

Argonne - Latin America Collaborations

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Collaboration Meeting

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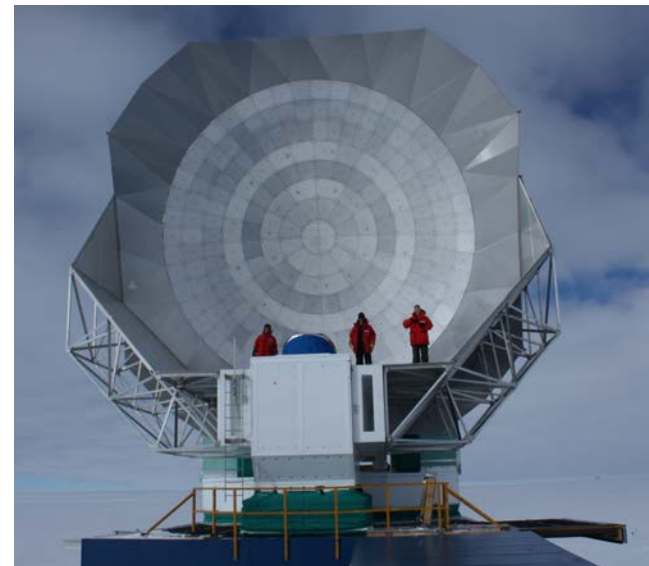
Argonne Interests in Latin & South America

- Many individual collaborations
 - Condensed matter physics, chemistry and chemical dynamics, battery science & technology (Chile is a major source of Li), computational science, nanoscience, nuclear physics, atmospheric science, automotive technologies, tribology, light sources (Laboratorio Nacional de Luz Sincrotron (Brazil)),
- Important part of Argonne's SUF user community: 110 registered users
 - Argentina 8
 - Brazil 33
 - Chile 4
 - Colombia 9
 - Costa Rica 2
 - Mexico 22
 - Panama 1
 - Puerto Rico 27
 - Uruguay 2
 - Venezuela 2



Argonne Interests in Latin & South America

- Nuclear Energy and Nuclear Non-Proliferation
- Energy Sector Analysis
- Cosmology
 - Dark Energy Survey (Cerro Tololo Inter-American Observatory)
 - Large Synoptic Survey Telescope (Cerro Pachon)
 - South Pole Telescope



South Pole Telescope



Energy Sector Analysis

- **Mexico:** Evaluation of long-term benefits of wind generation in the power system. Training of local utility (CFE) experts in power sector investment analysis.
- **Mexico:** Power sector analysis and energy policy study with IAEA and Ministry of Energy, power company, oil company, and others
- **Guyana:** Power sector analysis
- **Jamaica:** Several rounds of assistance and training provided to the Ministry of Energy and Natural Resources, local electric utility and other organizations in Jamaica in demand forecasting, energy planning, and power sector investment analysis.
- **Peru:** Power sector analysis with IAEA and local nuclear energy center
- **Colombia:** Power sector study and energy systems analysis with IAEA, Ministry of Energy, and Nuclear Energy Institute
- **Brazil:** Power sector study and energy systems analysis for State of Minas Gerais with IAEA and local utility
- **Uruguay:** 3 rounds of studies: evaluation of natural gas pipeline feasibility, power sector analysis, energy policy study, and climate change study for Ministry of Industry and UNDP
- **Uruguay:** Currently training Uruguayan expert in power sector investment analysis



Nuclear Energy, Radionuclides, and Non-Proliferation

- Organization and execution of training courses on behalf of the IAEA in the areas of safety, security, and regulation of nuclear power, as well as non-power applications of nuclear S&T (e.g., radioisotopes for research and medical uses).



18 February – 1 March 2013



IAEA-Argonne
Group Fellowship Training on
Quality Assurance in the Physical and Technical Aspects of Radiotherapy

- Technical leadership of U.S. engagement with Latin American countries in the areas of nuclear safeguards and export control, as part of the global effort to prevent proliferation of nuclear weapons capabilities.
 - Carried out through the International Nuclear Export Control Program (INECP) managed by the NNSA Office of Nonproliferation and International Security (NA-24).
 - Includes consultations and training on export control and enforcement of controls on transfer of sensitive (dual-use) materials, equipment, technologies, etc.



