



Rubin(+DES) at FNAL Roadmap update

Brian Yanny
CSAID meeting
23 March 2023

DES: Dark Energy Survey Roadmap:

All data in hand, ~2 years of analysis/publication work left.

Final production runs happening at NCSA/Illinois, FNAL (jobsub-lite in use with jobs submitted from FNAL machines).

Analysis runs underway mostly at NERSC, using dedicated DES project cpu allocation.

Planning now for long term (at least 5 year) archival of DES data:

- Astro-catalogs served from NOIRLab, Tucson (NSF funded) (0.5PB)
- Physics/Cosmology catalogs archived at FNAL (1PB dcache disk + 1copy tape backup).
 - One-time (FY23) experiment (cosmic frontier) funds of order \$100K available for archive dcache disk and maint.

DES: Dark Energy Survey

Details of FNAL archive (con't):

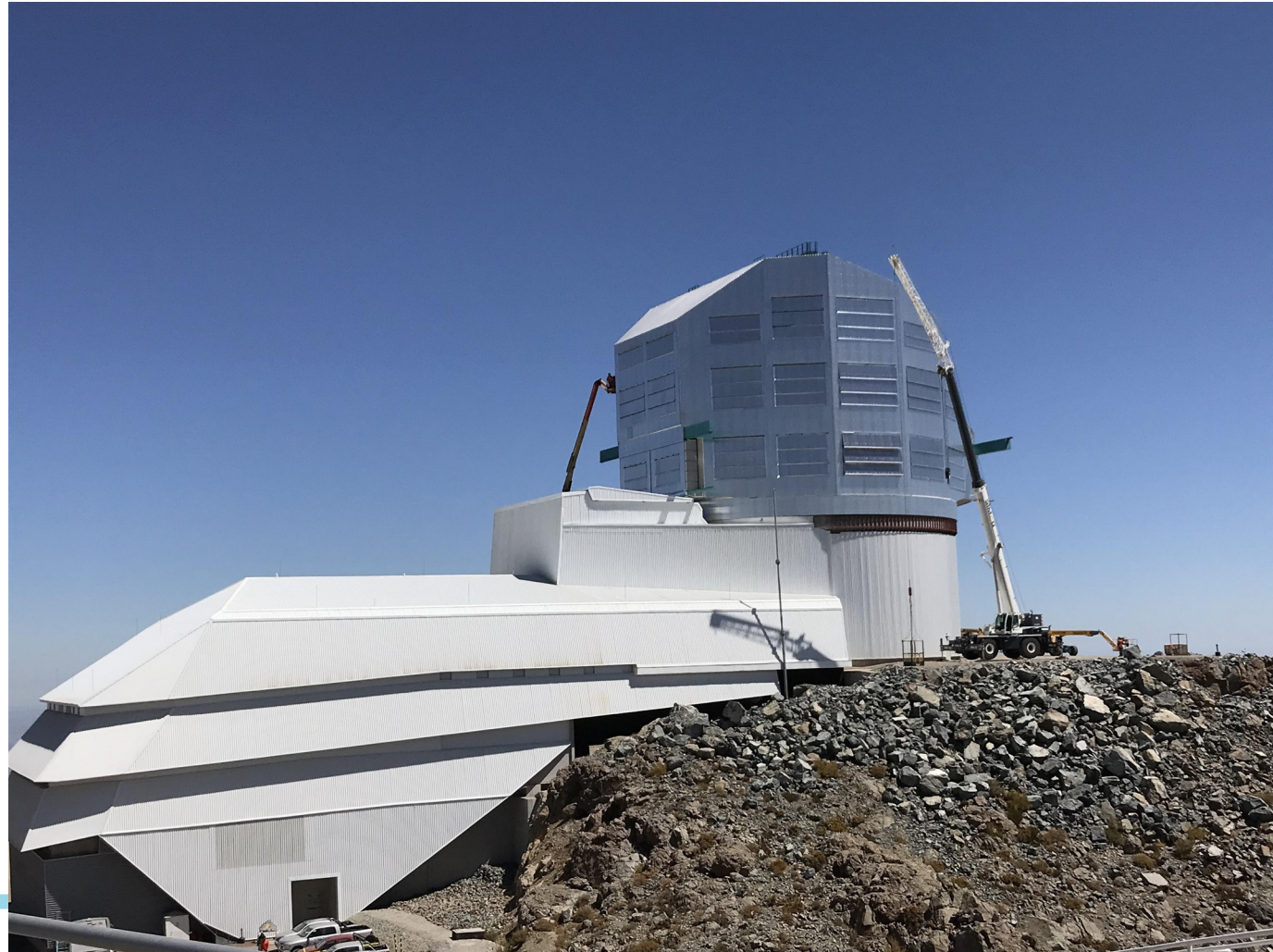
Hope to use the microboone model:

