

Cosmic Frontier Experiment Status

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June 2, 2014

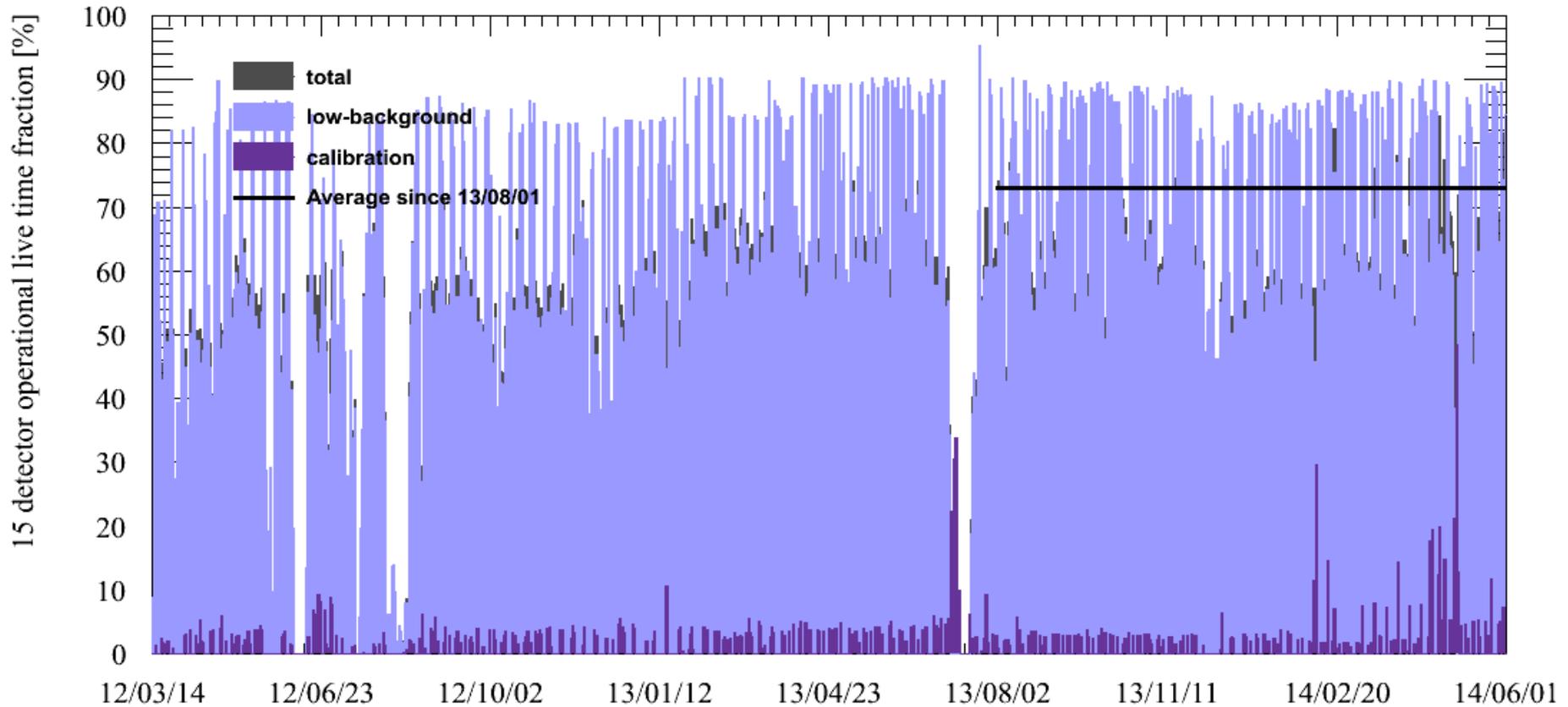
Schramm Experimental Fellow
DES Collaboration

