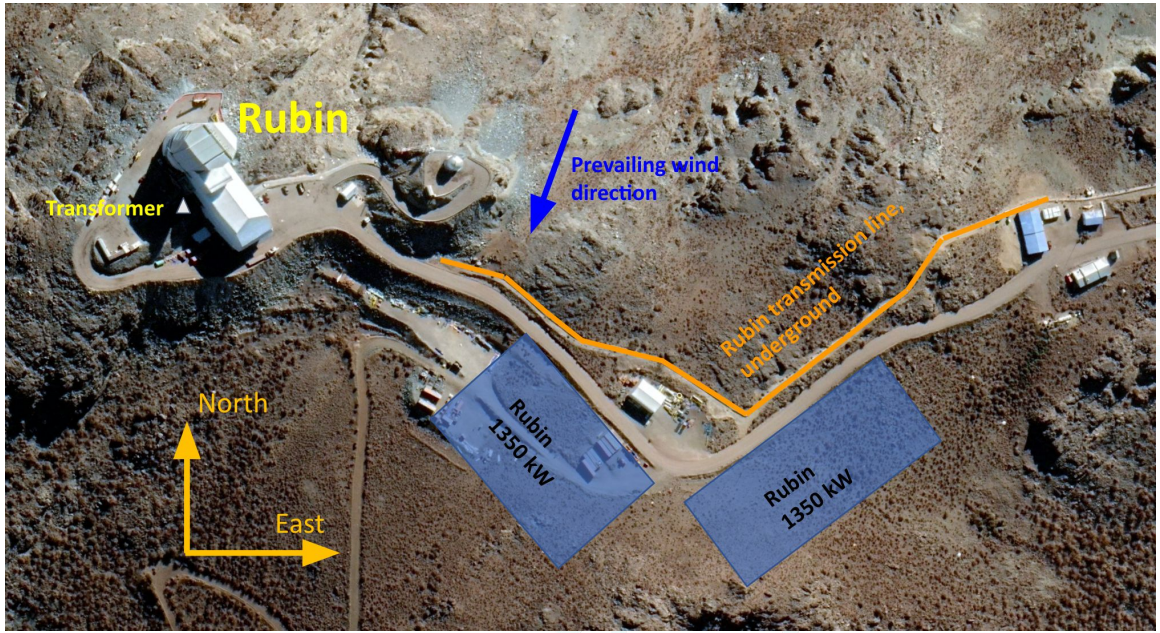
# Rubin Euclid Collaboration (good satellite problem)

- Extensive Community based, Science Based program to define derived data products from Rubin+Euclid
- Independently, Rubin agreed to observe in the Euclid Deep Field South. Euclid and Rubin agreed (MOU) to sharing data from both surveys with both communities.
- Now working on implementation phase of larger DDP program (letter of intent). Requires additional resources beyond either projects currently funded plans.
- Coordination with Roman is happening too. See Thursday session on Rubin+Roman.

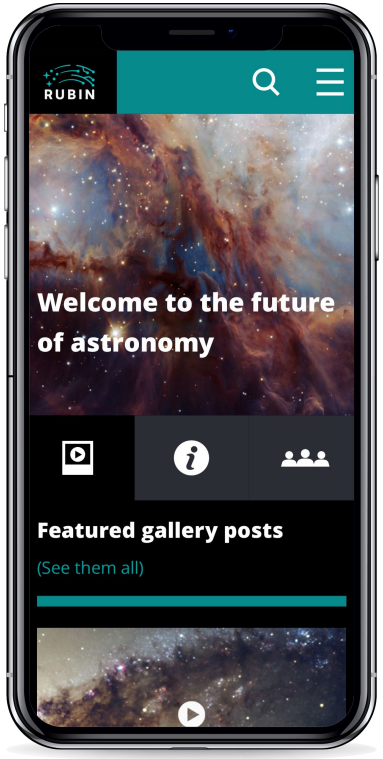


# NOIRLab Sustainability - Rubin Extension

- New supplemental proposal to NSF submitted; led by NOIRLab (builds on current large investment)
- Goal: Pachón Carbon Neutral
- Supplement Covers 40% of Rubin use, one half of ultimate 2x1350 KW system proposed
- Accounts for 1400 tons CO2
- Engineering, site, PM, hardware $4.2M
- Engage local university engineering students



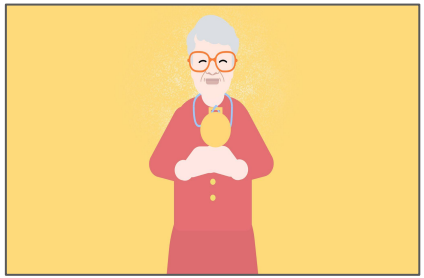
# EPO Program is active in Operations!

