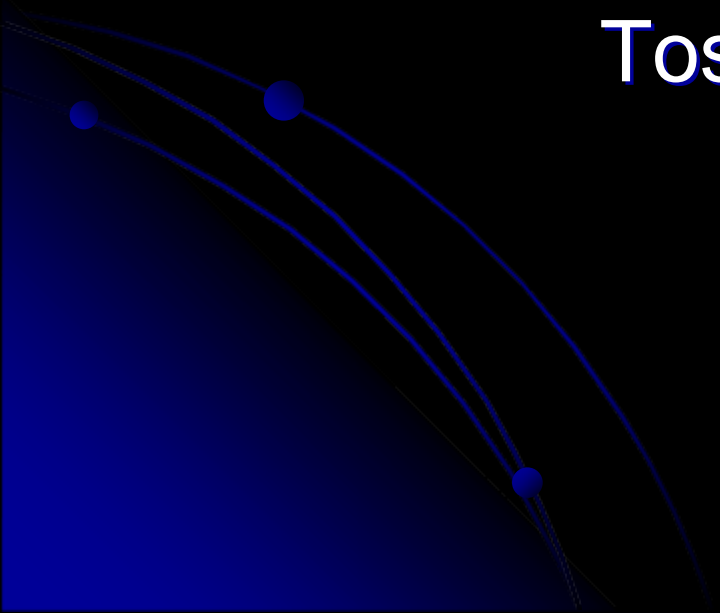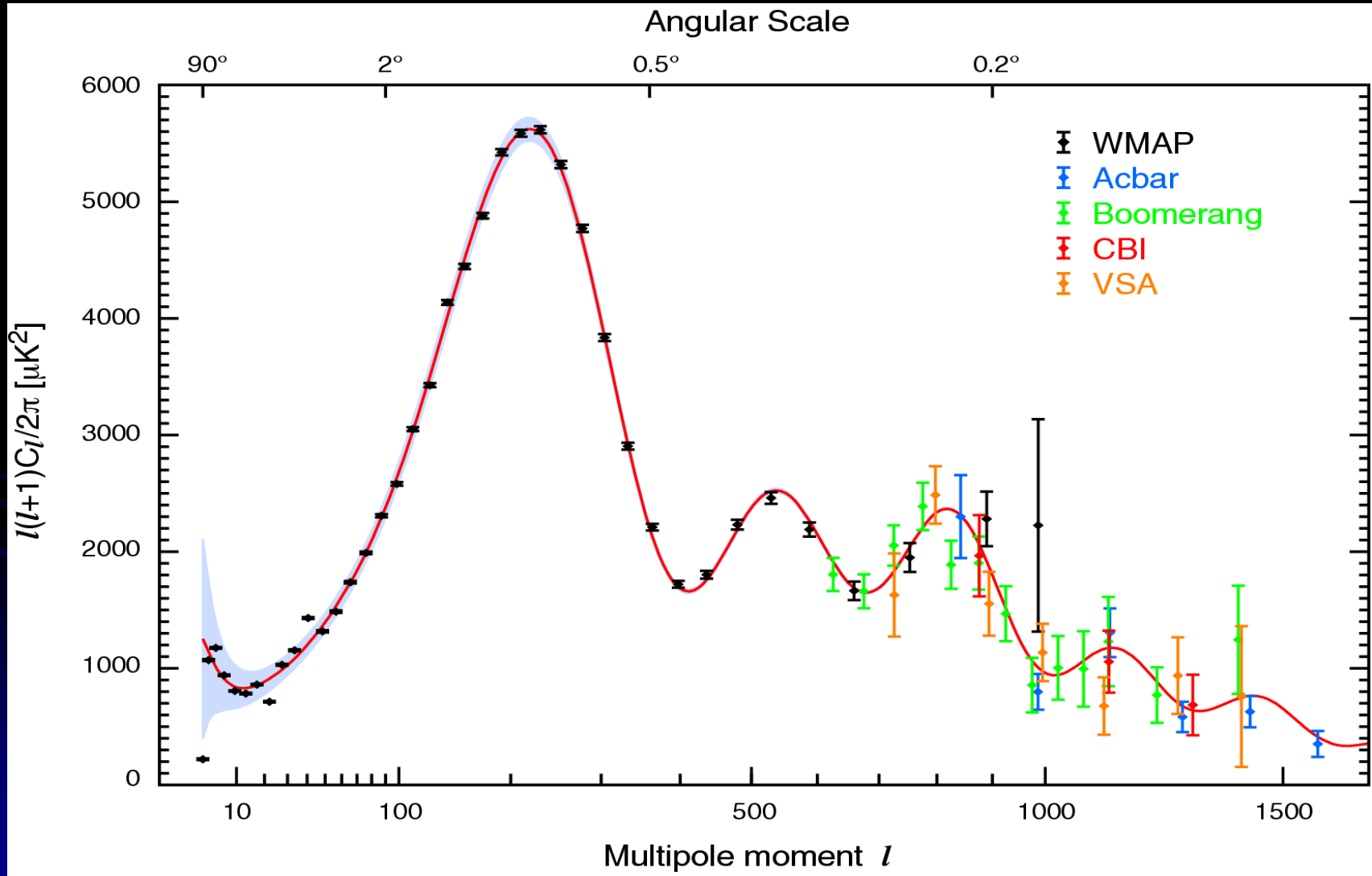