

Cosmic Frontier Experiment Status

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March 2, 2015

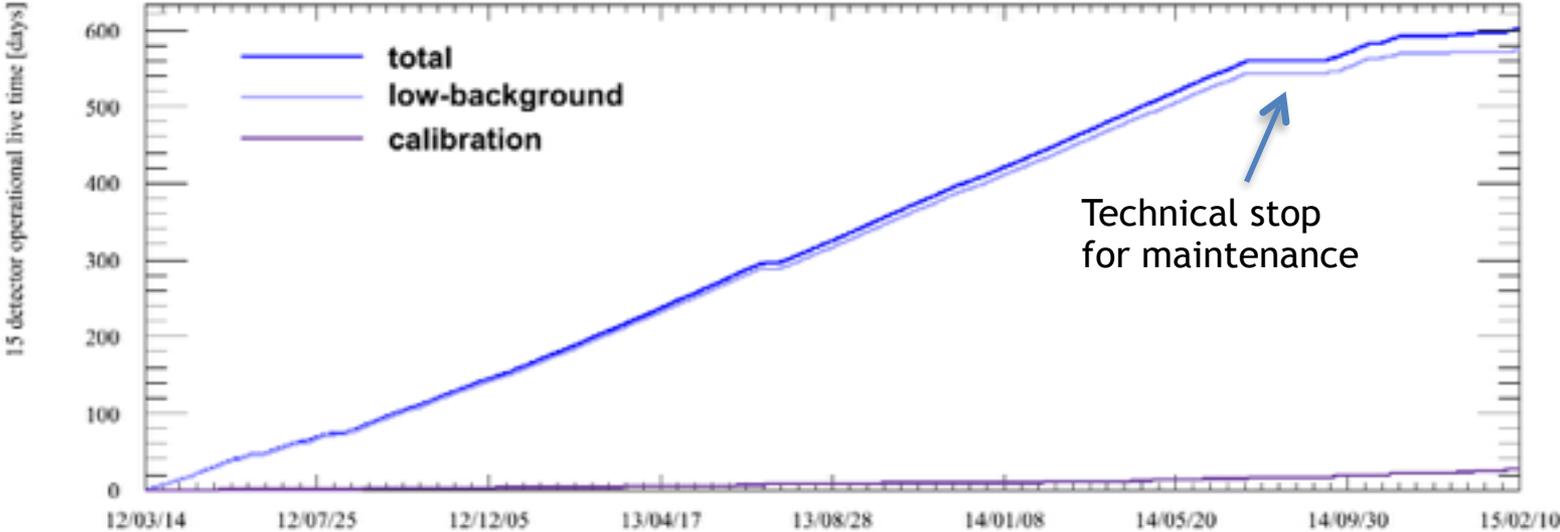
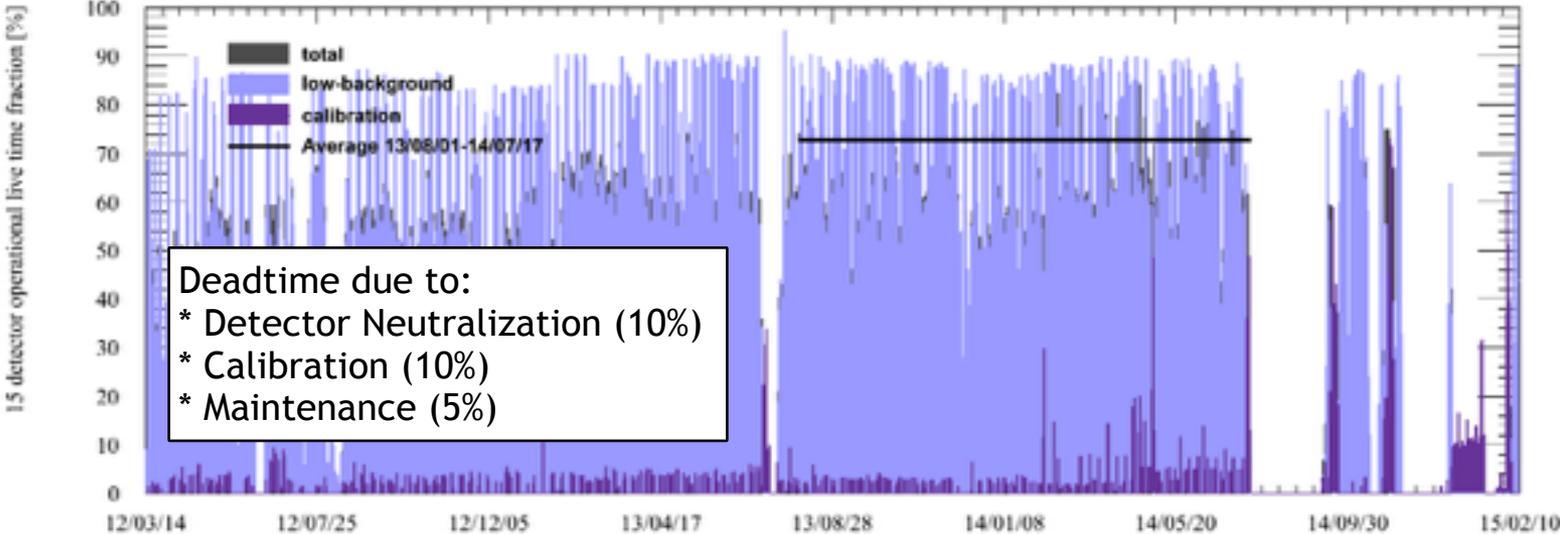
DES Collaboration
Fermilab Center for Particle Astrophysics