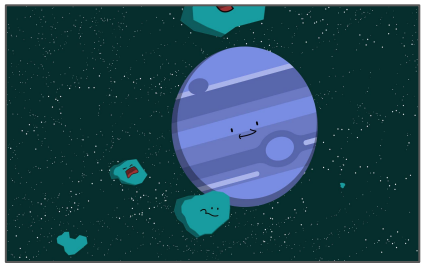



Website live:
**rubinobservatory.org**

**Initial Public launch on social media in Jan/Feb 2023, continuing to build engagement.**

Animated videos on YouTube, available in English and Spanish






Try for a high score at spacesurveyors.app

# Education & Public Outreach

- New content regularly posted to News, Events, Rubin Voices, and Education sections
- Final versions of the Surveying the Solar System and Expanding Universe formal education investigations released
- Internal testing of Citizen Science Principal Investigator workflows and notebooks (LSST: UK connection)
- So far in FY23, social media accounts published 900 posts, reaching 470,000 users and growing

**EPO Open House: 4:00 pm Thursday**

Come by to chat with the EPO team, see a newly-released animated video, and talk to EPO about your science plans with Rubin data

Bring your completed BINGO card for a chance to win a prize!

# Committee / Policy Activity

Active

- Science Advisory Committee
- Users Committee
- Survey Cadence Optimization Committee
- Contribution Evaluation Committee

Looking to stand up in FY24 in advance of Operations start

- Data Policy Committee
- Resource Allocation Committee
- Resource Forum

You have a voice in Rubin policy! Please give us your input on a **Rubin Values statement** during the current **community comment period.** *What kind of Observatory and Science Community do you want to see?*

# Sessions to Look for this Week

- Monday 9am, 11am SAC
- Tuesday 11am Allies Across Rubin Support Session
- Tuesday 2pm Early Science
- Tuesday 4pm Celebration of Construction
- Tuesday 4pm Rubin Science Medley including new Simonyi/NSF Scholars
- Wednesday 9am Plenary: Science Collaborations
- Wednesday 11am Supporting Science at Small and/or Underserved Institutions
- Wednesday 2pm In-Kind Program
- Thursday 9am Keynotes: A. Roodman and D. Norman
- Thursday 2pm Data Preview 0
- Friday 9am Users Committee Meeting
- Friday 11am Wrap up

# Summary

- Planning survey start in mid 2025
- Data Preview 0 continues successful development of Ops team and community. Adding Solar System catalog as DP0.3
- In-kind program is active and growing. Progress in DRAs is slow but progressing
- Continuing to further develop Sustainability program for Rubin Observatory and NOIRLab
- EPO active in Operations
- Thanks to community members for their service!


*Everything is coming together. Get ready!*

# New NSF Funding Opportunity: Simonyi-NSF Scholars

- Funded by a gift from Charles Simonyi with matching funds from AST
- Pilot Program this year.  First Simonyi-NSF Scholars
  - **Darryl Seligman** (AAPF)  “Interstellar Comets and the New Insights to Planet Formation They Provide”
  - **Colin Burke** (AAPF)  “A precise measurement of intermediate-mass black hole demographics with the Rubin Observatory”
  - **Gautham Narayan** (CAREER)  “Understanding the Nature of Dark Energy with the Young Supernova Experiment and the Legacy Survey of Space and Time”
  - Plus, two AAG PIs still pending
- Lightning Talks Today at 4pm.  Be there!

# New NSF Funding Opportunity: Simonyi-NSF Scholars

- Charles Simonyi **doubled** his gift for next year to $2 million, which will be matched by AST for a total of $4 million available.
- Expect about 8 awards next year
- Available within existing programs:  CAREER, AAPF, AAG
- Supports proposals
  - With **focus on Rubin science**, including theoretical work and simulations
  - For **early-career scientists**: < 10 years from PhD or < 5 from tenure
- If possible, add Rubin or LSST to your proposal title.
- AST contact:  **Luca Rizzi  (lrizzi@nsf.gov)**

# New NSF Funding Opportunity: AI Research Institutes

- National Artificial Intelligence (AI) Research Institutes
- See **Program Solicitation NSF 23-610** for details.
  - Theme 1 supports AI for astronomical sciences.
  - Average up to $4 million per year for 5 years per award.
  - Up to $40 million total available for awards.
  - FAQ available, and Webinar led by CISE coming soon.
  - AST contact: **Andreas Berlind (aberlind@nsf.gov)**

- Also, come to a special session Wednesday, 11am, on support at small/underserved institutions for more info.

