## An Experimentalist's

L. Page, Fermilab June 23, 2008

## **The Receiver/Radiometer**

- Detector sensitivity is not the main issue. The requisite sensitivity has been (or very nearly so) demonstrated with bolometers.
- One expects that a sufficient receiver design will be demonstrated well before we have the opportunity to propose a space mission.
- Though challenging, no "show stoppers" have been identified.

## Limitations

# The limitation at large angular scales will be foreground emission. The estimate in the Weiss report of r<0.01 is based on foregrounds.





## Expectations at l=100



From Jo Dunkley

Foreground "free" window !

Dust at 150 GHz from FDS

1000 close packed dets for 1 year at 350 uK-sec<sup>1/2</sup> raw or 700 uK-sec<sup>1/2</sup> on sky.

Boxes inst sensitivity not sky rms sens.

## Why Space?

For a definitive measurement, space is the place.

#### Stability.



Physical temperature of Bside primary over three years. This is the largest change on the instrument.

Three parameter fit to gain over three years leads to a clean separation of gain and offset drifts.

## Why Space?

#### Gain.

WMAP gain known 20X better than any prior CMB measurement.

Full sky coverage with unique scan strategies.No other platform can tie together large and small angular scales with as much precision.Knowledge of the instrument and of noise.

I believe a space mission is *required* to make maps that will withstand close scrutiny for decades hence, but the case is more subtle than for other fields.



## **Rough Timeline**



**Balloon** 

## Positioning for CMBPOL:

- The CMB is the best handle on physics above the LHC energy scale.
- CMB measurements have broad appeal and touch on everything from galactic astronomy to string theory.

To get it we need to generate enthusiasm for the mission. This will in turn free up funds for technology studies and measurements.

