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

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

New Jersey 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)