# DOE Office of High Energy Physics Cosmic Frontier

## ->Mission & Funding Opportunities

**Cosmic Frontier Program Managers**

- **Kathy Turner, Kathy.Turner@science.doe.gov**
- Bryan J. Field, Bryan.Field@science.doe.gov
- Christopher Jackson (detailee) Christopher.Jackson@science.doe.gov

Full list of Funding Opportunity Announcements (FOA)
https://science.osti.gov/hep/Funding-Opportunities

# DOE, SC and the HEP Program

The mission of the DOE is to ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions.

The mission of the DOE Office of Science (SC) is to deliver the scientific discoveries and major scientific tools that transform our understanding of nature and advance the energy, economic, and national security of the United States.

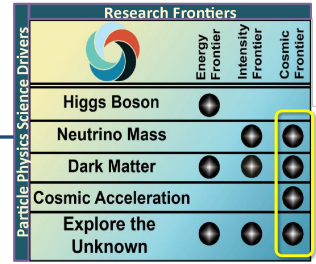
DOE National Labs – Our Crown Jewels

Together, the 17 DOE laboratories comprise a preeminent federal research system, providing the Nation with strategic scientific and technological capabilities.

The Office of High Energy Physics' (HEP) mission (one of six scientific offices within SC) is to explore the fundamental nature of matter, energy, space and time.

- HEP uses community input to develop a strategic plan for projects & experiments to carry out to reach our science goals.
- Experimental Research funding supports scientists that are participating in the design, construction and operation of projects and experiments, as well as data simulations and analysis, and planning for the future.

# Cosmic Frontier
# - an Experimental Research Program



We get advice and input from:

- Official government advice is provided by HEPAP and the AAAC
- Input from National Academy of Sciences studies, such as the Decadal Survey of Astronomy & Astrophysics (Astro2020), Basic Research Needs studies, and other avenues.

-> HEP is carrying out a staged suite of projects as recommended by the HEPAP 2014 "P5" subpanel's strategic plan. A 2023 P5 study will be released this fall.

Cosmic Frontier: Naturally occurring data is used to study of the fundamental nature of matter, energy, space and time in areas complementary to the accelerator-based experimental Energy and Intensity Frontiers.

- Imaging and Spectroscopic surveys to determine the nature of Dark Energy: BOSS, eBOSS, DES, DESI, **Rubin (LSST Camera, Commissioning, Operations) & the LSST DESC.**
- Survey experiments also constrain neutrino properties.

- Measurements of the Cosmic Microwave Background (CMB) to probe the Inflationary era: SPT-3G, CMB-S4 planning

- Underground searches for Dark Matter particles: ADMX-G2, LZ, SuperCDMS SNOLAB and new initiative concept studies.

# FY202X Research Opportunities in High-Energy Physics (HEP FOA)

**The HEP FOA has been the primary avenue for university faculty to request support for > 10 years.**

- This FOA is for "research" funds to support scientists participating in all phases of design, construction and operations, data simulations and analysis, etc. in support of the HEP roles, responsibilities and science interests on projects and experiments.
  - ->The FOA comes out in the late summer or early fall.
  - ->The FOA calls for proposals in any of the experimental Frontiers (Energy, Intensity, Cosmic), Theory, Advanced Detector R&D, and Accelerator R&D. (Theoretical cosmology studies should be proposed to the HEP Theory Frontier).

- Compliant proposals are sent out to "mail in" reviewers. Then an in-person review panel is convened over 3–5 days in the DC area to discuss and compare proposals and assess if it's in a top, middle, or low tier.

- These tiers, along with funding availability, programmatic priorities, are the basis, for the funding recommendations by the Program Manager(s).

**However, the times they are a-changing ☐**

# FY202X Continuation of Solicitation for the Office of Science Financial Assistance Program

- This is SC's annual, broad, "Open Call" FOA that covers all research areas in SC and is open throughout the Fiscal Year. Any research within SC's Congressionally-authorized mission may be proposed under this FOA.
- It always starts September 30, 202X and runs for a full year.
- HEP had been using this FOA for conferences, supplements to existing grants, experimental operations, and to consider proposals that weren't considered in the HEP FOA process (e.g. were late).
  - HEP prioritizes research funding using the HEP FOA & there are usually minimal funds left to support any research proposals going to the Open Call FOA.

**Things have changed! Starting FY2024, we will no longer have the HEP FOA. Research proposals should now be submitted to the Open Call FOA.**

Proposals received by December 1, 2023, (?) will be eligible for the FY2024 HEP comparative review panels and proposals received by September 1, 2024, (?) will be eligible for the FY2025 comparative review.