IAEA-ANL Training Courses for 2012 and 2013 (as of 9 May 2013)
Latin American Participants

Course Title	Dates	Country	No. Participants
Regional Practical Training Course in Nuclear Facility Decommissioning and Environmental Remediation Skills	4/16/2012 - 4/27/2012	Brazil	2
International Seminar on the Essential Elements of Nuclear Security	4/30/2012 - 5/11/2012	Brazil	3
Group Fellowship Training for Developing National Long-Range Nuclear Energy Strategies (INPRO)	8/20/2012 - 8/31/2012	Argentina	3
		Brazil	1
		Chile	1
		Mexico	1
Regional Training Course on Leadership and Management for Introducing and Expanding Nuclear Power Programmes	8/6/2012 - 8/17/2012	Argentina	1
		Peru	1
Workshop on Training and Qualification of Personnel for the Operating Organization and Regulatory Body for Research Reactors	10/8/2012 - 10/12/2012	Brazil	1
Interregional Training Course on Integrated Management Systems and Development of Safety Culture	11/5/2012 - 11/16/2012	Argentina	1
Training Course on Preparation, Review and Assessments of Safety Documents for Research Reactors	12/3/2012 - 12/7/2012	Brazil	1
Group Fellowship Training for Quality Assurance and Quality Control in Radiotherapy	2/18/2013 - 3/1/2013	Argentina	5
		Brazil	4
		Chile	3
		El Salvador	1
		Mexico	4
		Nicaragua	1
		Peru	2
		Venezuela	1
Interregional Training Course in Nuclear Facility Decommissioning and Environmental Remediation Skills	4/8/2013 - 4/19/2013	Brazil	1
		Peru	1
Workshop on Development of Operating Programs for Research Reactors	4/29/2013 - 5/3/2013	Brazil	1
		Jamaica	1
Sustainable Energy Development	5/6/2013 - 5/10/2013	Uruguay	1
International Seminar on the Essential Elements of Nuclear Security	5/13/2013 - 5/24/2013	Colombia	2



Argonne HEP Cosmology

Astro
physics

CTA

Ground based gamma rays with international Cherenkov Telescope Array (CTA).
US involvement unclear: try to coordinate with SLAC

VERITAS
DES
SPTpol

DES →
LSST

Dark Energy Survey (DES) started taking data.
Possible intermediate program
LSST with emphasis on dark energy; theory & data handling

Future:
CTA-US
LSST
SPT-3G

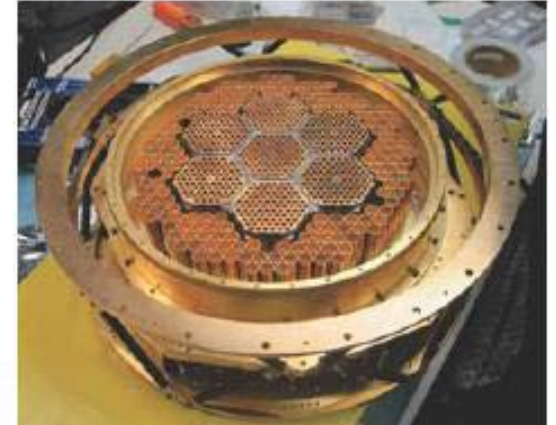
SPTpol →
SPT- 3G

SPTpol is running now
SPT-3G proposal to NSF & DOE - upgrade of SPTpol
Planning ultimate ground based CMB experiment (joined with SLAC/Stanford, Berkeley but lead is ANL/Chicago). Laying groundwork in "Snowmass" process

Cosmic
Frontier

→
ultimate
CMB

Aug 30th 2011 DECAM installation in Chile. SPTpol; 90 (ANL) & 150Ghz sensors






Connection between Argonne and Chile: Dark Energy Survey

- Argonne is a member of The Dark Energy Survey (DES), a joint DOE/NSF/Chilean project that upgraded an existing telescope on the Chilean mountain of Cerro Tololo with a new 570-megapixel CCD camera.
- DES achieved first light September 12th 2012. The camera is working extremely well.
- Argonne contributed significantly to the calibration and mechanical construction of the camera, as well as testing of the CCD chips.
- Argonne scientists led the preparation of the supernova science component of the survey. They are now working with the new data and new supernova discoveries.

