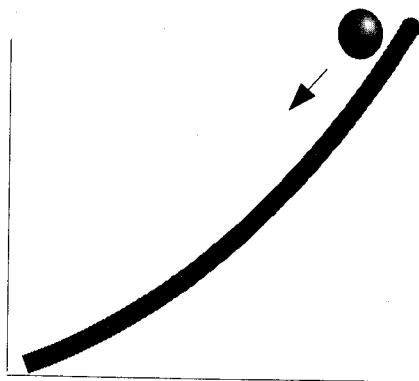


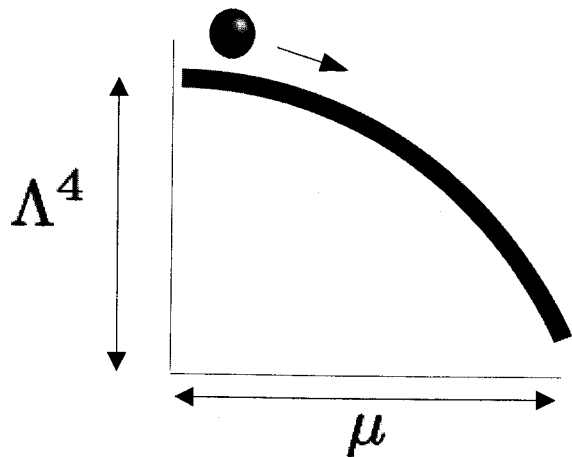
Inflation: zoology



Large field

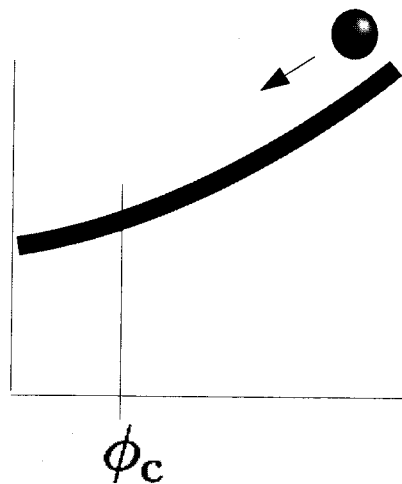
$$V(\phi) = \Lambda^4 (\phi/\mu)^p$$

$$V(\phi) = \Lambda^4 e^{\phi/\mu}$$



Small field

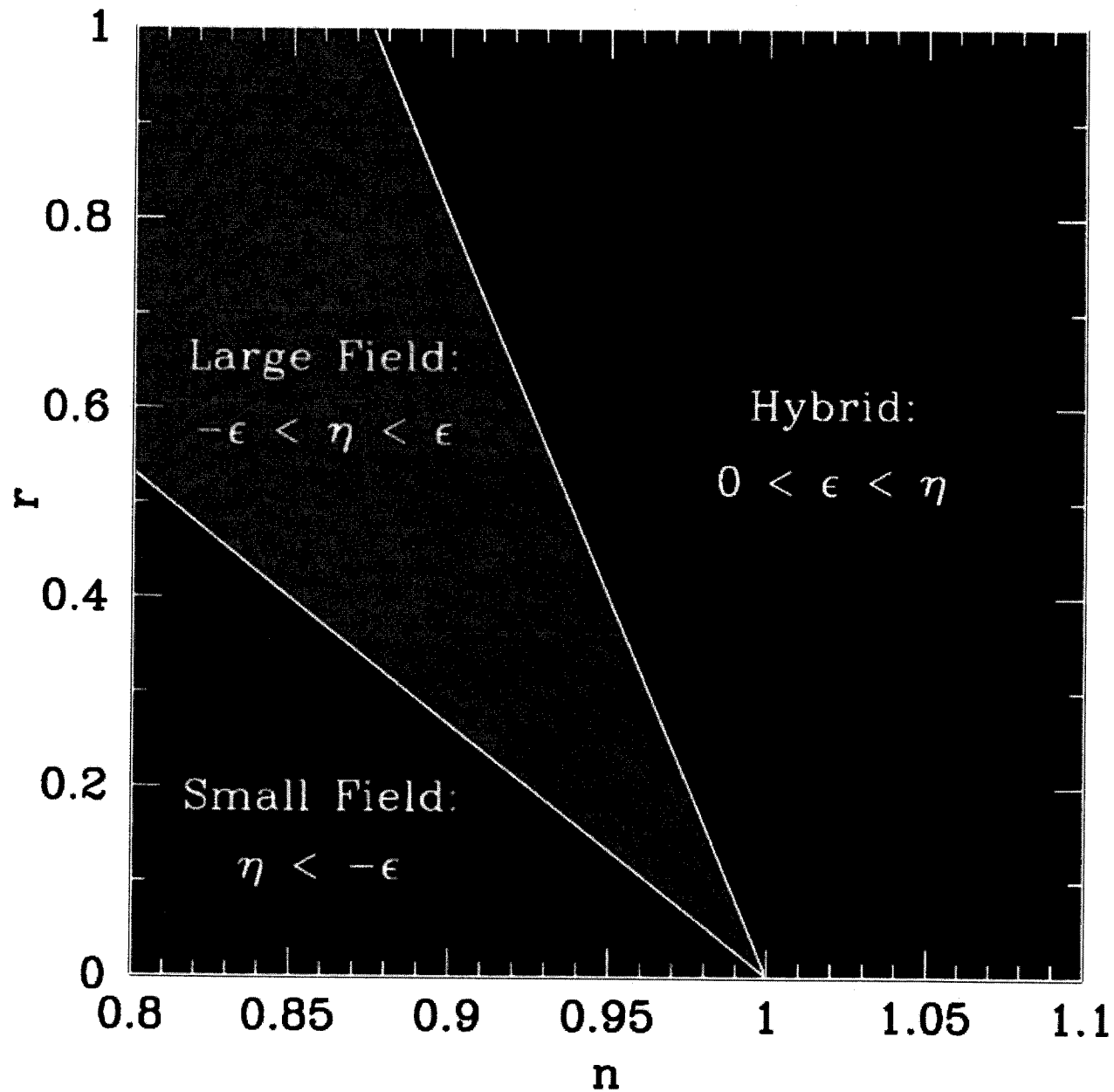
$$V(\phi) = \Lambda^4 [1 - (\phi/\mu)^p]$$