Cosmic Frontier Experiment Status

June 2, 2014

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

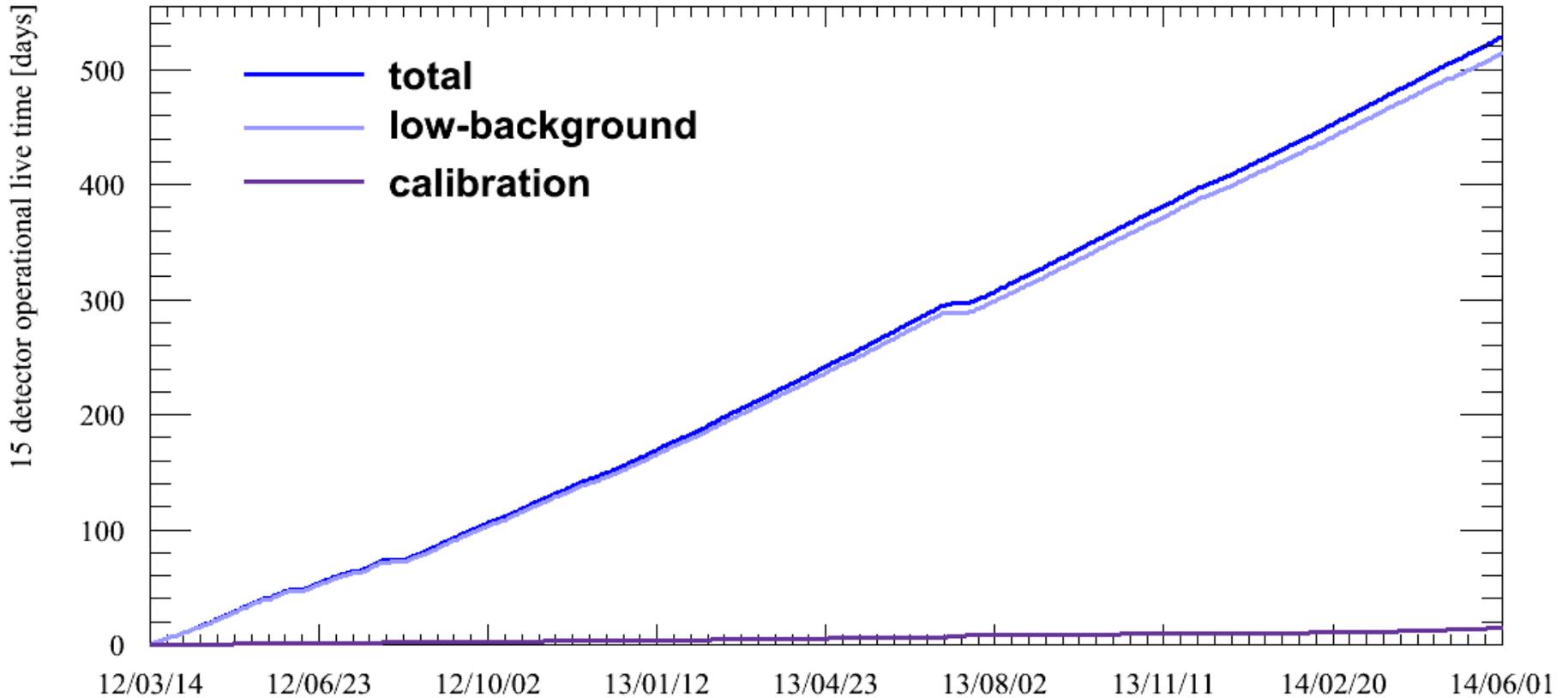
SuperCDMS Soudan



Continuing normal data-taking
Extended neutron calibration taken
at beginning of May

Contributions to the dead-time include:
10% due to calibration with gamma and neutron sources
10% to maintain detector charge collection
5-8% for maintenance and special data sets