 [Fermilab](#) — The Fermi National Accelerator Laboratory

 [Chicago](#) — The University of Chicago


 [NOAO](#) — The National Optical Astronomy Observatory


 United Kingdom DES Collaboration

- [UCL](#) - University College London
- [Cambridge](#) - University of Cambridge
- [Edinburgh](#) - University of Edinburgh
- [Portsmouth](#) - University of Portsmouth
- [Sussex](#) - University of Sussex
- [Nottingham](#) - University of Nottingham



 DES-Brazil Consortium

- [ON](#) - Observatorio Nacional
- [CBPF](#) - Centro Brasileiro de Pesquisas Fisicas
- [UFRGS](#) - Universidade Federal do Rio Grande do Sul

 [OSU](#) — The Ohio State University

 TAMU — Texas A&M University

[Munich—Universitäts-Sternwarte München](#)


-  [Ludwig-Maximilians Universität](#)
-  [Excellence Cluster Universe](#)

 [UIUC/NCSA](#) — The University of Illinois at Urbana-Champaign


 [LBLN](#) — The Lawrence Berkeley National Laboratory

 Spain DES Collaboration

- [IEEC/CSIC](#) - Instituto de Ciencias del Espacio,
- [IFAE](#) - Institut de Fisica d'Altes Energies
- [CIEMAT](#) - Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas

 [Michigan](#) — The University of Michigan

 [Pennsylvania](#) — The University of Pennsylvania

 [ANL](#) — Argonne National Laboratory

 Santa Cruz-SLAC-Stanford DES Consortium

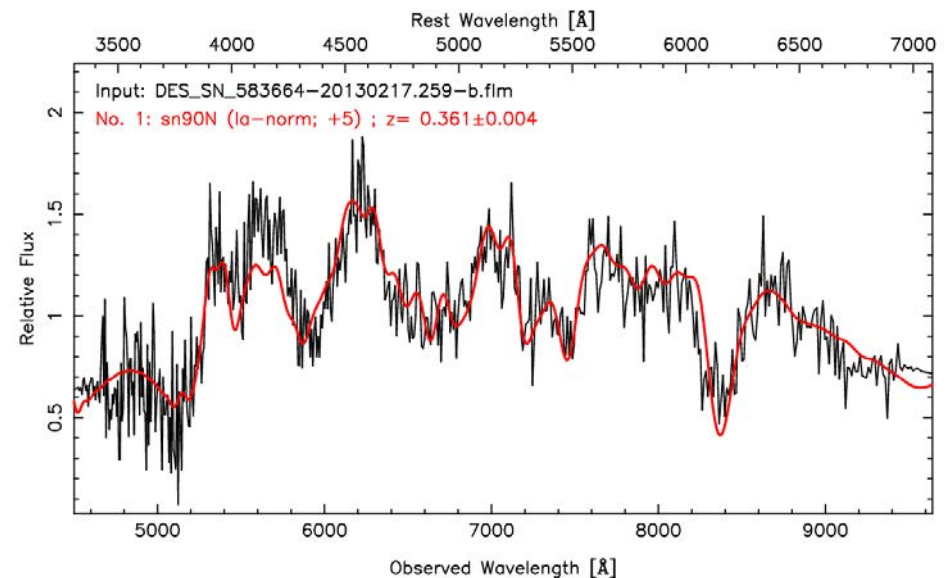
- [Santa Cruz](#) - University of California Santa Cruz
- [SLAC](#) - SLAC National Accelerator Laboratory
- [Stanford](#) - Stanford University