Hybrid

$$V(\phi) = \Lambda^4 [1 + (\phi/\mu)^p]$$

The zoo plot



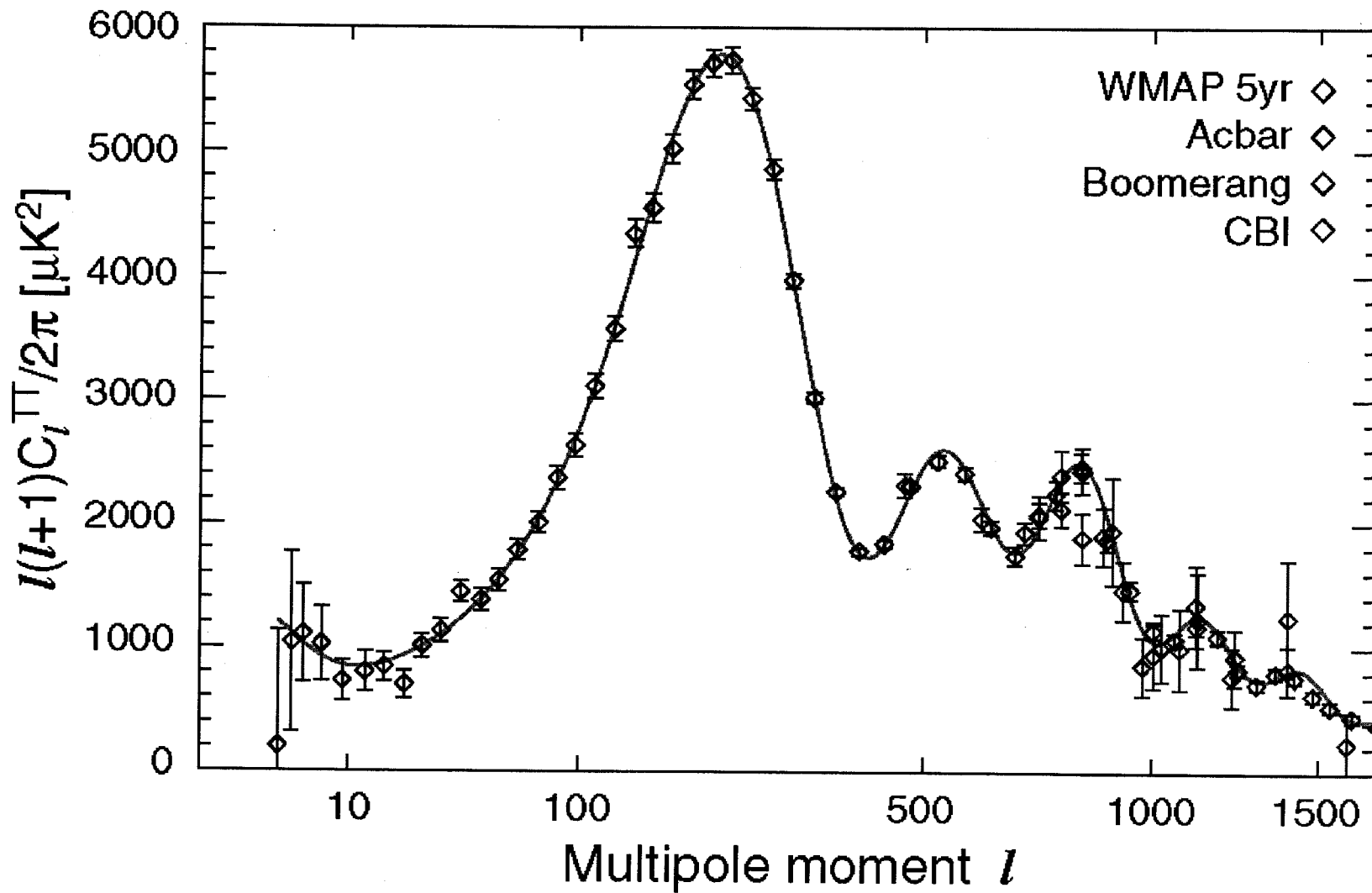
Primordial Perturbations



(Figure courtesy of the NASA/WMAP science team)

Things we know

