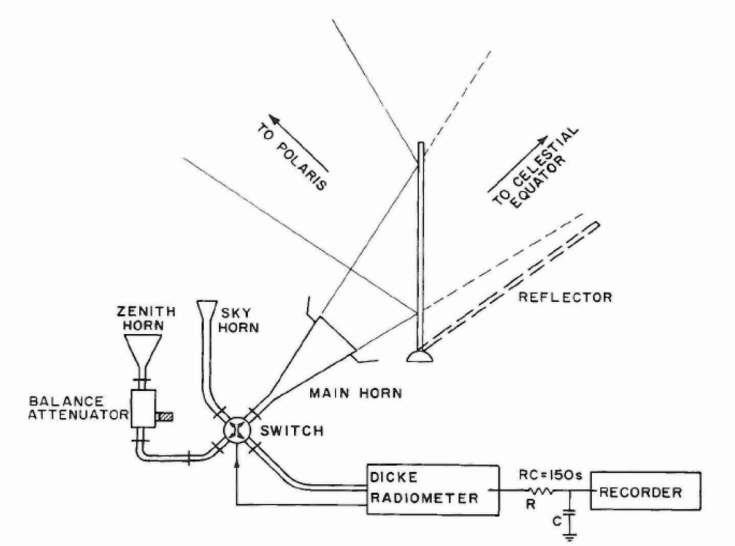
Nulls –
Out of the Box….

Nulls –
Out of the Box or Out of my Mind

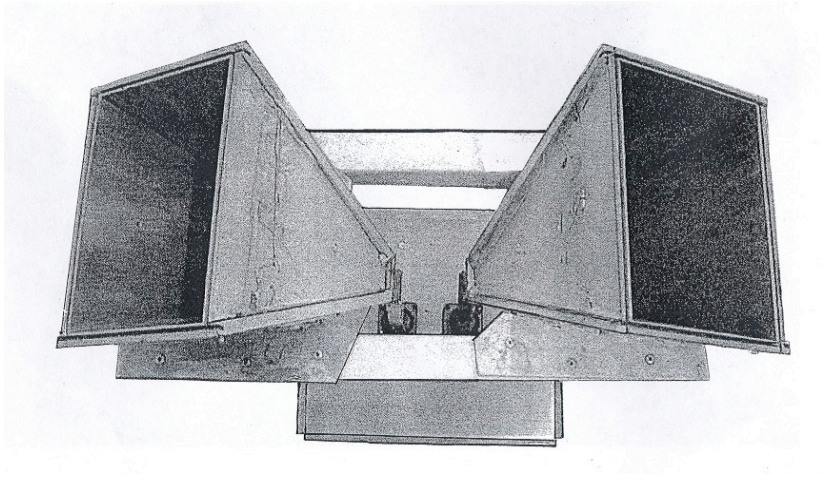
Lessons from First 2 Isotropy Experiments (1960s)

Wilkinson & Partridge 1967
Fixed apparatus*
~1.5 Kogut levels
Price – ½ of observing time



New Jersey

Conklin and Bracewell 1969
Fixed apparatus*
1 Kogut level (but differential “scan strategy”)
Price – ½ of observing time & complicated data