 [ETH-Zuerich](#) — Eidgenössische Technische Hochschule Zuerich

Dark Energy Survey "First Light" and First Supernova Discovery



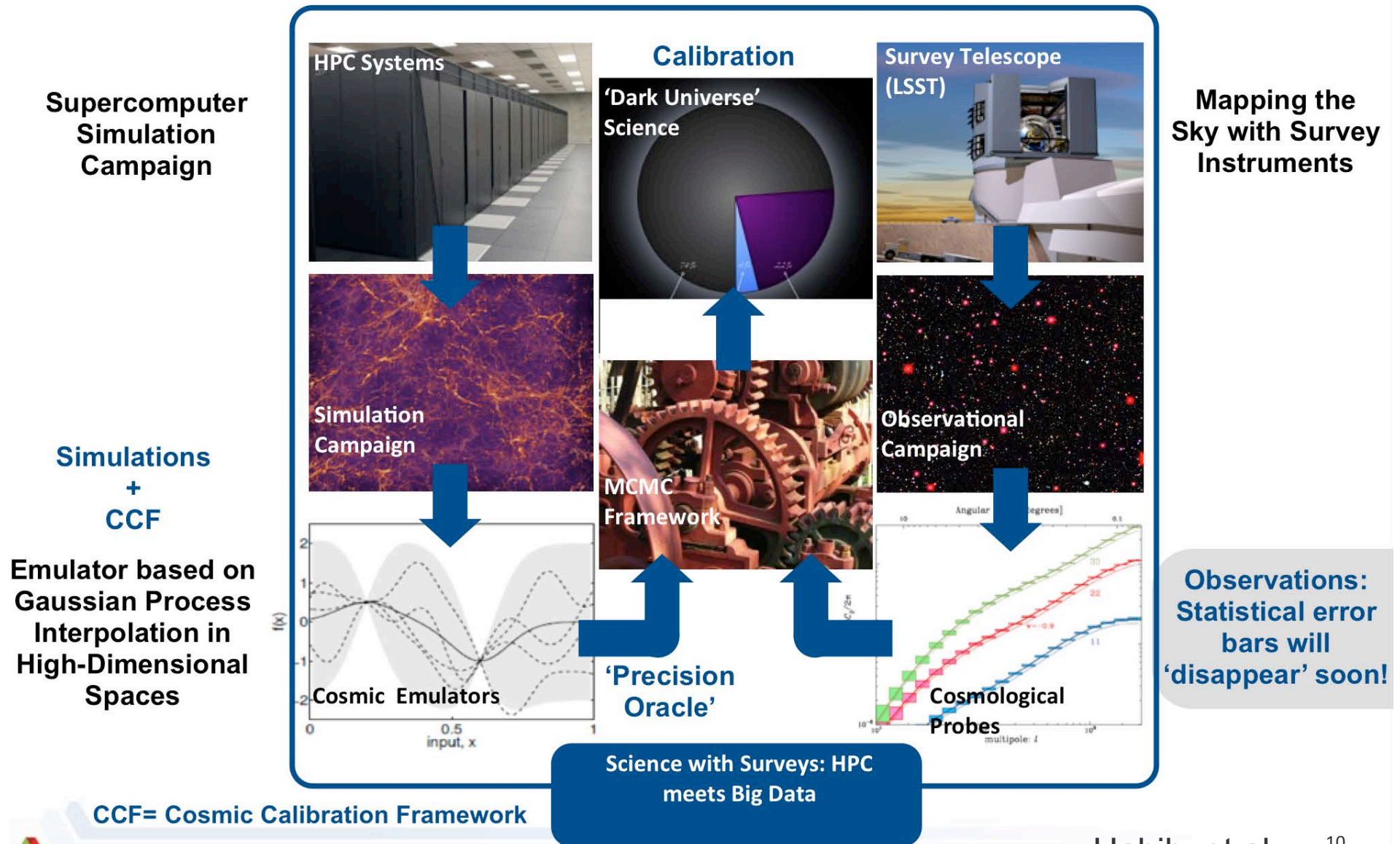
Galaxy NGC1365
observed on first
night of observations