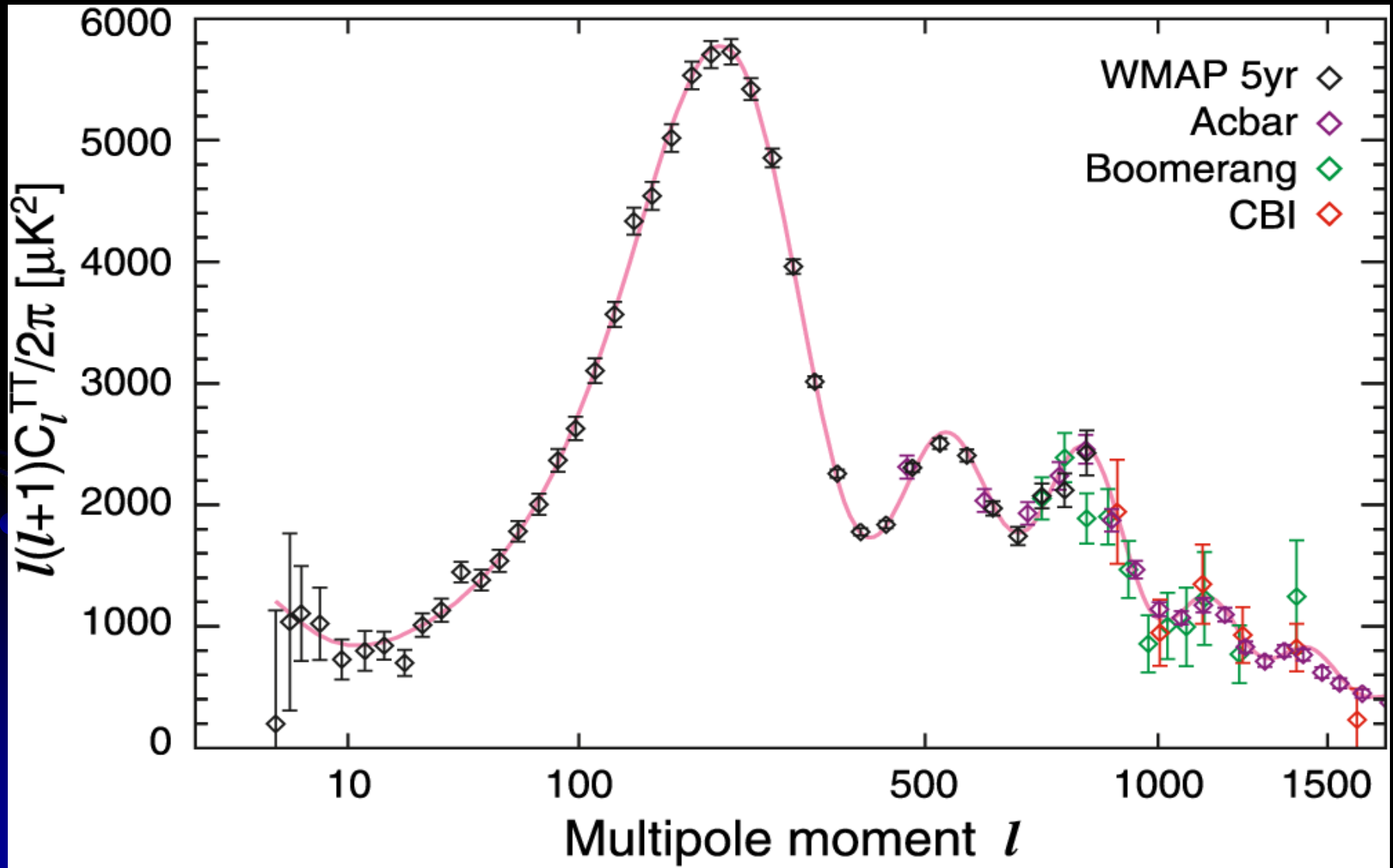# WMAP 7yr

