

# Next Steps

Joint FCPA/KICP/ANL Retreat  
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# Context

- Extraordinary scientific opportunities (Golden Age?)
  - Convergence of Inner Space/Outer Space
  - Decade of the WIMP
  - Dark Energy, the most profound mystery in all of science
  - Testing inflation/current paradigm
- But “interesting” times; NB:
  - Tight budgets
  - New, uncertain future for Fermilab
  - OHEP strategy of steady stream of science results
  - Cosmic Frontier has increasing importance at DOE
  - NSF/DOE Dark Matter G2 down select 2014
  - Future of HEP: 10/12 FNAL Workshop and Snowmass 2013

# Strengths

- FCPA ... since 1983
  - Direct dark matter detection (CDMS, COUPP, DarkSide, novel detectors)
  - Dark energy (DES)
  - Diversity (axions, holometer, ...)
  - Terrific capabilities dedicated to exploring matter, energy, space and time
- KICP ... since 2001
  - PFC, Kavli Institute (people and endowment)
  - Strong cosmology & synergistic activities in A&A, HEP, Physics, ...
  - Students (42) and fellows (34)
  - Thrusts: dark matter, dark energy, inflation, computational cosmology, detectors, multi-messenger
- Astro/Cosmology@ANL ... since 2006(?)
  - Computational cosmology (with leadership class computer)
  - VERITAS/DES/LSST/SPT/CTA?
  - Young program at a multiple-purpose lab with broad capabilities

**Collectively, arguably the strongest and broadest program  
in particle astrophysics and cosmology in the world**

# Strong Connections

- Computational cosmology: ANL, FCPA, KICP
- Dark matter (direct): FCPA, KICP
- Dark energy: FCPA, KICP, ANL
- CMB: KICP, ANL (formerly FCPA)
- High-energy cosmic particles: KICP, ANL, FCPA
- Theory (complementary strengths)
- Joint appointments & “common parent”  
(UChicago)

# Important questions

- High-energy gamma-ray astronomy: CTA? Which institutions participate?
- Ultra-high energy cosmic rays: what next? JEM/EUSO, Next Auger, ...; which institutions participate?
- LSST: Chicagoland involvement/role?
- CMB polarization: what's next? How do we exploit our strength and DOE's new attitude?
- DESpec/BigBOSS: what's next in dark energy?
- What to do/how much to do about low-mass WIMPs
- Post-WIMP detection future: ??
- New hires at Fermilab/ANL/UChicago (beyond Luca Grandi and Bock)

# Next Steps

from the obvious to the difficult

- Deliver science from SPT, DES, COUPP-60, CoGeNT/C4, Auger, VERITAS, CDMS
- Continue ANL/KICP CMB Detector initiative. Role for FCPA?
- Computational Cosmology: strength and complimentary goals at all three sites – keep building
- Dark Energy: explore/plan for DESpec (big PFC investment)
- Dark Matter: COUPP-500, Dark Side (PFC/KICP/FCPA); new technologies/novel detectors
- LSST roles for ANL, FCPA and KICP?
- Theory: strong theory, but fewer connections. Opportunity.
- Be prepared for Snowmass 13 process (both for Cosmic Frontier and for Chicagoland)