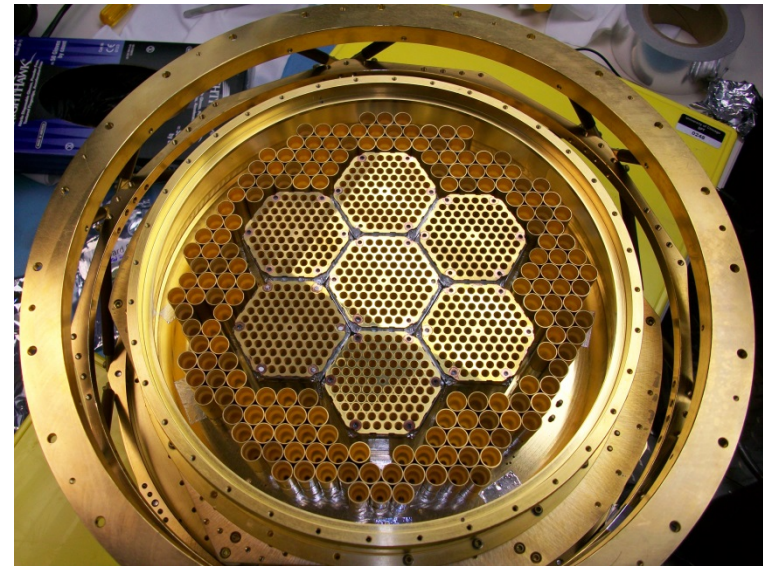
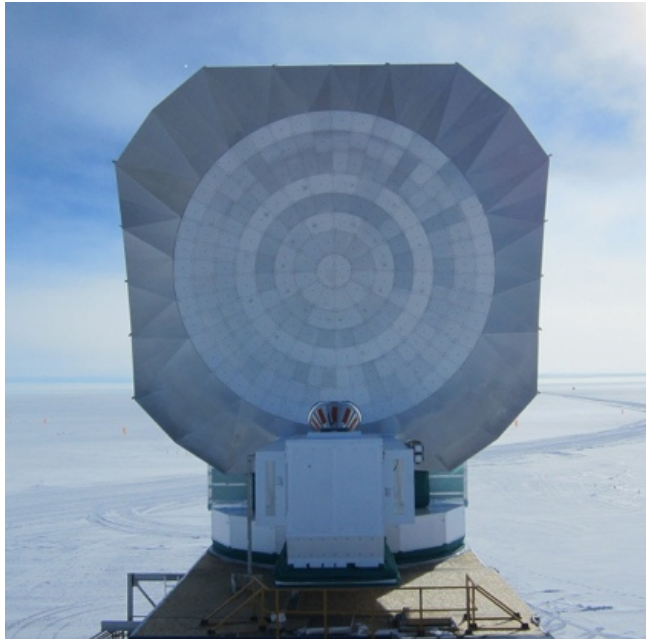
Spectrum of DES
Supernova Discovered
in 2nd Month