Toshiya Namikawa
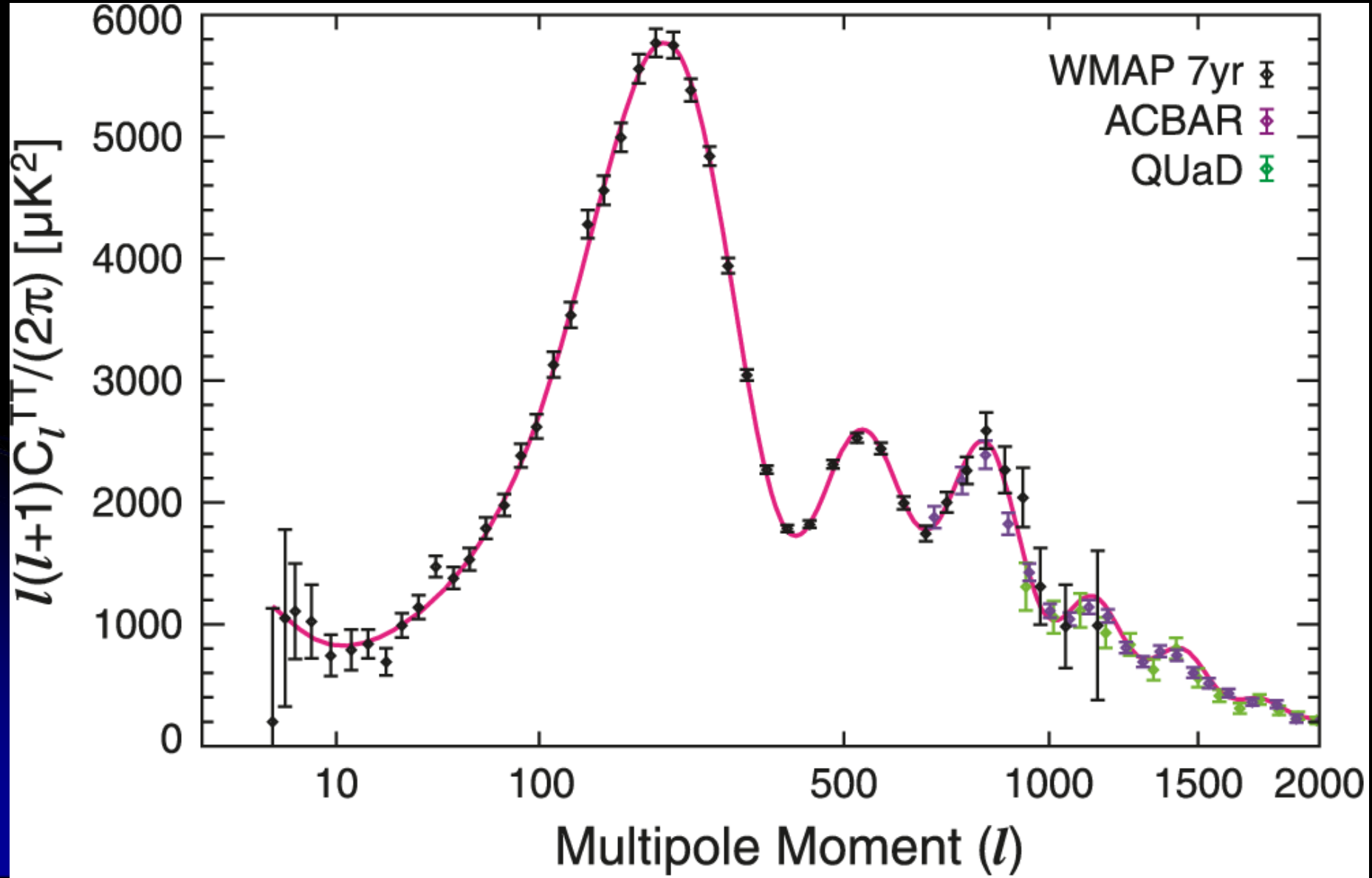
# Angular Power Spectrum (3yr)