Draft language

# Early Career Research Program

**This FOA has a time constraint**

- What do you mean by, "early career?" Time since your PhD was awarded.
- To address special circumstances and challenges due to the COVID-19 pandemic, the Office of Science (SC) extended the eligibility window for this competition from 10 to 12 years after PhD for all applicants.
- CHECK THIS! It may revert to 10 years in FY2024.
  - https://science.osti.gov/hep/Funding-Opportunities/-/me
    FOA_0002821.pdf
  - https://science.osti.gov/-/media/early-career/pdf/Early-Career-FAQ-FY-2023-final.pdf
- The awards are for 5 years and are open to university PI's or laboratory scientists. You may apply for both a "regular" Research grant and an Early Career Award, but if the research is the same, you will have to choose.

This is the FY2023 FOA & FAQ. **Check for changes in FY2024.**

# Virtual HEP PI Meeting to be held on August 15-16, 2023

- Open to everyone! Not just faculty who already have grants. Come and learn more about the HEP program and process.
- To take advantage of this opportunity, we encourage you to visit the PI Meeting website and register: https://www.orau.gov/heppi2023
  - General presentations during a plenary Zoom session covering the overall DOE-HEP program, budgetary issues, and different HEP FOAs at DOE which PIs may apply to.
  - Parallel Zoom sessions led by individual DOE-HEP Program Managers (PMs). Parallel topics are planned to include multiple HEP research areas. These sessions will provide an opportunity for PMs to present PIs with detailed guidance on preparing applications for the DOE-HEP merit review process and discussing programmatic priorities and budgetary factors for the respective subprogram.
- Cosmic Frontier will set up a few Doodle polls so you can meet with us (Bryan, Chris, and Kathy) individually for fifteen minutes. If you didn't get an email from Bryan Field about how to sign up, please send him an email to be added to the list.

# Additional Info

- Other opportunities are available. We have FOA's for underserved people and institutions as well as continuing opportunities for graduate students, internships etc. □ See my talk tomorrow.

When applying for a grant:

- READ the FOA CAREFULLY.
- You are responsible for addressing all requirements, which often have changes year to year, e.g.
  - Some require a Letter of Intent, some don't.
  - A PIER plan is required (as of FY2023).

**Some general notes:**

- **Proposals that review well are typically those in which the PI's are carrying out critical, timely roles in our program, aligned with our roles and responsibilities, and as part of a scientific collaboration.**
- **Describe your full efforts in one proposal (e.g. project, operations efforts as well as data analysis).**

Have questions? We are here to help.
->Send an email to one/more of the program managers
and we will answer and/or set up a zoom meeting!

# Student Lightning Pitches (2/2)

## Ryan Oelkers

### LSST-DA Summer Student Program Director

**19 undergraduates** have been supported by LSST Discovery Alliance to attend the 2023 Rubin Project & Community Workshop.

Please remember, tomorrow there is a breakout session dedicated to Career Pathways for students at **2PM in the Sabino room** – all are welcome to attend!

All of the 19 undergraduate students will present posters on their research projects related to Rubin / LSST right after today's plenary session.

Today we'll hear a ~30-second "pitch" from the second half of the undergraduates as well as a few graduate students, and then you will have the opportunity to enjoy the undergraduate posters and learn more about their research in the lobby from **~10:30am to 11:00am!**

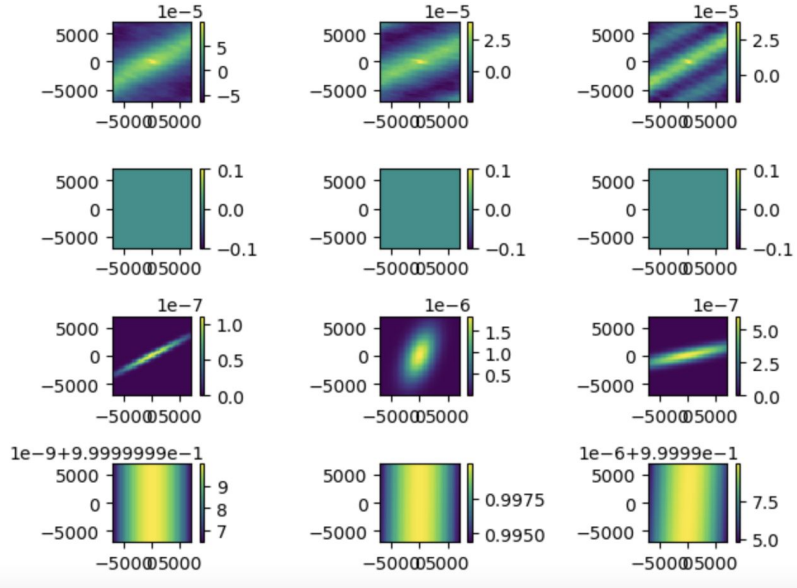
# **Peter Kiernan** | Stanford University

Advisor: Pat Burchat, Claire-Alice Hébert

Research question: When interpolating only the atmospheric PSF, how do ‘gaussian processes’ compare to other interpolation methods?

