

TO: CMB Research Community
FROM: Task Force on CMB Research
CONCERNING: Request for information

August 4, 2004

A group has been drawn together by DOE, NASA and NSF, the three federal agencies that support research on the cosmic background radiation, to recommend a program of research dedicated to understanding the properties of the inflationary epoch of cosmology using CMB observations. The agencies are following a recommendation of the Turner Panel which generated a set of fundamental questions at the intersection of particle physics and cosmology "From Quarks to the Cosmos" NRC Press 2003. The Task Force was adopted in the OSTP strategic plan that responded to the Turner Panel report in the document "Physics of the Universe" (<http://www.ostp.gov/html/physicsoftheuniverse2.pdf>)

The charter of the Task Force is to outline an observational program using earth and space based instruments to elucidate the inflationary epoch. The components of such a program will include measurements of the small scale CMB anisotropy and the polarization of the cosmic background in a search for primeval gravitational waves thought to have been generated by the inflation of primeval quantum fluctuations. The Task Force has been asked to provide an ordered program of preliminary observations and technology development ultimately leading to a possible space mission post WMAP and PLANCK.

We have been asked to provide a final report by spring 2005 to the DOE High Energy Physics Advisory Panel (HEPAP) and the combined NASA/NSF Astronomy and Astrophysics Advisory Committee (AAAC). We have also been asked to prepare a set of preliminary recommendations by January 2005.

We have had two meetings. The first was in June where we reviewed the current program of CMB research and heard presentations from the proposers of a satellite mission to measure the polarization of the CMB. We just completed our second meeting which concentrated on detector development for the field. Subsequent meetings will be held in October and November with several telephone conference calls in between. We intend to have a first draft of our report ready to send to reviewers for comment late in the fall.

In broad outline the report will include a pedagogic overview of inflationary cosmology and the special role of CMB measurements in providing observational constraints. We will review the current effort in measuring the small scale anisotropy and the polarization of the CMB as well as the Sunyaev-Zel'dovich effect and tie them to the cosmological model parameters. We will discuss the perturbations from foreground sources and the techniques required to control systematic errors. A significant part of the report will be the evolution of a time line of the research anticipating the sensitivity and angular scales of the various measurements and the associated technical advances that are needed to make the observations. We expect to make a set of recommendations to the funding agencies for support of critical areas to advance this science.

We are writing to make you aware of the group and would value your input to our deliberations. Please send your comments and suggestions to me. Also, we would appreciate your sending this note to others in the field we might have inadvertently omitted.

Rainer Weiss
NW17-161, MIT
175 Albany St
Cambridge Mass, 02139
weiss@ligo.mit.edu

Members of the CMB Task Force

Berger, Beverly
bberger@nsf.gov

Partridge, Bruce
bpartrid@haverford.edu

Bock, James
jjb@astro.caltech.edu

Ruhl, John
ruhl@cwru.edu

Church, Sarah
schurch@leland.stanford.edu

Salamon, Michael
michael.h.salamon@nasa.gov

Devlin, Mark
devlin@physics.upenn.edu

Sharp, Nigel
nsharp@nsf.gov

Hertz, Paul
Paul.hertz@hq.nasa.gov

Staffin, Robin
robin.staffin@science.doe.gov

Hinshaw, Gary
gary.hinshaw@gsfc.nasa.gov

Tegmark, Max
max@physics.upenn.edu

Lange, Andrew
ael@astro.caltech.edu

Timbie, Peter
timbie@wisp.physics.wisc.edu

Lee, Adrian
atl@physics.berkeley.edu

Turner, Kathy
kathy.turner@science.doe.gov

Page, Lyman
page@princeton.edu

Winstein, Bruce
bruce@cfcf.uchicago.edu

Papitashvili, Vladimir
vpapita@nsf.gov

Zaldarriaga, Matias
mzaldarriaga@cfa.harvard.edu

angelaq@princeton.edu,
hanany@physics.umn.edu,
doriese@boulder.nist.gov,
bkeating@ucsd.edu,
Charles.L.Bennett@nasa.gov,
Edward.J.Wollack@nasa.gov,
kogut@stars.gsfc.nasa.gov,
jcherven@pop500.gsfc.nasa.gov,
carl.m.stahle@nasa.gov,
Dominic.J.Benford@nasa.gov,
dale.j.fixsen.1@gsfc.nasa.gov,
limon@pupgg.Princeton.EDU,
acr@phobos.caltech.edu,
charles.lawrence@jpl.nasa.gov,
swlh@socrates.berkeley.edu,
jc@oddjjob.uchicago.edu,
pryke@aupc1.uchicago.edu,
amber@calvin.phys.columbia.edu,
staggs@princeton.edu,
fowler@wiess.Princeton.EDU,
jarosik@pupgg.Princeton.EDU,
peterm@cfi.deepspace.ucsb.edu,
lubin@cfi.deepspace.ucsb.edu,
gunder@physics.miami.edu,
tucker@holley.physics.brown.edu,
jklein@hep.upenn.edu,
eml@polestar.uchicago.edu,
halpern@physics.ubc.ca
richards@physics.berkeley.edu
Robert.F.Silverberg@nasa.gov
Cottingham@gst.com
ec@conceptual-analytics.com
wilson@fcraol.astro.umass.edu
albrecht@physics.ucdavis.edu
edbert@mit.edu
bond@cita.utoronto.ca
rhb@het.brown.edu
ebunn@richmond.edu
dodelson@fnal.gov
guth@ctp.mit.edu
whu@background.uchicago.edu
kamion@tapir.caltech.edu
lknox@ucdavis.edu
whkinney@buffalo.edu
kofman@cita.utoronto.ca
rocky@fnal.gov
alinde@stanford.edu
dscott@astro.ubc.ca
useljak@princeton.edu
dns@astro.princeton.edu
steinh@princeton.edu

mturner@oddjob.uchicago.edu
vilenkin@cosmos2.phy.tufts.edu
mwhite@berkeley.edu
HGSpier@lbl.gov
irwin@boulder.nist.gov,
jonas@socrates.caltech.edu,
meyer@oddjob.uchicago.edu,
moseley@stars.gsfc.nasa.gov,
Todd.C.Gaier@jpl.nasa.gov