# Cosmic Frontier Experiment Status

**April 28, 2014**

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Location</th>
<th>Status</th>
<th>Start of operations</th>
<th>Nominal end of operations</th>
<th>Physics</th>
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<tr>
<td>COUPP/PICO 2L</td>
<td>SNOLAB</td>
<td>Operating</td>
<td>Dec 2013</td>
<td>Dec 2014?</td>
<td>Dark Matter</td>
</tr>
<tr>
<td>COUPP/PICO 60</td>
<td>SNOLAB</td>
<td>Operating</td>
<td>June 2013</td>
<td>Dec 2015?</td>
<td>Dark Matter</td>
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<tr>
<td>Darkside 50</td>
<td>LNGS (Gran Sasso)</td>
<td>Operating/Calibrating</td>
<td>Jan 2014</td>
<td>Dec 2016?</td>
<td>Dark Matter</td>
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<tr>
<td>DAMIC</td>
<td>SNOLAB</td>
<td>Operating</td>
<td>Dec 2012</td>
<td>Dec 2015</td>
<td>Dark Matter</td>
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<td>Dark Energy</td>
<td>CTIO, Chile</td>
<td>Operating/Off-season</td>
<td>Sep 2013</td>
<td>Feb 2018</td>
<td>Dark Energy</td>
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<td>Survey</td>
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<td>Pierre Auger</td>
<td>Argentina</td>
<td>Operating</td>
<td>2008</td>
<td>2015 (for FNAL)?</td>
<td>High Energy</td>
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<td>Holometer</td>
<td>Meson Lab</td>
<td>Commissioning</td>
<td>Spring 2014</td>
<td>2015</td>
<td>Spacetime</td>
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</table>
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
Full recovery of all cryogens with reliquefiers minimizes cryo deadtime
SuperCDMS Soudan

Integrated live time (days) since beginning of operations
Detector mass is approximately 9 kg Ge, so WIMP exposure = 11.6 kg-years
COUPP/PICO Operations Summary

COUPP-60 and PICO-2L runs are both operating well

- End of run for both chambers planned for May 15 to allow for upgrades and sampling of internal fluids
- In the last few weeks, aim is to collect large calibration data set in COUPP60 (neutron source running every few days)
- PICO-2L continuing dark matter search data until end of run
COUPP-60 Exposure Vs. Time

24–Apr–2014
11:40:32

Pressure sensor failure
Camera noise triggers
Hydraulic leak
Holometer (E-990) Commissioning Status:

• **Achieved consistent, stable interferometer operation with 1 kW beams.**
  - Degradation of mechanical damping system for optics was found to be due to stiffening of viton rubber dampers due to cold temperatures
    → Solved by heating the system to 35°C with temperature control loop.
  - Beam instabilities due to angular seismic motions have been discovered and mitigated by removing poorly-mounted ion pumps.
  - Current effort is on further stabilizing the beam to reduce the interference fringe power from 400 mW → 200 mW, the maximum the photodetectors can eat.
    • Excess signal power must unfortunately be thrown away...

• **Two interferometer cross-correlation data taken for ½ hour**
  - Current sensitivity is ~10^{-19} meters/rtHz, a factor of 30 below shot noise
  - Already lots of interesting effects to analyze

• **Interferometer power pushed to 2.1 kW for short periods.**
  - Previous best was 1.6 kW
  - Sensitivity to Planck-suppressed holographic noise improves as 1/Power^{2}
Activities between April 1 - 20

• SD efficiency: 91% efficiency in the past two weeks, on-going maintenance, upgrade R&D activity (involves SD) in the field.

• Recent FD observation period: - March 23 - April 9; no error, smooth running, high wind and rain on some days. - current shift is running; April 20 - May 9.

• Radio array (AERA) is running: able to detect air showers in coincidence with SD/FD.

• April 1 - 20: Number of triggers from cosmic rays ($E > 10^{18}$ eV) per minute ~ 12000 / day
DAMIC – Dark matter with CCDs  
(FNAL, UChicago, UMich, Mexico, Argentina, Paraguay, Zurich)

March – April 2014
• Taking data with prototype detectors. Uptime >95%. High quality data.

• Current setup dominated by 210Pb. Preparing shield upgrade to include 1" of ancient lead and 1" of low radioactivity commercial lead (order placed by Zurich collaborators).

Spring - Summer 2014
• DAMIC-100: detectors fabrication completed by DALSA. Will start packaging them soon (May-June).

• If prototype packages demonstrate success -> 100g detector in operation during 2014 to probe CoGent/CDMS region... and even lower DM masses
DarkSide-50 Status

- Detectors Operating
- TPC
  - Running with Atmospheric Ar
  - Demonstration of 39Ar rejection (278 kg - day, equivalent to 2.6yr UAr DS-50) DONE
  - Collecting high statistics to prove 39Ar rejection for DS-G2.
    - Several fixes to the DAQ are making data taking smooth and >95% live.
    - Acquiring at 40 kg- day/day
- Neutron Veto
  - Observed a high 14C rate due to TMB
  - Separation of PC from TMB and replacement with low 14C TMB started on April 1st. Scheduled to be finished by June 1st.
Dark Energy Survey

- August 30, 2013 < Season 1 < February 10, 2014
- Now DECam is being used by other experiments/projects until DES restarts in mid-August 2014.
- Meanwhile, DES is
  - Working on completion of science publications. Getting close for 1st submission, a tight race between several analyses
  - On April 11th Year 1 preliminary data catalog “Y1P1” released, 240 sq-deg
  - Checking DESDM software for “Y1A1”, to be released after start of Y2 in August ~1000 sq. deg.

- May 12-18, 2014 Engineering Work Trip for FNAL team
  - After 7m operation, replace LN2 pump that cools CCDs to -100C with a refurbished pump
  - Remove frozen H₂O from two LN2 transfer pipe vacuum-jacket segments, train CTIO staff