- Inflation fits the data *really well*.

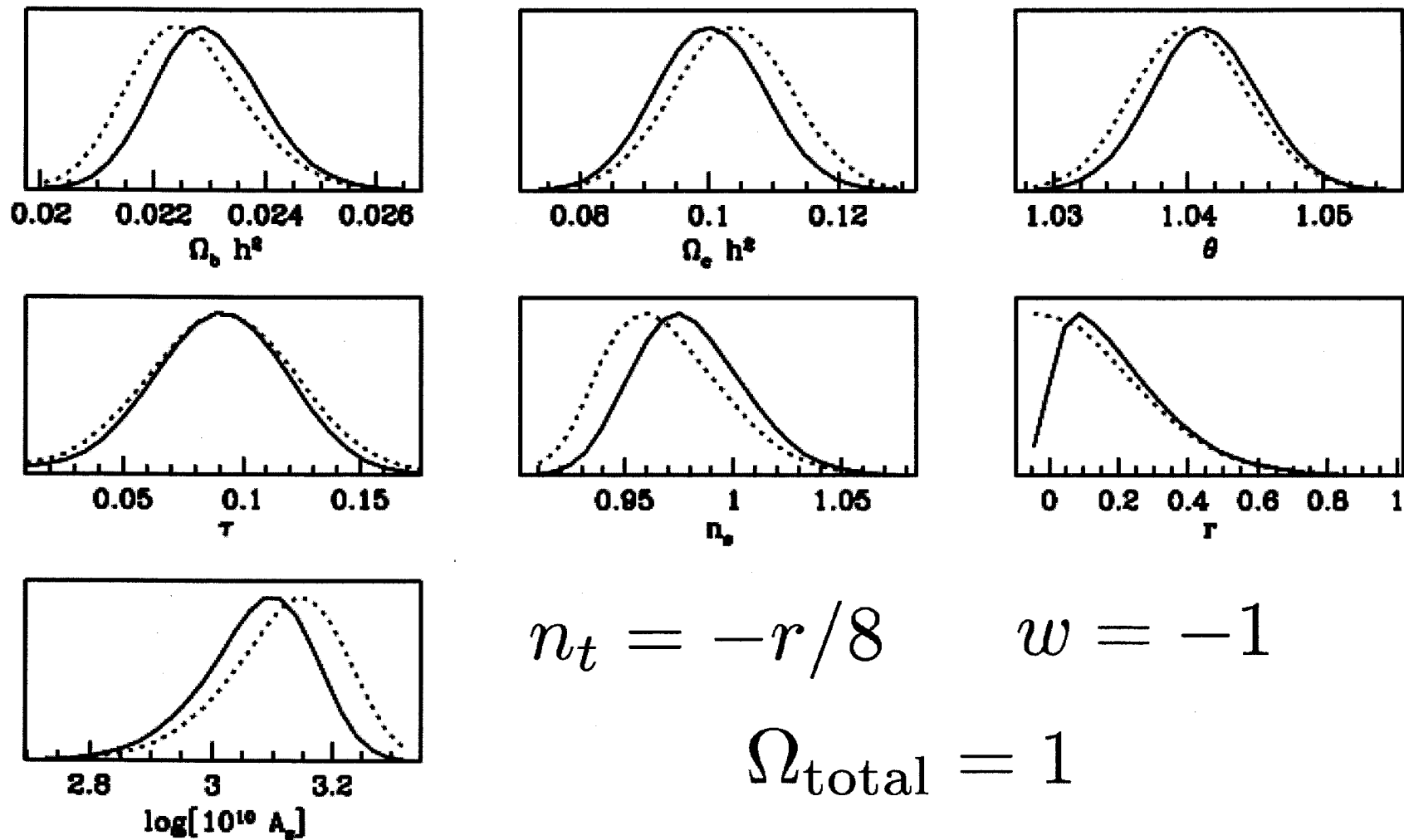


UB Center For Computational Research

U2: 800-node 2x Intel 3.2 GHz Xeon "Irwindale" cluster

Code: COSMOMC (Lewis and Bridle, astro-ph/0205436)