# Angular Power Spectrum (5yr)

# Angular Power Spectrum (7yr)

# Dark Energy Equation of State $w$

$3yr$    $-0.967^{+0.073}_{-0.072}$      **WMAP + SN**
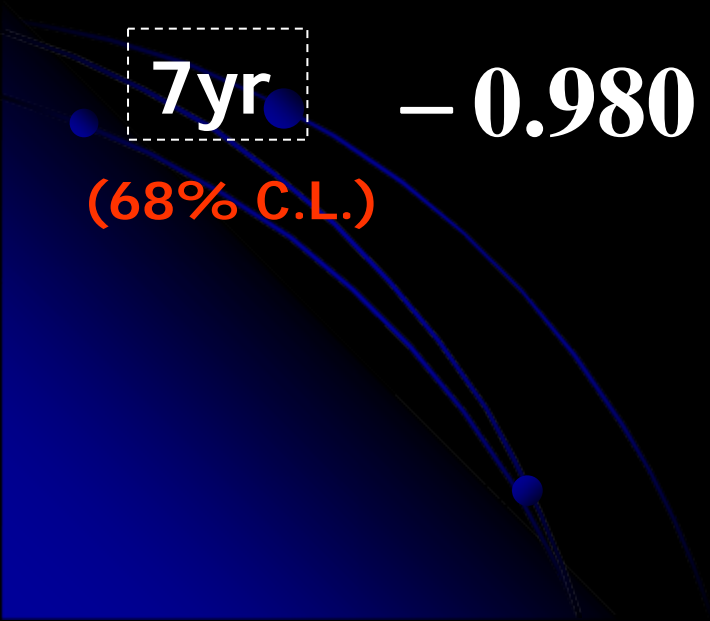
$5yr$    $-0.12 < 1 + w < 0.13$    **WMAP + BAO + SN**

**(95% C.L.)**

$7yr$    $-0.980 \pm 0.053$      **WMAP + BAO + SN**

**(68% C.L.)**

# Neutrino Mass $\sum m_\nu$

$$w = -1$$

Upper limit

**3yr**

$1.8[\text{eV}]$  WMAP

(95% C.L.)

$0.66[\text{eV}]$  WMAP + 2dFGRS + SDSS + SN

Spergel et al (2007)

**5yr**

$0.67\ [\text{eV}\ ]$  WMAP + BAO + $H_0$

(95% C.L.)

**7yr**

$1.3\ [\text{eV}]$  WMAP

(95% C.L.)  $0.58\ [\text{eV}]$  WMAP + BAO + $H_0$

# Relativistic Species $N_{\text{eff}}$ $w = -1$

**3yr**

$7.1^{+4.1}_{-3.5}$    WMAP + SDSS + SN

(95% C.L.)

$2.7 \pm 1.4$    WMAP + 2dFGRS + SN

$3.3 \pm 1.7$    WMAP + 2dFGRS +SDSS + SN
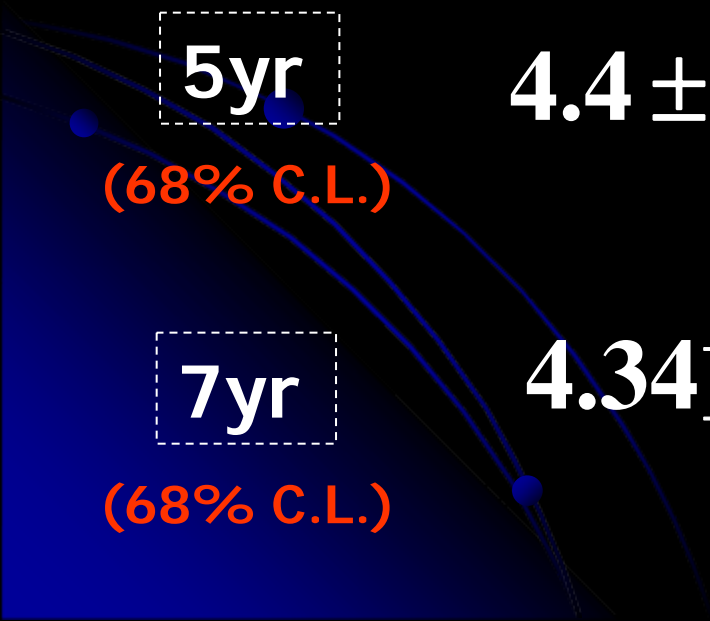
**5yr**

$4.4 \pm 1.5$    WMAP + BAO + SN + HST

(68% C.L.)

**7yr**

$4.34^{+0.86}_{-0.88}$    WMAP + BAO + $H_0$

(68% C.L.)

# Primordial Power Spectrum $n_s$ $\alpha$

|  | $n_s$ | $\alpha$ |
|---|---|---|
| 3yr | $1.16 \pm 0.10$ | $-0.085 \pm 0.043$ |
| 5yr | $1.087^{+0.072}_{-0.073}$ | $-0.050 \pm 0.034$ |
| 7yr | $1.076 \pm 0.065$ | $-0.048 \pm 0.029$ |

(68% C.L.)  $k_{\mathrm{pivot}} = 0.002\,\mathrm{Mpc}^{-1}$

# Primordial Non-Gaussianity $f_{NL}$

(95% C.L.)

5yr $\qquad -9 < f_{NL}^{local} < 111 \qquad -151 < f_{NL}^{equil} < 253$

7yr $\qquad -10 < f_{NL}^{local} < 74 \qquad -214 < f_{NL}^{equil} < 266$