Cosmic Frontier Experiment Status

March 2, 2015

Experiment	Location	Status	Start of operations	Nominal end of operations	Physics
SuperCDMS	Soudan	Operating	Mar 2012	Sep 2015	Dark Matter
COUPP/PICO 2L	SNOLAB	Operating	Dec 2013	Sep 2017	Dark Matter
COUPP/PICO 60	SNOLAB	Operating	June 2013	Sep 2017	Dark Matter
Darkside 50	LNGS (Gran Sasso)	Operating/Calibrating	Jan 2014	Sep 2017	Dark Matter
DAMIC	SNOLAB	Operating	Dec 2012	Sep 2016	Dark Matter
Dark Energy Survey	CTIO, Chile	Operating	Sep 2013	Feb 2018	Dark Energy
Pierre Auger	Argentina	Operating	2008	Sep 2015 (for FNAL)	High Energy Cosmic Rays
Holometer	Meson Lab	Operating	Sep 2014	Sep 2016	Spacetime

SuperCDMS Soudan - 3 years of data taking



March 2012

Feb 2015

SuperCDMS Soudan 2015 Operations Plan

- CDMSlite Run 3 (Feb-May, 2015)
 - 3 month run underway with lower energy thresholds
 - Substantial improvement in sensitivity to very low mass WIMPs
- Photo-Neutron Calibration data (June-August, 2015)
 - Mono-energetic neutrons for nuclear recoil E scale
- Systematic studies (September - December, 2015)
 - Study electrical and vibrational noise sources
 - Determine reasons for failures of detector channels
 - Measure dilution refrigerator performance
- Decommission in 2016