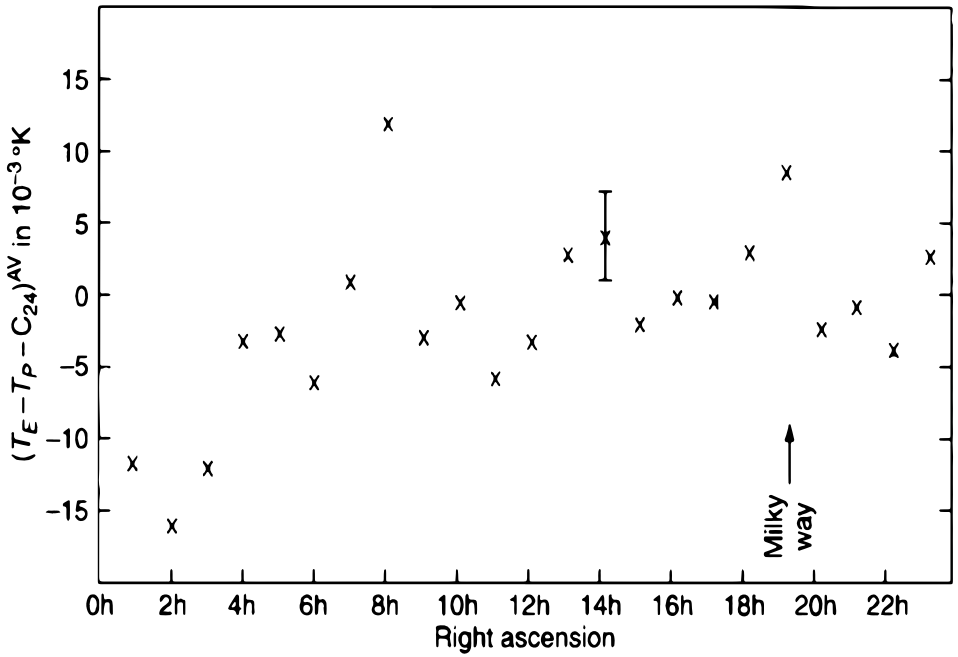
12,000’ dry site

* Wilkinson/Delabrouille rule

Results

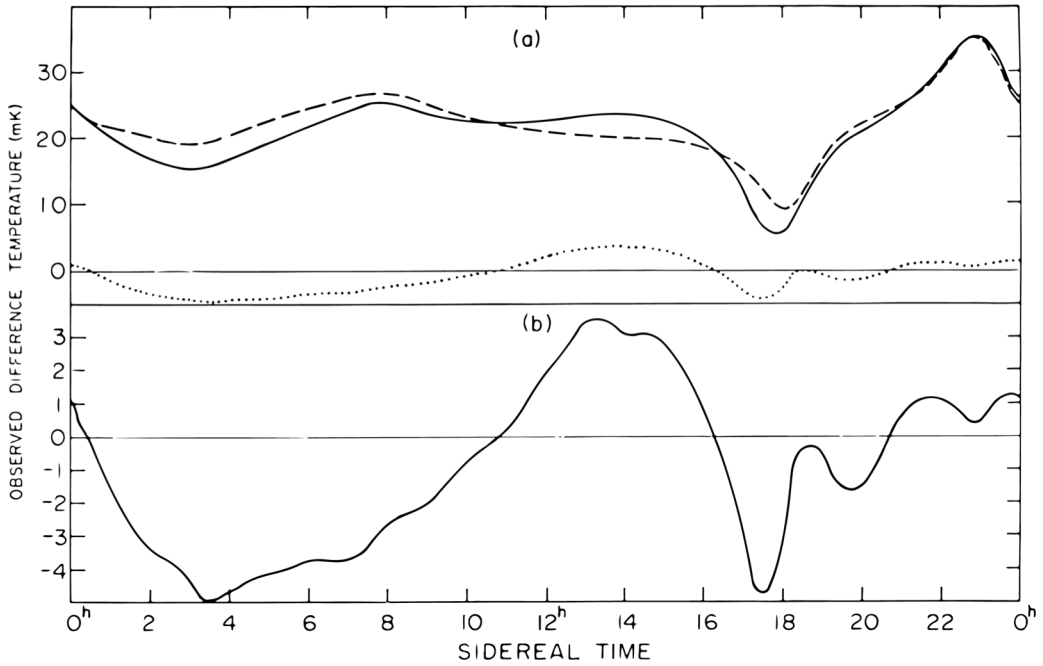
Wilkinson & Partridge

Dipole not detected



Conklin & Bracewell

Dipole detected “at limit set by astronomical foregrounds”



Both improved limits on anisotropies by ~100 reaching ~0.1%

Lessons from First 2 Isotropy Experiments (1960s)

Symmetry better

Faster switching better

Anyplace is better than New Jersey (Dave' next experiments from balloons)

Dual-horn symmetrical approach used for U2, COBE, WMAP….

Looking Ahead

Post-Planck

Merge fantastic control of systematics to higher Kogut levels

Kogut levels to dream of:

1. Scan strategy -- cross each pixel in different directions in rapid cadence

2. Hardware
   -- Polarization modulation
   -- One more layer (Al Kogut's ideas; rotation around boresight a la BICEP...)

3. Software -- many

Prices to Be Paid

Complexity (bad)

Possibly moving parts (bad)

Sacrifice sensitivity, solid angle, bandwidth, or…. (manageable)

More complicated data analysis (good and bad)