Current points of work: Adjusting the gaussian process kernel fitting process, and investigating using cross-correlations.

Side project: Photometric filter optimization




Participant in the LSST Discovery Alliance’s program for student researchers at the 2023 Rubin PCW.

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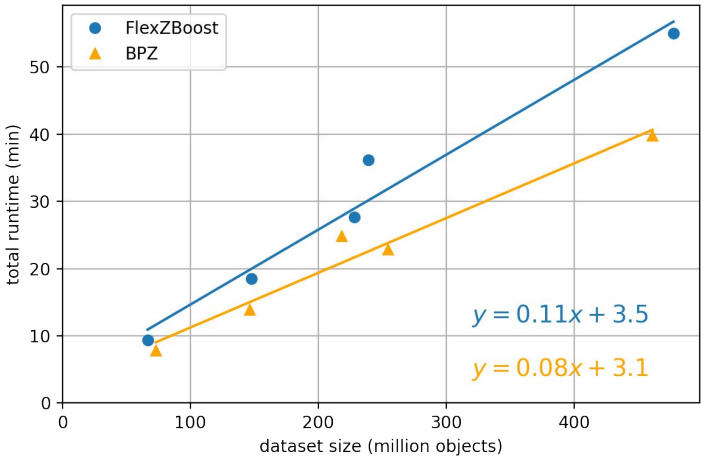
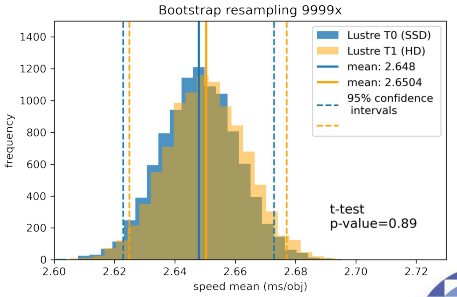
# **Heloisa Mengisztki** | Laboratório Interinstitucional de e-Astronomia (LIneA)

Advisor: Julia Gschwend

Research questions: Considering the current HPC Apollo infrastructure, how long will it take to compute photo-zs using two RAIL algorithms for DR1? Is it a linear relationship as we increase dataset size? What is the impact on the pipeline execution speed when changing configurations?

Outcomes: Forecasts for DR1 photo-zs and recommendations for workflow optimization.

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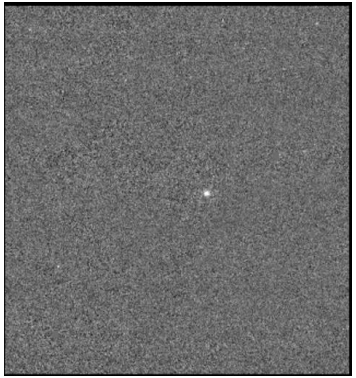
# **Mathilda Nilsson** | University of Pittsburgh

Advisor: Michael Wood-Vasey

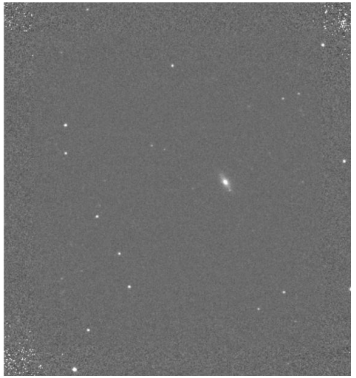
Research question: Goal is to continue analysis of data from the 2013-2016 SweetSpot survey of Type 1a supernovae in the near-infrared, for better use of the SNe as standard candles.

Outcomes:

All stacks of images of observed SNe were inspected, and photometric curves have been generated for all the stacks which were inspected and marked as usable for stars observed in 2015.