COUPP/PICO Operations Summary

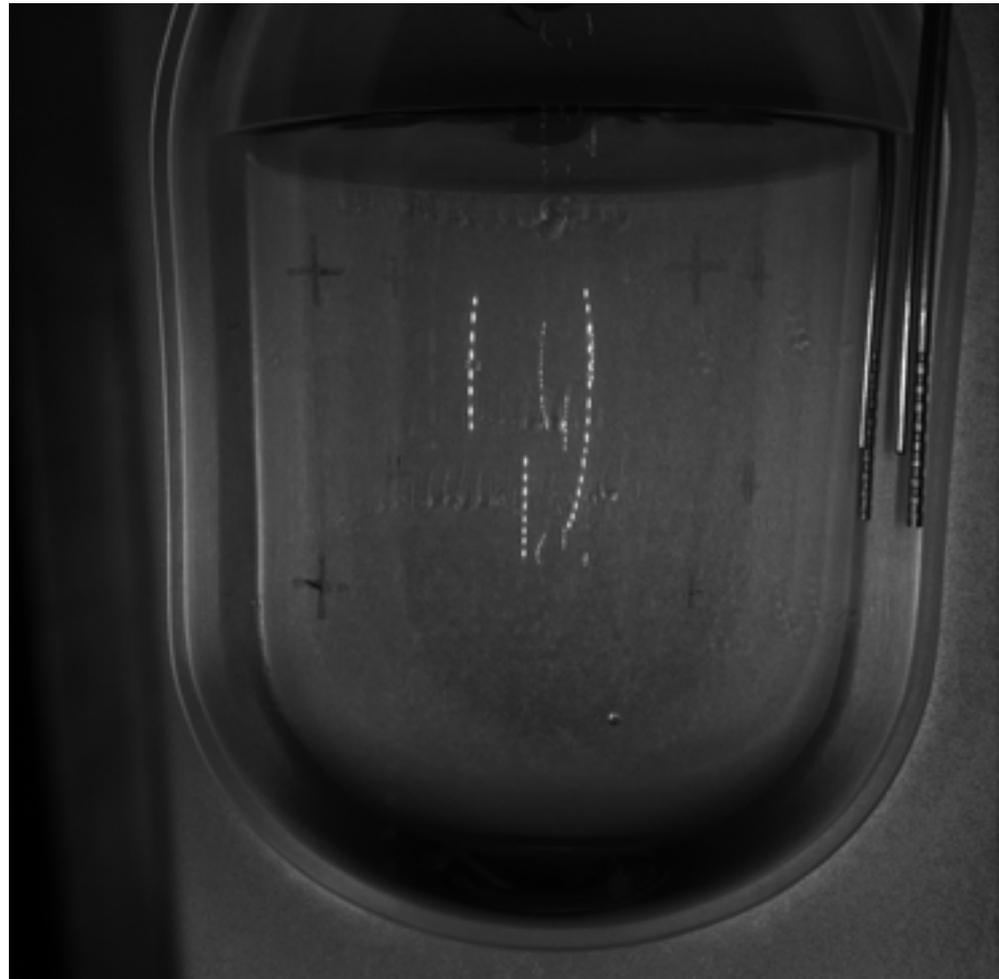
- We continue to learn about particulates extracted from PICO-2L and COUPP/PICO60 last year
- Ongoing testing of particulate sources of events in small test chambers at Northwestern and Queens
- Goal remains to eliminate all sources of background
 - Prevent them from getting in (new run of PICO-2L)
 - Remove them in situ

COUPP/PICO Operations Summary

- PICO-2L with new jar flange, cleaning process and QA is now running at SNOLAB as of last week

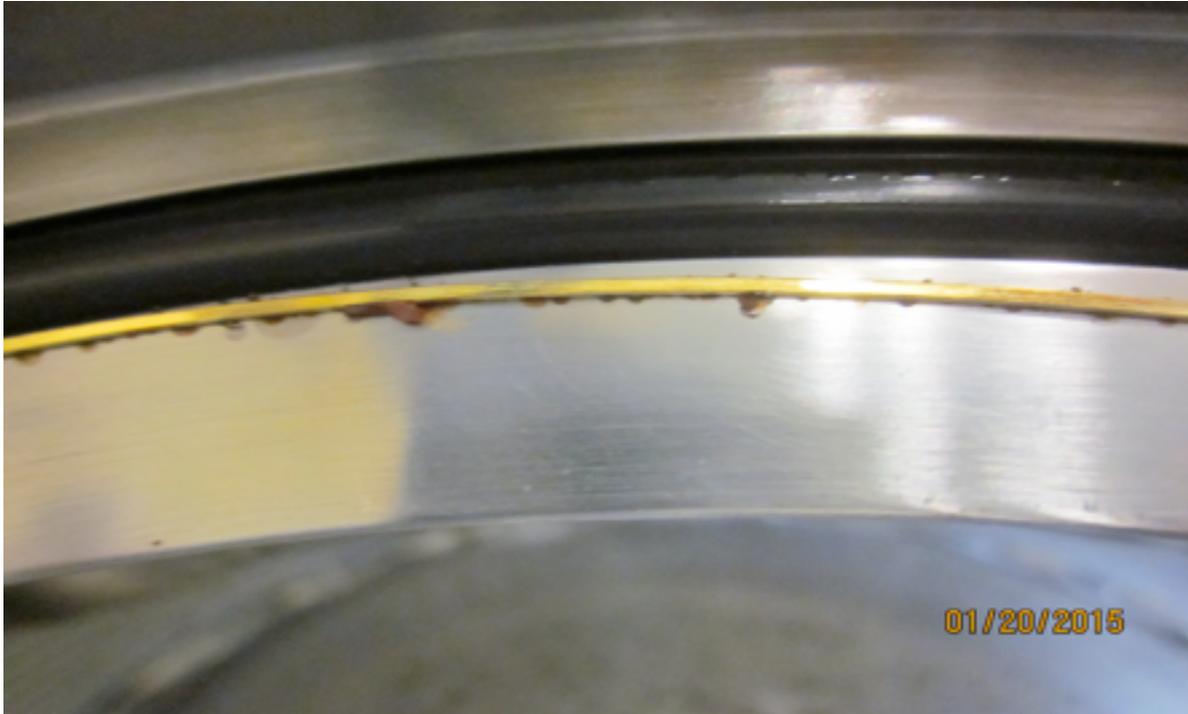
Engineering run to test whether particulates come in from the fill or are produced in situ