SuperCDMS Soudan



Integrated live time (days) since beginning of operations

Detector mass is approximately 9 kg Ge, so WIMP exposure =12.8 kg-years

COUPP/PICO Operations Summary

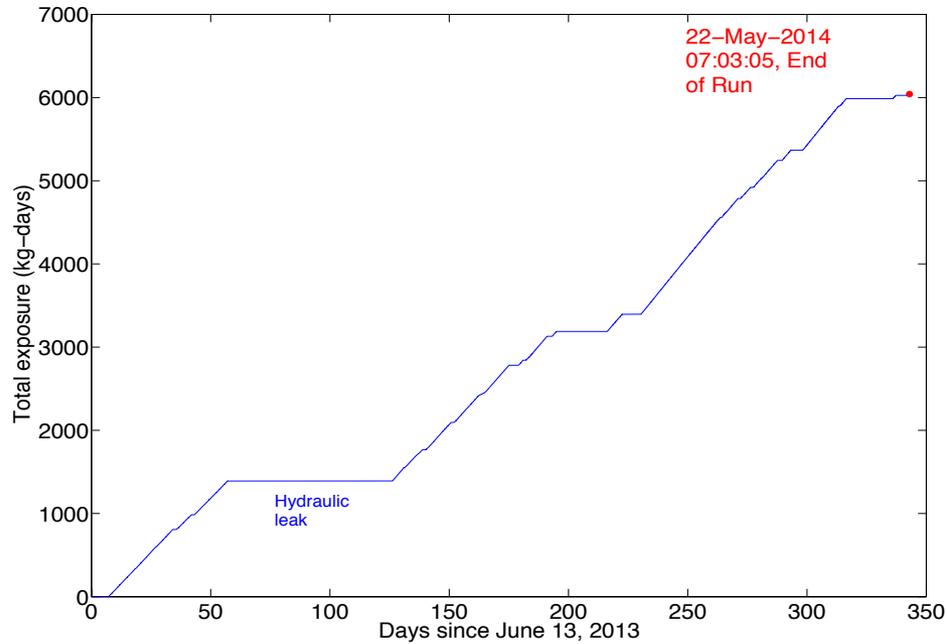
Ended both COUPP-60 and PICO-2L in the last two weeks

- Both runs ended without incident
- Target fluids safely drained and detectors are now idle and un-pressurized
- Collected large calibration data sample in COUPP-60 over last several weeks, PICO-2L ran in dark matter search mode until the end
- Currently making a temperature measurement in PICO-2L to confirm our understanding of the thermodynamic conditions
- Plan for June is to begin a careful sampling of the remaining fluids, looking primarily for particulate contamination
- To be followed by a refill of PICO-2L with a new buffer fluid (LAB liquid scintillator)
- COUPP60 plan will be determined once sampling results are in hand

