Summary of Mission Concept
Study Reports

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1 July, 2009
2003 Beyond Einstein

2005 Weiss Report

2007 PPPDT

2008 CMBpol AMCS

2010 Decadal Survey

Three CMB space mission proposals

A program of research and technology development leading to a space mission

Generate a research plan for the decade 2010 including a space mission concept

Oversee development of program to measure inflationary signal in CMB polarization
Study Goals

1. Enhance priority of inflation science. Put a plan and motivation endorsed by the CMB community on the table.

2. Bring together the CMB researchers. Collectively answer key questions:
   b. Foregrounds and systematics: How well have we done, what do we expect? Review techniques and estimates. Can we reach interesting limits?
c. Review current and upcoming suborbital experiments: what have we/will we learn from them?

d. Review current technology status: What do we need for next generation suborbital experiments and space missions?

e. Generate a plan for the decade: What is the most efficient path to extracting the information in the CMB?
3. Update the Weiss report science foreground and technology discussion. Update the costing for the suborbital program.

4. Update/enhance designs of a CMBpol space mission.

5. Deliver a Mission Concept Study for NASA for an Inflation Probe.

6. Begin a repository for information on the current state of the field: theory, experiments, technology, mission design.
Theory Workshop
FNAL, Chicago, IL  June 2008

- Inflation
- Reionization
- Lensing
- Foreground Removal
- Foreground Science

- AIP Conference Series Number 1141, (2009)
- http://cmbpol.uchicago.edu/workshops.html#theory
Systematics Workshop
GSFC, Annapolis, MD   July 2008

- Experiments with data
- Experiments in development
- Experiment Concepts
- Simulation and analysis

- http://cmbpol.uchicago.edu/workshops/systematic2008/presentations.html
Technology Workshop
NIST, Boulder, CO    August 2008

• Telescope Optics
• Coolers
• Detector Systems
  - TES
  - MKIDS
  - Amplifier/Coherent Detection
• Readout Systems
• Other Technology

• Journal of Physics: Conference Series Volume 155
• http://www.iop.org/EJ/toc/1742-6596/155/1
• http://cmbpol.uchicago.edu/workshops/technology2008/
Workshop output

- 94 Presentations online
- 37 White Papers online
  - 5 Theory
  - 10 Systematics
  - 22 Technology
- http://cmbpol.uchicago.edu/workshops.html
Input for the Astro2010 Survey

• Science Papers
  - The Origin of the Universe as Revealed Through the Polarization of the Cosmic Microwave Background (Dodelson et al.)
  - Observing the Evolution of the Universe (Page et al.)

• Project Papers
  - A Program of Technology Development and of Sub-Orbital Observations of the Cosmic Microwave Background Polarization Leading to and Including a Satellite Mission (Meyer et al.)
  - Experimental Probe of Inflationary Cosmology (EPIC) - Intermediate Mission for NASA's Einstein Inflation Probe (Bock et al.)

• Technology Papers
  - Superconducting Detector Arrays for Far-Infrared to mm-Wave Astrophysics (Bock et al.)
  - Cooling Systems for Far-Infrared Telescopes and Instruments (Holmes et al.)
Plan for the Decade

- Continue the vigorous program of suborbital research.
- Support research in theory and data analysis techniques.
- Enable continued technology development.
- Establish a CMBPol mission project office in preparation of a mid-decade start to a space mission. Asked for a mid-decade review of space mission.
- Budget of ~$25M/yr research program
- Increase for ($2M) for technology development support and project office for planning for mid-decade review.
Current Workshop

- Where do we go from here?