First bubble (unprocessed) at right



COUPP/PICO Operations Summary

- PICO60 vessel to be removed and inspected in next month
- Particular interest in flange seal
 - Damage to quartz flange a possible source of radioactivity
 - Galvanic rust (observed in prototype, see image) possible source of particulates



Replacement seal design (PTFE gasket) in place to be tested in parallel on prototype vessel

DarkSide-50 Status



- **Neutron Veto**

- After adding more PPO to increase the LY a calibration campaign was done to establish the sensitivity of the detector to alphas.

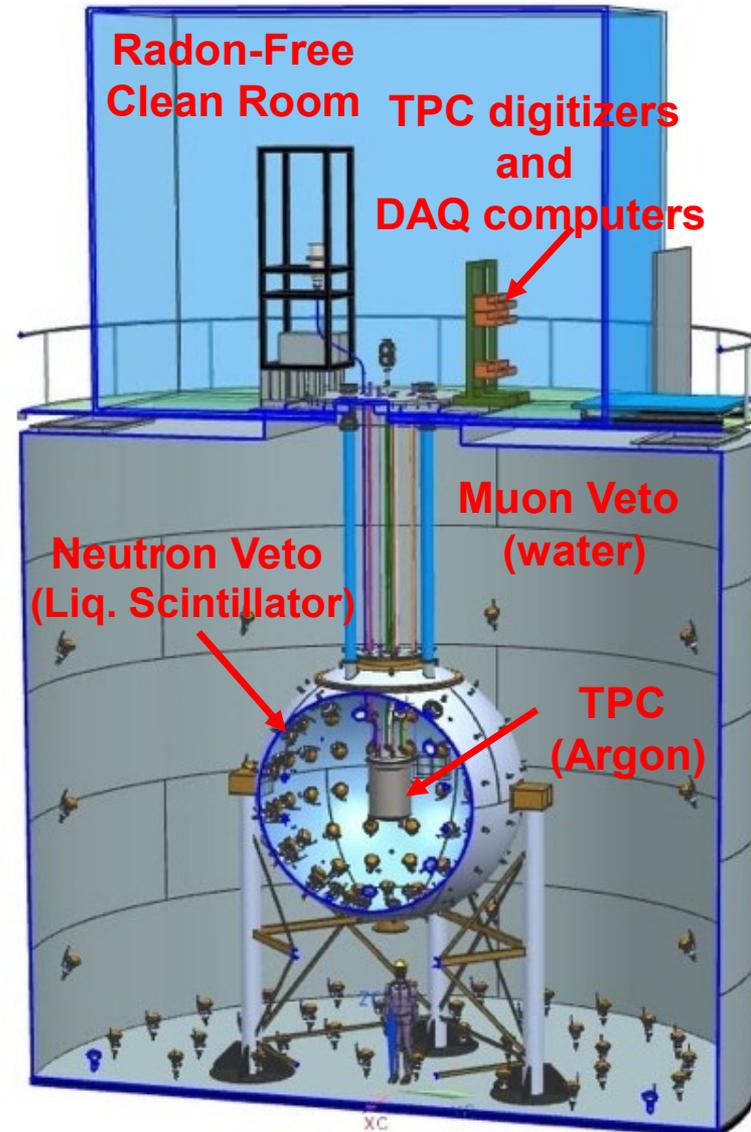
- **TPC: several important steps**

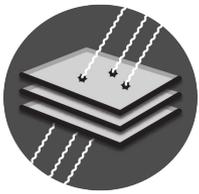
- **Underground Ar**

- Most of Underground Ar (~143kg) arrived to LNGS.
- The remaining ~13kg are leaving Fermilab today and will be transported by air (expected arrival to LNGS: March 13th)
- Filling of UAr is expected during March.

- **Data Taking**

- Last runs with atmospheric Ar exploiting high rate.