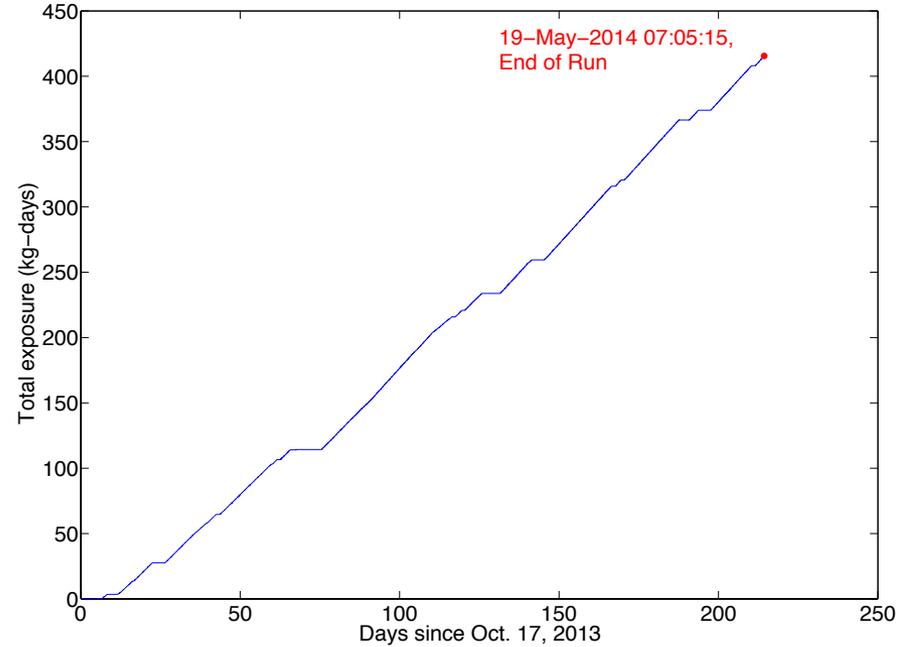
Final Exposure vs Time

2013-2014 Run

COUPP-60



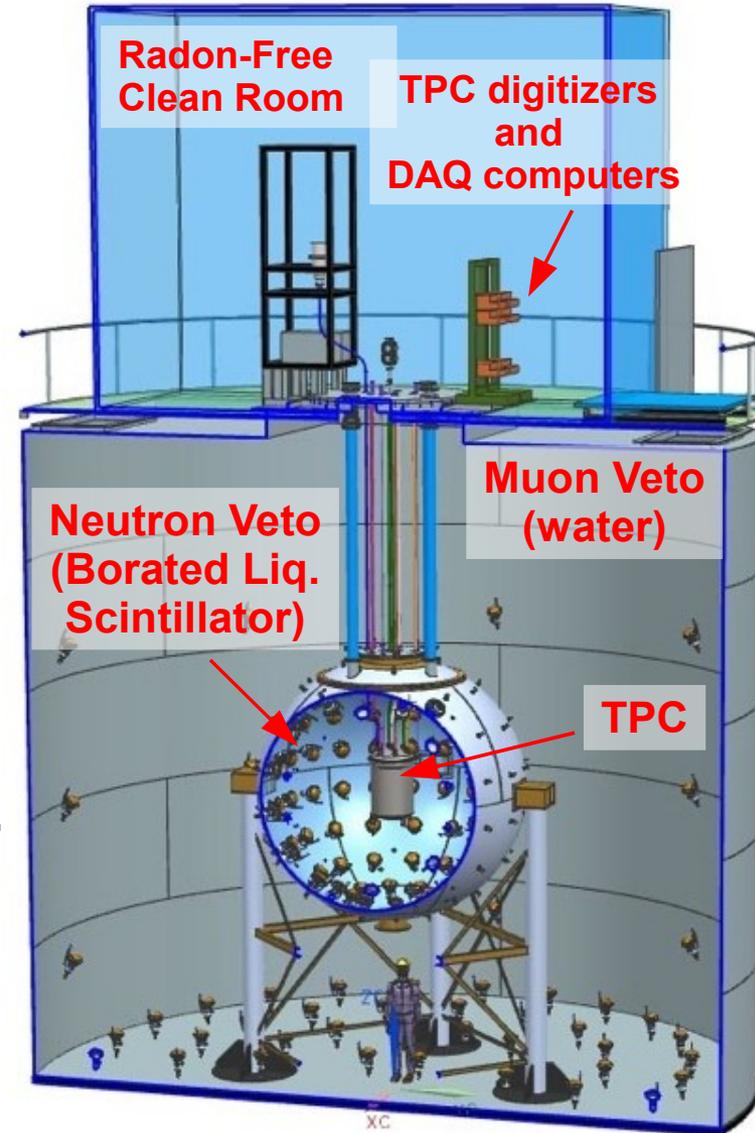
PICO-2L

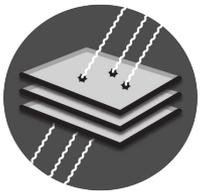


DarkSide-50 Status



- During May all detectors operated
- TPC
 - Running with Atmospheric Ar
 - Collecting high statistics to prove ^{39}Ar rejection for DS-G2.
 - Several fixes to the DAQ are making data acquisition smooth and $>95\%$ live.
 - Acquiring at 40 kg- day/day
- Neutron Veto (TMB and PC mixture)
 - Observed a high ^{14}C rate due to TMB
 - TMB removal and replacement with new PC.
 - Distillation plant:
 - Purification of new PC batch. **DONE**
 - Separation of old PC from the TMB: **ONGOING**
 - Scheduled to be finished by end of July.