- <https://microboone.fnal.gov/documents-publications/public-datasets/>
where files sit in dcache, with github jupyter notebooks for access.
- Will additionally have a read-only light-weight database (sqlite?) with 'metadata' about the 1PB file archive, can be a stand-alone container that users can download if not 'live' on FNAL server/VM.
- Initially, access will be restricted to DES collaboration
- After ~2 years, hope to make access public, with public dcache files available for download to NERSC for analysis. Need to understand if tokens are needed, (and need to be generated offsite) for access to transfer mechanisms – but time (2 years) to understand this problem.

Vera Rubin Observatory

The Large Scale Survey of Space and Time (LSST) with the Vera Rubin Observatory is scheduled to begin test data taking with it's full 189 4Kx4K CCD mosaic Camera in early 2024, with operations scheduled to begin in early FY 2025.

This is the dome enclosure (above) and cooling airflow structure (below) as of Mid March 2023 (credit: K Herner)
On the summit of Cerro Pachon (2700m) Chile



Dome Interior March 2023

Credit:
K Herner



While the dome and telescope and mosaic camera are largely complete, the camera awaits transportation from SLAC/US to the mountaintop in Chile and installation. This is scheduled for late 2023.

Credit:
K. Herner (FNAL)
March 2023



Rubin Roadmap:

Large set of FNAL people (computing and cosmic frontier science) involved in Rubin operations, especially DM (Data Management) tasks, but also science-pipelines (DESC and Ops) and Verification and Validation.

- Data Curation group:
 - Brandon White (lead)
 - Yuyi Guo
 - Omari Paul (postdoc)
 - (Jhonatan Amado – starts May 2023, was with CMS)

This group is responsible for setting up and maintaining Rucio for Rubin, which is used for distributing data between the 4 main processing sites (Chile, SLAC-USDF, CCIN2P3-France, RAL UK).

Rubin Roadmap:

Data Curation group (con't):

This group also facilitated loan of 1.2PB FNAL dcache space (now returned to FNAL DM) while USDF/SLAC was setting up its tape-archival system.

Database and Networking Support:

Olga Vlasova and FNAL DBA and networking groups

Science-Pipelines (DESC and Rubin-Ops):

Marc Paterno: high performance codes for DESC

Ken Herner: difference image analysis (DIA) pipeline team. This time-domain pipeline has its roots in the FNAL-LDRD project from a few years ago led by Marcelle Soares-Santos (now professor at U. Michigan) for gravitational-wave followup and DES supernovae imaging.

Rubin Roadmap:

Campaign Production group:

Jennifer Adelman-McCarthy (also does CMS production)

Huan Lin

Brian Yanny

Nikolai Kuropatkin

Verification and Validation:

Eric Neilsen

Douglas Tucker

Community Engagement:

Brian Nord

Jim Annis

Alex Drlica-Wagner

Rubin Roadmap:

DM Middleware post-doc support:

Sreevani Jarugula

Becky Nevin

(Omari Paul)

This team of post-docs (also working with Brian Nord on AI/ML research projects) is learning infrastructure tools and techniques (kubernetes, github, service-deployment, graphana monitoring) and has begun to contribute positively to the myriad of compute service modules needed to keep Rubin USDF going. So far so good!

Rubin Roadmap (con't):

Most of these named FNAL people are part time funded on Rubin (typically 50%, but it varies), however research scientists are mostly not Rubin-funded. Total is about 8 FTEs on the Rubin budget currently – may need to revisit this arrangement (or scientist roles) for FY24 and beyond, especially as DES project support ends.

Development is very active on all fronts, with FNAL members making important and appreciated contributions to DM-ops, Science pipelines, validation and monitoring tools, and community programs.

Training from FNAL CSAID experts for skills like Rucio (FTS, message services), Condor, Kubernetes, Graphana/Kibana, software development tools have been and continue to be very valuable, and useful to the Rubin project.

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Upcoming Milestones:

- Camera on telescope late 2023.
- Shakeout and test data 2024.
- Full survey operations late 2024.
- Project scheduled to run 10 years – 2033 or so.
- FNAL is and plans to remain an important contributor to Rubin USDF and project computing!

Part of a control room display panel showing weather and other condition monitoring. Credit: K Herner