LSQ14aeg observed on 03/19/2014



Co-added image of ASASSN-14ay from 06/06/2016

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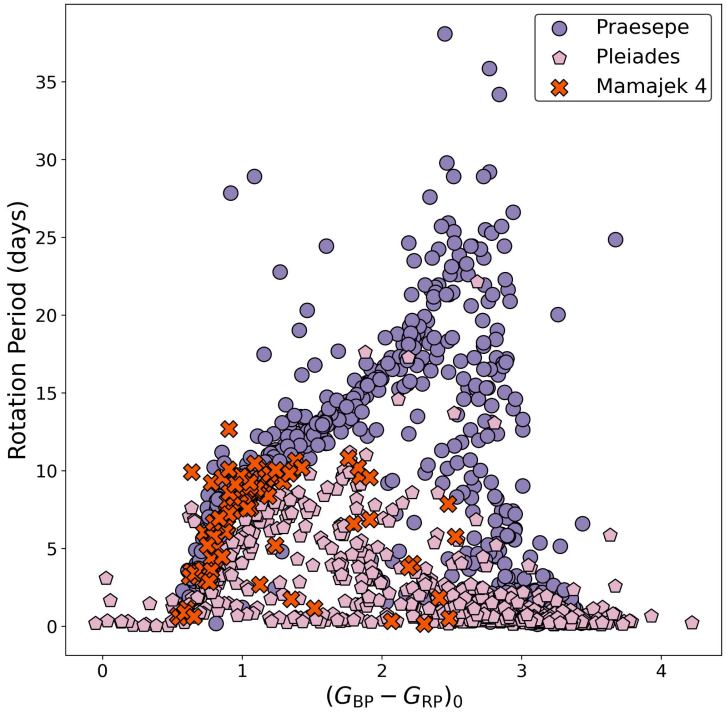
# **Ella Roselli** | Columbia University

Advisor: Marcel Agüeros

Research question: What are the different stellar age indicators and how can we use open clusters (OCs) to further our understanding of the evolution of low-mass stars?

Outcomes: We look at three age indicators—isochrone fitting, lithium abundances, and gyrochronology—to begin characterizing three understudied OCs as new stellar evolution benchmarks.

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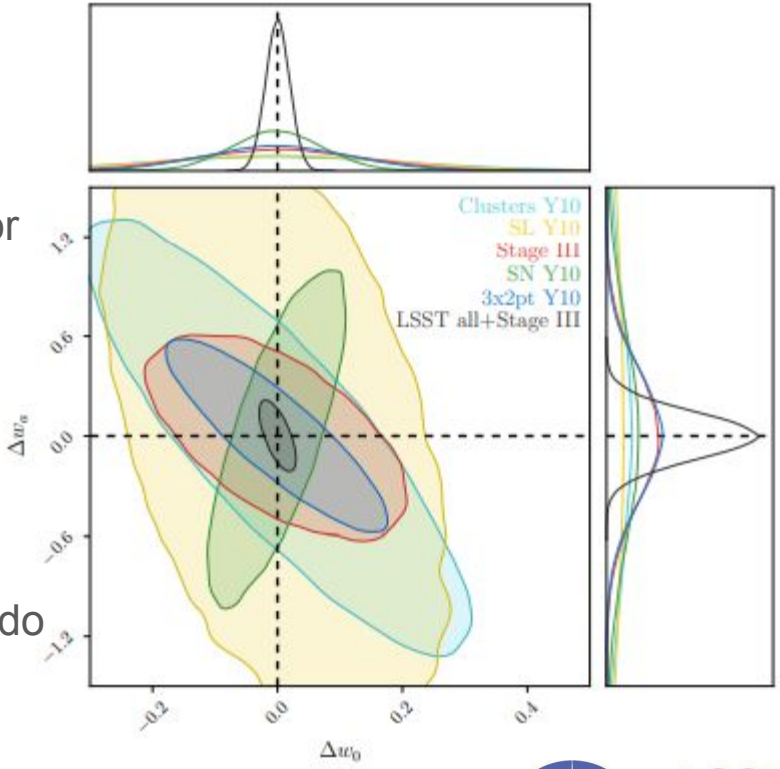
# **Joseph Santos** | Rutgers University

Advisor: Eric Gawiser and Heather Prince

Research question: Photometric redshift error or dark energy shenanigans?

Outcomes: It's vital to marginalize over redshift uncertainties when we do cosmology. This project investigates how the redshift uncertainties propagate into the cosmological parameters. We are also working on implementing a faster way to do that marginalization.

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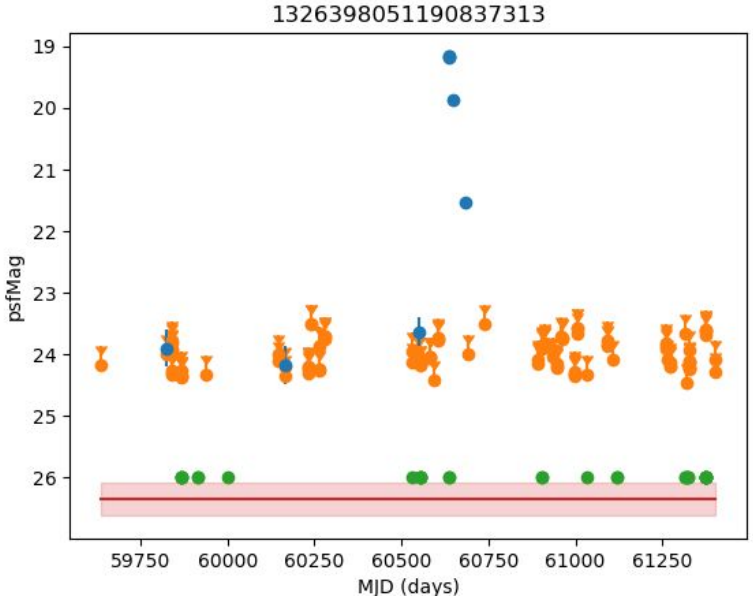
# **Sam Scott** | Stanislaus State