DAMIC - Dark Matter In CCDs

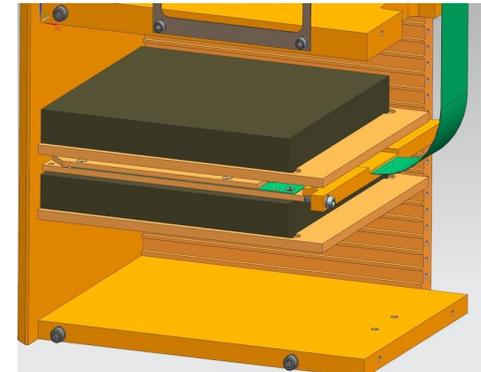
FNAL, UChicago, UMich, Mexico, Argentina, Paraguay, Zurich

February 2015 - March 2015

- DAMIC-100 first phase upgrade at Snolab
 - All detectors working with unprecedented low background levels.
 - Etched copper Vessel to remove surface contamination.
 - New nitrogen purge box to reduce Radon background installed and working perfect.



- DAMIC@Snolab: Next Upgrade - March
 - Two new detectors to be installed during the next upgrade.
 - New inner ancient lead shield ready, will produce a super-shielded CCD to test the limits of the current package design.



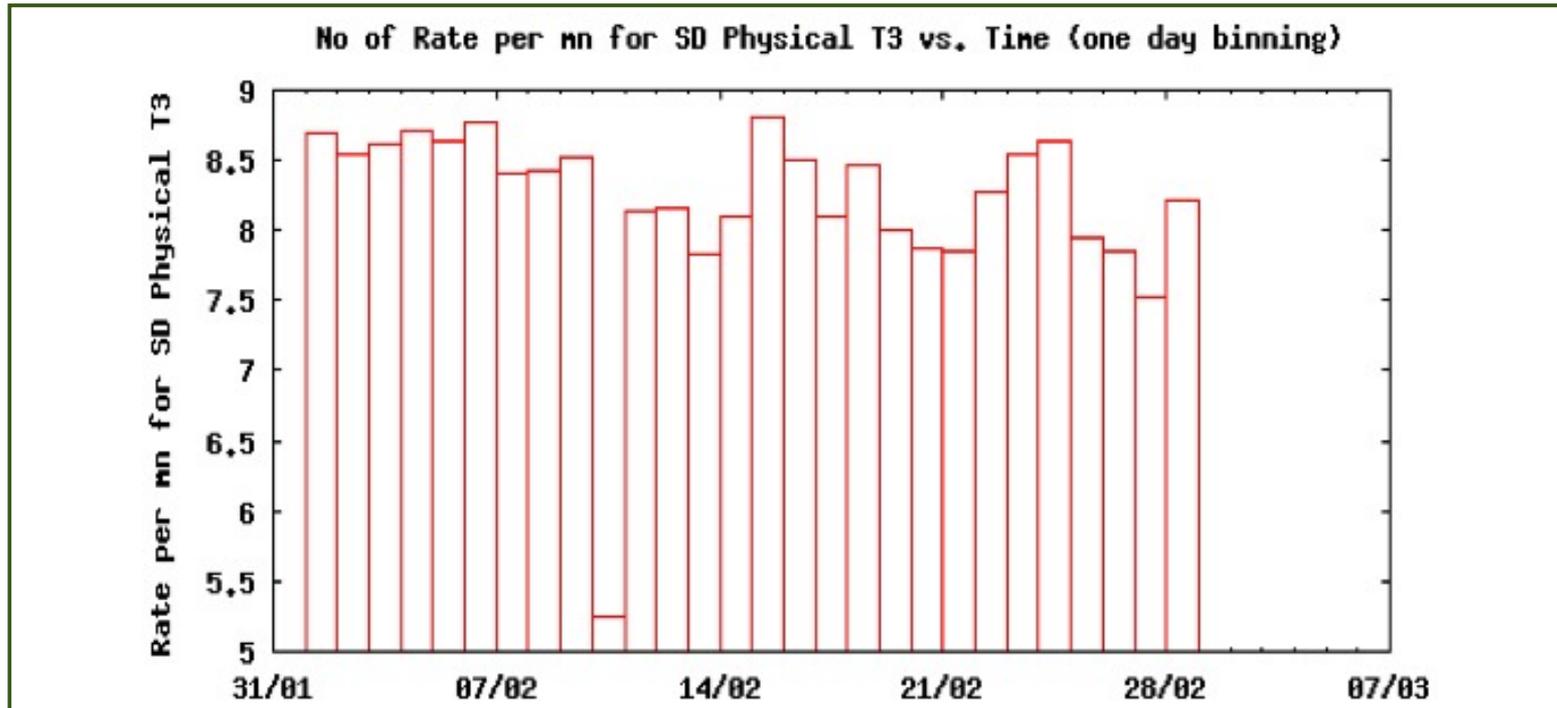
Status: taking data with prototype detectors. Uptime >95%. High quality data.