Precision Cosmology: 'Big Data' Meets Supercomputing



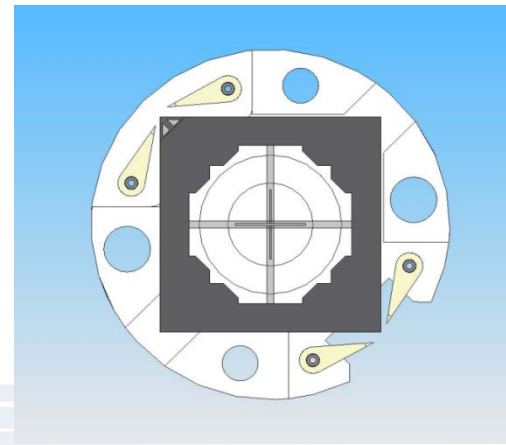
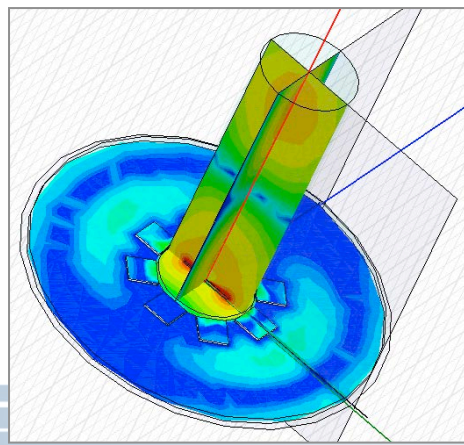
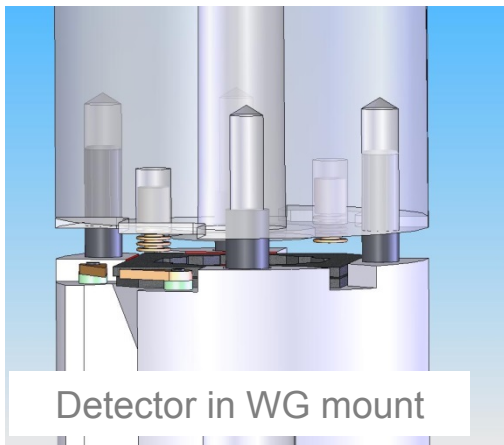
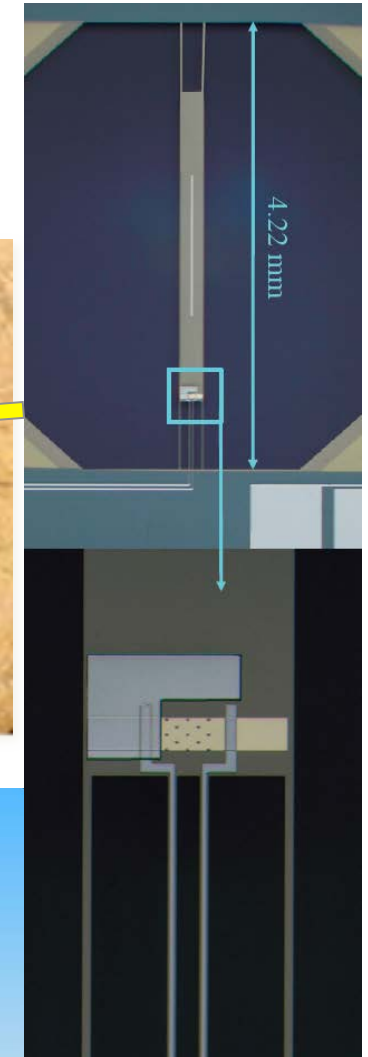
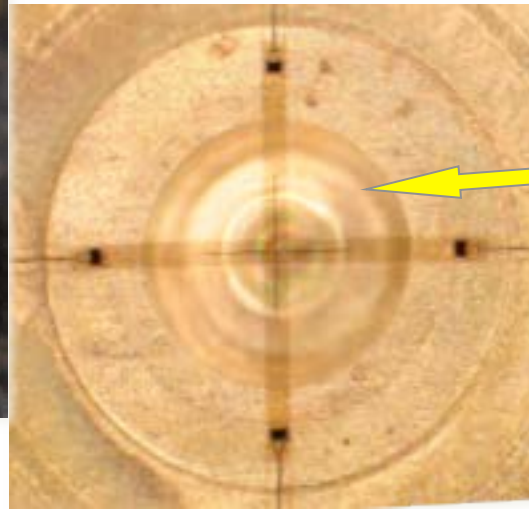
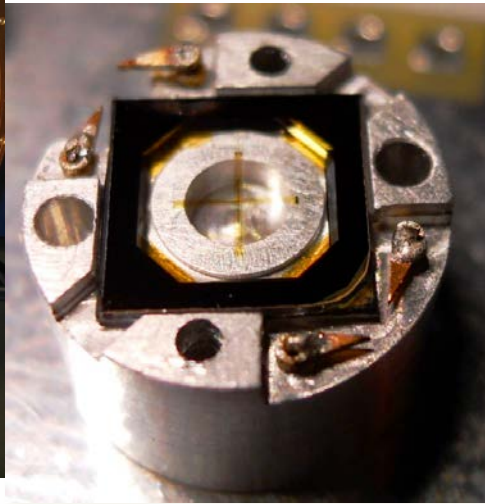
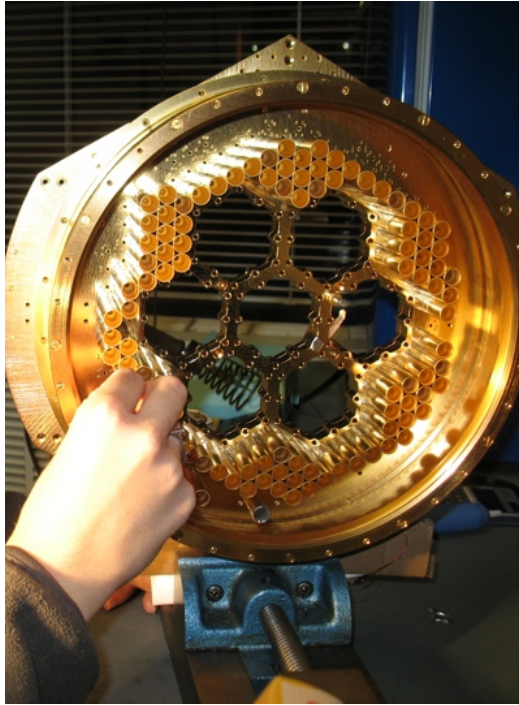
STP-Pol: a polarimeter for the South Pole Telescope