Advisor: Brian Morsony

Research question: What can be found when comparing multiple supernovas against one another, focusing on the precursors?

Outcomes: So far, we have created a tool to run photometry at the location of a transient. This creates a light curve that will help confirm if transient is a supernova and identify possible precursors.

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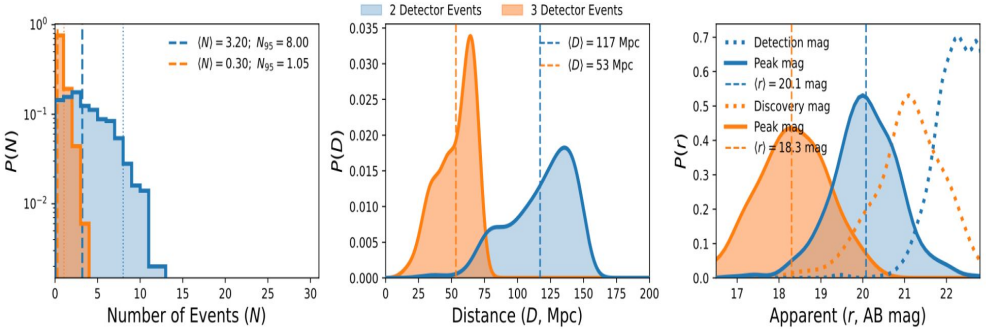
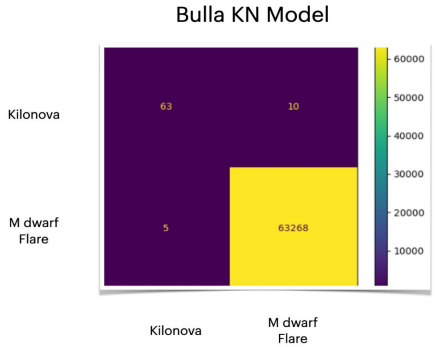
# **Ved Shah** | University of Illinois at Urbana Champaign

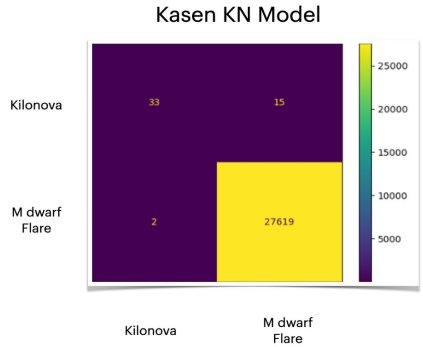
Advisor: Gautham Narayan

Research question: How many kilonovae can we expect to see over LIGO 04 and how can we optimize their discovery?

Outcomes: We have estimated KN rates based on BNS merger rates for LIGO 04 to be 3-5 over 18 months and found ways to identify KN in the presence of foreground contaminants like m dwarf flares.

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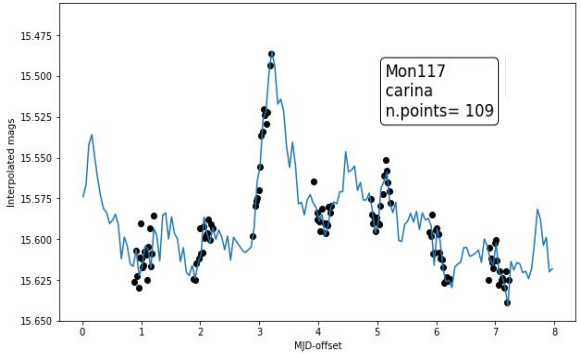
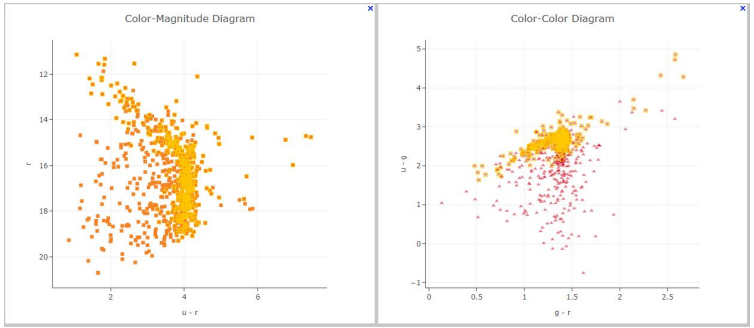
# **Alessandro Salvatore Tramuto** | University of Palermo

