











History of CMBR research II

- 1934: First prediction of the existence of the CMBR
 - Tolman: Expanding Universe should be filled by thermal radiation from its hot past
- 1948: First prediction of the current CMBR temperature
- Gamow, Alpher & Herman: $T_0 \approx 5 \text{ K}$
- 1965: CMBR discovered by Wilson & Penzias • Temperature measured to be $T_0 \approx 3.5 \text{ K}$

History of CMBR research III

- 1992: COBE satellite
 - Close to perfect BB, with T \approx 2.73 K
 - Large-scale dipole
 - Small-scale temperature fluctuations (~10⁻⁵ K)
- Late 90s: MAXIMA & BOOMERanG balloons
 Small-scale temperature and polarization variations
- 2003 now: WMAP satellite
- Full-sky maps of polarization and small-scale temperature variations

- Aig Bang

Bues Bit

Big Bang

- - Superior polarization measurement
 - Planck-scale physics???























