Pierre Auger Observatory

Activities between Feb 1 - Feb 28

- SD efficiency: 95.66% efficiency in the past two weeks, on-going maintenance, upgrade R&D activity (involves SD) continuing in the field.
- Recent FD observation period: Feb 12 - 27; very smooth, rain on Feb 15, 25
- remote shift operational
- Radio array (AERA) - stable & continuous data taking

❖ Feb 1 - Feb 28: Number of triggers from cosmic rays ($E > 10^{18}$ eV) per minute ~ 12000 / day



- Mode of operation for next few months:
 - Analyze data to discover systematics
 - Modify apparatus to quantify/correct systematics
 - Take more data
- 50 hours of data November-January,
- Another 40 hours of data taken in February, 2015
- Studies underway:
 - Injecting correlated signals into both interferometers;.
 - Data quality assurance based on interferometer monitoring observables
 - Absolute calibration
- 1st graduate student passed PhD defense
- W&C talk being planned with gravitational wave analysis based on early data

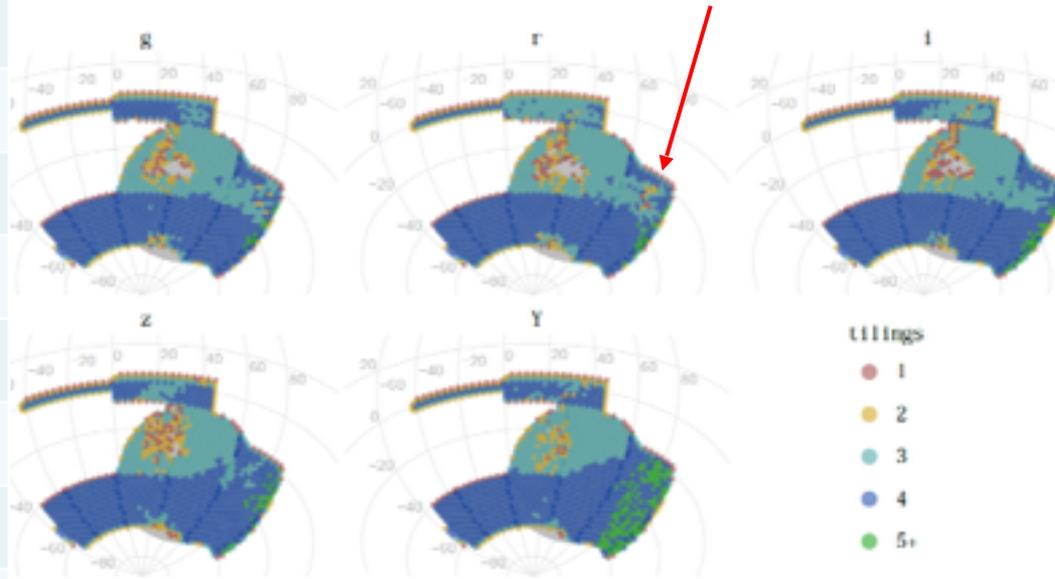


Y2 WF Survey Status (02/15/15)

DARK ENERGY SURVEY

	Nights	# WF Images	# WF Good (%)
Aug.	9	1382	955 (69%)
Sep.	18	3023	2056 (68%)
Oct.	21	3297	2369 (72%)
Nov.	21	3555	2764 (78%)
Dec.	18	3442	3283 (95%)
Jan.	14	2230	2190 (98%)
Feb.	4 ½	859	831 (97%)
Total	105	17788	14447 (81%)

Tendency to be declared bad when actually good.



- Aug. to Nov. Even when we observed, we often had partially cloudy conditions. Not clouded out since.

- Y2 had 11 more (preliminary) good images than Y1, but significantly more riz (more time on sky)
- Preliminary count of good exposures (error bar is +100, -10)
- Fully on-track is 6418 good images per band (32090 total)
- 28883/32090 = 90.0%



LN2 System Improvements for Y3+

DARK ENERGY SURVEY

- Testing new ceramic bearings to increase LN2 pump lifetime.



Zirconia Bearing
PTFE Seal or Metal Retainer



Silicon Nitride Bearing
In Stock for Immediate Delivery

- Examining rotor balance and alignment.



- Replacing 1s/1r LN2 transfer lines to decrease thermal leakage.