Advisor: Rosaria (Sara) Bonito, INAF - Osservatorio Astronomico di Palermo (Italy)

Research question: How to reconstruct LCs of variable Young Stellar Objects and which physical phenomena are behind these irregular luminosity fluctuations? How to recognize the presence of accretion in a YSO?

Outcomes: A dense sampling is needed to reconstruct the rapid luminosity variations. The accretion process is marked by the UV excess (bluest bands) of the emitted radiation.

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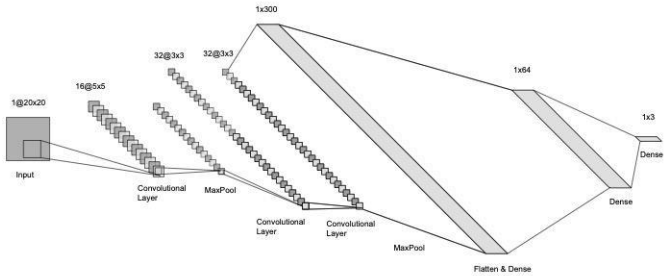
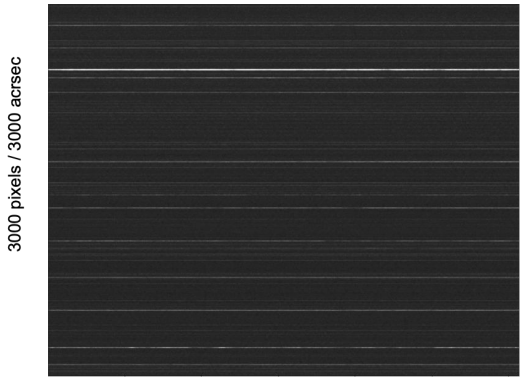
# **Shar Daniels** | University of Delaware

Advisor: Federica Bianco

Research question: How can we study sub-second timescale astrophysical transients?

Outcomes: We built a Convolutional Neural Network to explore 450 GB of ZTF “continuous readout” images, where stars are smeared into time-resolved streaks. On implanted gaussian brightening events of timescale 10 milliseconds, our convolutional neural network achieves a recall of 100% and a precision of 83%.

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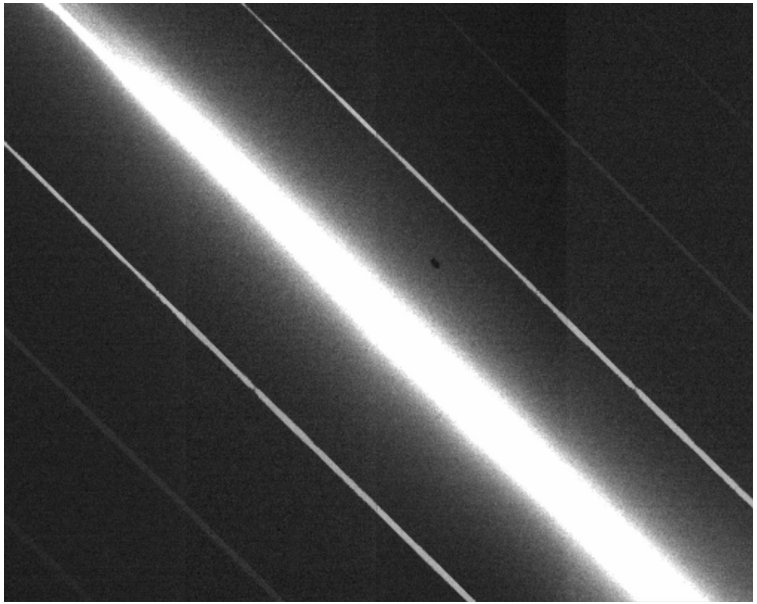
# **Daniel Polin** | University of California, Davis

Advisor: J. Anthony Tyson

Research topic: Photometric Impact of Low Earth Orbit Satellites on the Rubin Observatory LSST Camera

Outcomes: The Rubin LSST Camera experiences novel responses to low earth orbit satellites which include nonlinear crosstalk. We have characterized this in our UC Davis Lab and with an optimistic prognosis for LSST data.



Crosstalk from a simulated LEOSat Streak on a LSST Cam CCD Detector

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