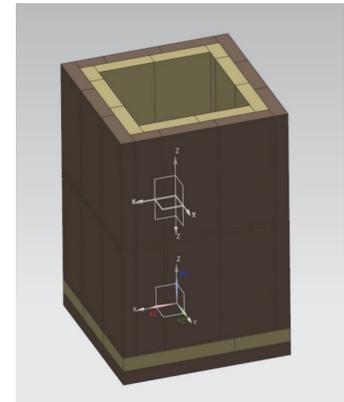
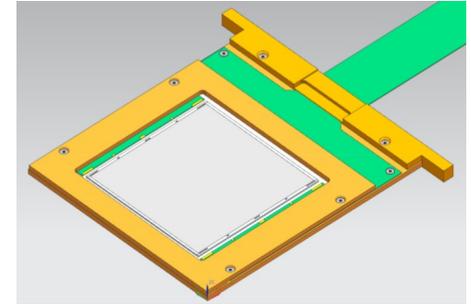
DAMIC - Dark Matter In CCDs

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

April-May 2014

- DAMIC-100 detectors fabrication completed
 - First batch already at Fermilab
 - Flex circuit in production at Cordoba, will be delivered next week.
 - Will start packaging the CCDs in June.

- Current setup dominated by ^{210}Pb background
 - Ancient lead pieces machined at UChicago, shipping to Snolab next week.
 - Low radioactivity lead pieces from Zurich ready, being shipped to Snolab.
 - Installation at Snolab during June.



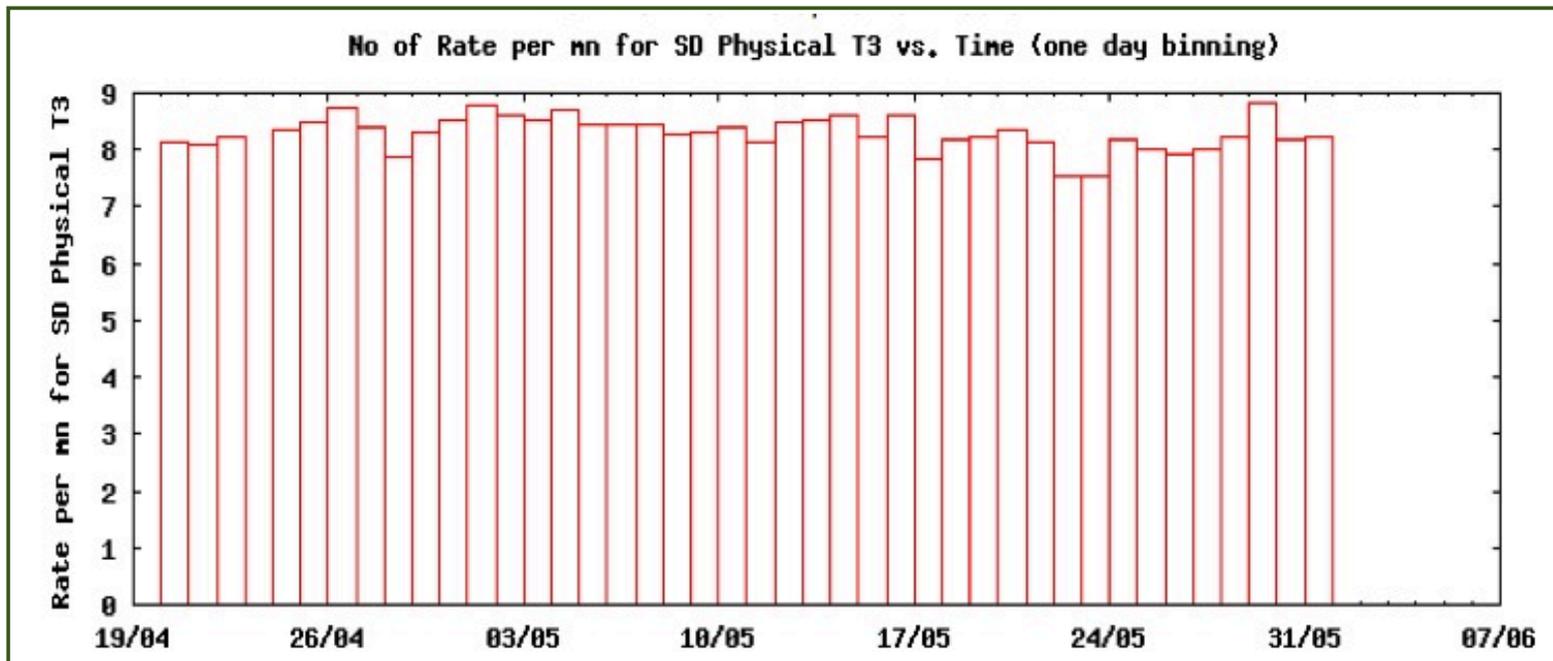
Status: taking data with prototype detectors. Uptime >95%. High quality data.