300 mK SPTpol focal plane
(deployed in January 2012)



Dual-Polarization TES Detectors for SPT

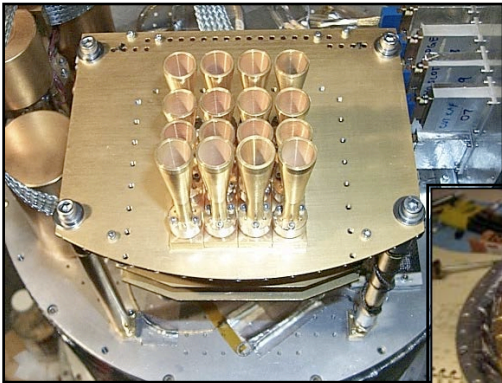


Novosad, et al.

How does this research fit into the field?

2001: ACBAR

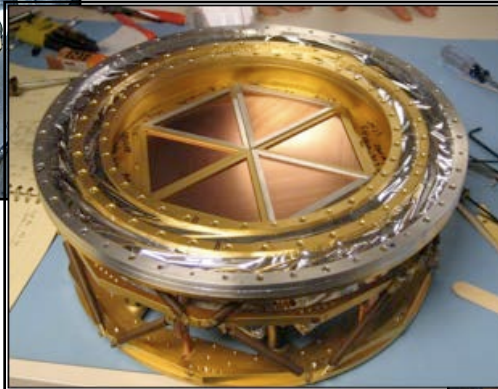
16 detectors



50x improvement

2007: SPT

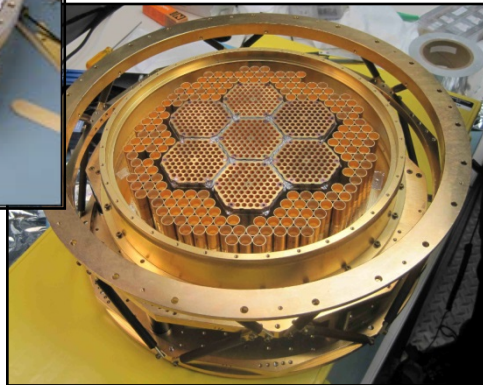
960 detectors



Add polarization

2012: SPT_{pol}

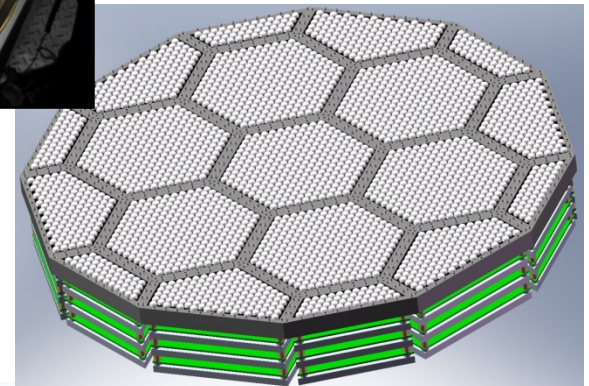
~1600 detectors



10x improvement

2016: SPT-3G

~15,200 detectors



Requires new approach for higher focal plane density. →



Novosad, et al.

Opportunities

- Environmental Science

- We recently completed a risk analysis with field work supported by the USEPA to determine mercury contamination from gold mining, especially related to very small scale refining of ore. The analysis also looked at inexpensive technologies to reduce mercury release into the environment.

- Automotive Technology and Alternative Fuels

- We work with the International Energy Agency on the Implementing Agreement for Hybrid Electric Vehicles (covers electric drive trains including Fuel Cells). Several South / Central America countries are Executive members (ex. Columbia, Brazil, and Ecuador). Tasks include communication between the 24 countries involved on electric vehicle and infrastructure status, fuel and energy consumption forecasting with modeling tools to 2025-2045, and vehicle integration of components for synergistic energy efficiency improvement and well-to-wheels analysis for fuel and technology pathways.
- We have been meeting with SAE Brazil this year about better cooperation.
- We have several users of Autonomie in South America (I.e., GM in Columbia)



Discussion