Pierre Auger Observatory

Activities between April 20 - May 31

- SD efficiency: 98.5% efficiency in the past five weeks, on-going maintenance, upgrade R&D activity (involves SD) continuing in the field.
- Recent FD observation period: - April 20 - May 9; no error, smooth running
 - current shift (May 19 - June 7); high wind warning for May 29, all smooth so far.
 - remote shift now enabled (@ Wuppertal, Germany)
- Radio array (AERA) is running, only few maintenance trips required - getting more stable.

♣ April 20 - May 31: Number of triggers from cosmic rays ($E > 10^{18}$ eV) per minute ~ 12000 / day



Holometer (E-990) Commissioning Status:

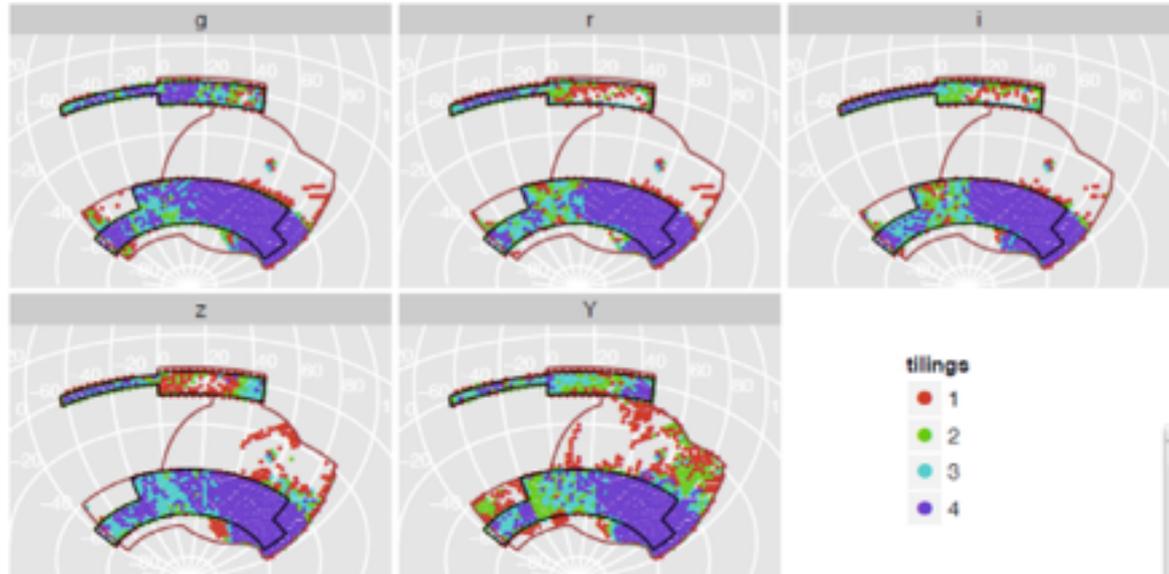
- **Control system now engages a stable 1 kW beam lock with a single mouse-click.**
 - Implements transitions through multiple intermediate cavity power configurations, adjusting gains and signal filtering at each stage
- **Interferometer power pushed to 4 kW for short periods.**
 - Previous best was 2.1 kW
 - Required signal integration time improves as $1/\text{Power}^2$
- **Wind noise is the dominant source of instability in locking the interferometers.**
 - Wind disturbances are somehow coupled into the ground around our external building enclosure. On windy days, interferometer control is erratic.
 - Currently implementing angular alignment control loops with the hypothesis that the wind noise couples mainly to angular misalignments
 - Additional mechanical isolation systems will be fabricated/installed in June.
- **High current photoreceivers are exhibiting RF saturation effects at >100 mA.**
 - Replacing 1mm photodiodes with 2mm photodiodes to reduce space-charge



Dark Energy Survey

DARK ENERGY
SURVEY

- Season 1: August 30, 2013
— February 10, 2014
- DECam currently being used by other experiments/projects.
- Season 2 schedule submitted to CTIO: Mid-August start (more half-nights)
- Early May: DOE/NSF agency review (went well)
- DES Collaboration meeting in May 24-28 @ UIUC hosted by NCSA
- DESDM and collaboration working hard towards Year 1 annual data release
- $\sim 1000 \text{ deg}^2$ scheduled for late August



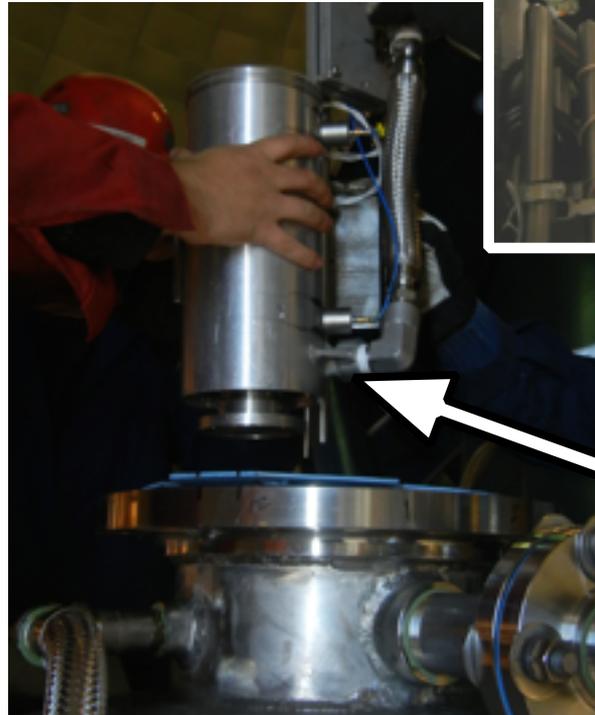


LN2 System Maintenance

DARK ENERGY
SURVEY

- DECam cooled by dual-phase, closed-loop LN2 system
- Vacuum jacket of LN2 transfer lines compromised during Y1
- FNAL team traveled to Chile to purge vacuum lines (train CTIO staff).
- Replace LN2 pump after 7 months of routine operation (install accelerometers to monitor pump performance).
- Vacuum re-established and LN2 pump running nominally

Trip By: T. Diehl, A. Lathrop,
R. Flores, O. Alvarez, and ADW



Bad vacuum
in these lines

Refurbished pump
installed with
accelerometers



First DES Scientific Publication

DARK ENERGY
SURVEY

Mon. Not. R. Astron. Soc. **000**, 1–19 (2014)

Printed 19 May 2014

(MN²LaTeX style file v2.2)

Mass and galaxy distributions of four massive galaxy clusters from Dark Energy Survey Science Verification data

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