Inflation Model Constraints: 7 parameter fit

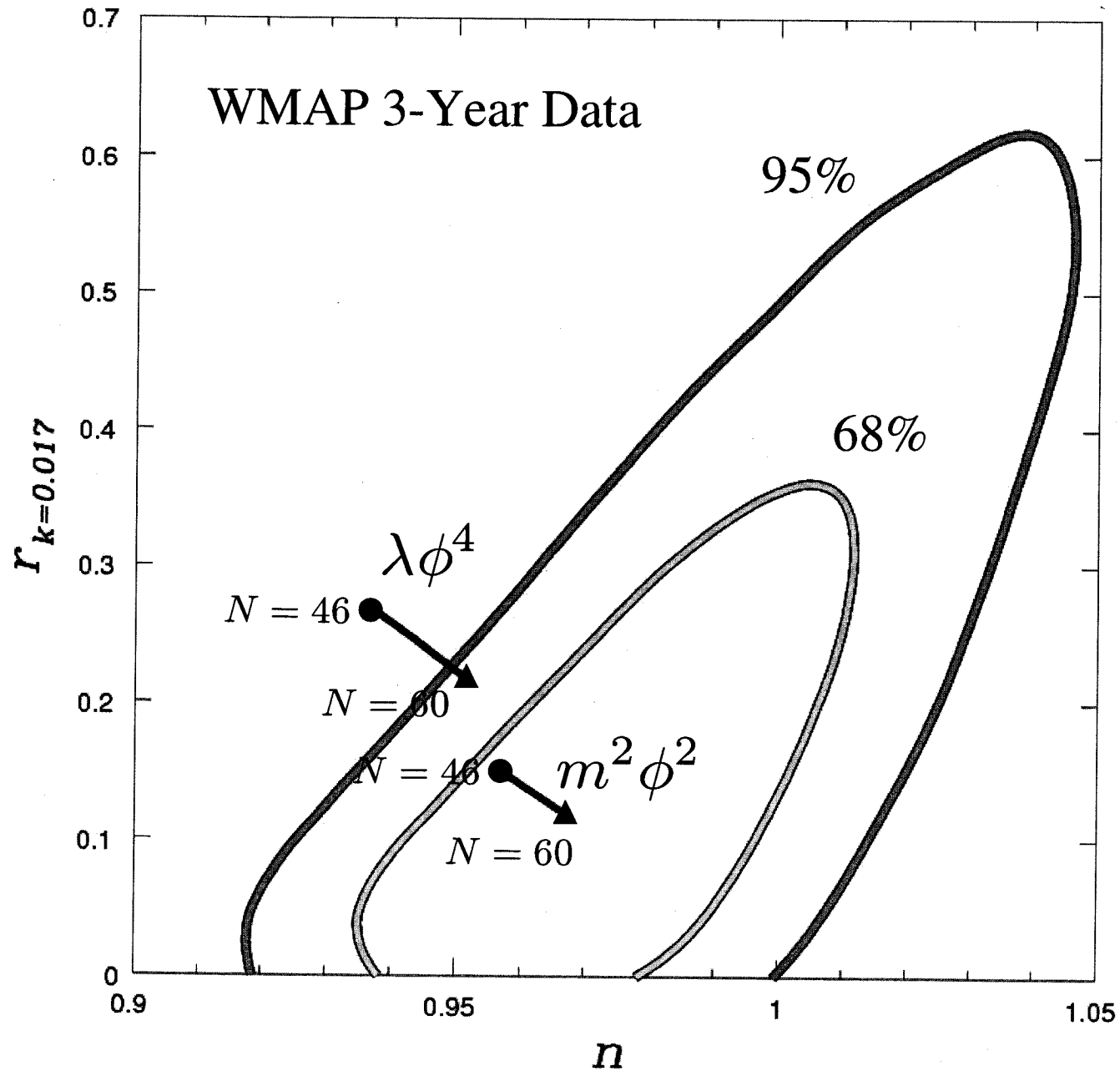


HST prior: $h = 0.72 \pm 0.08$

Tophat age prior: $t_0 = 10 - 20$ Gyr

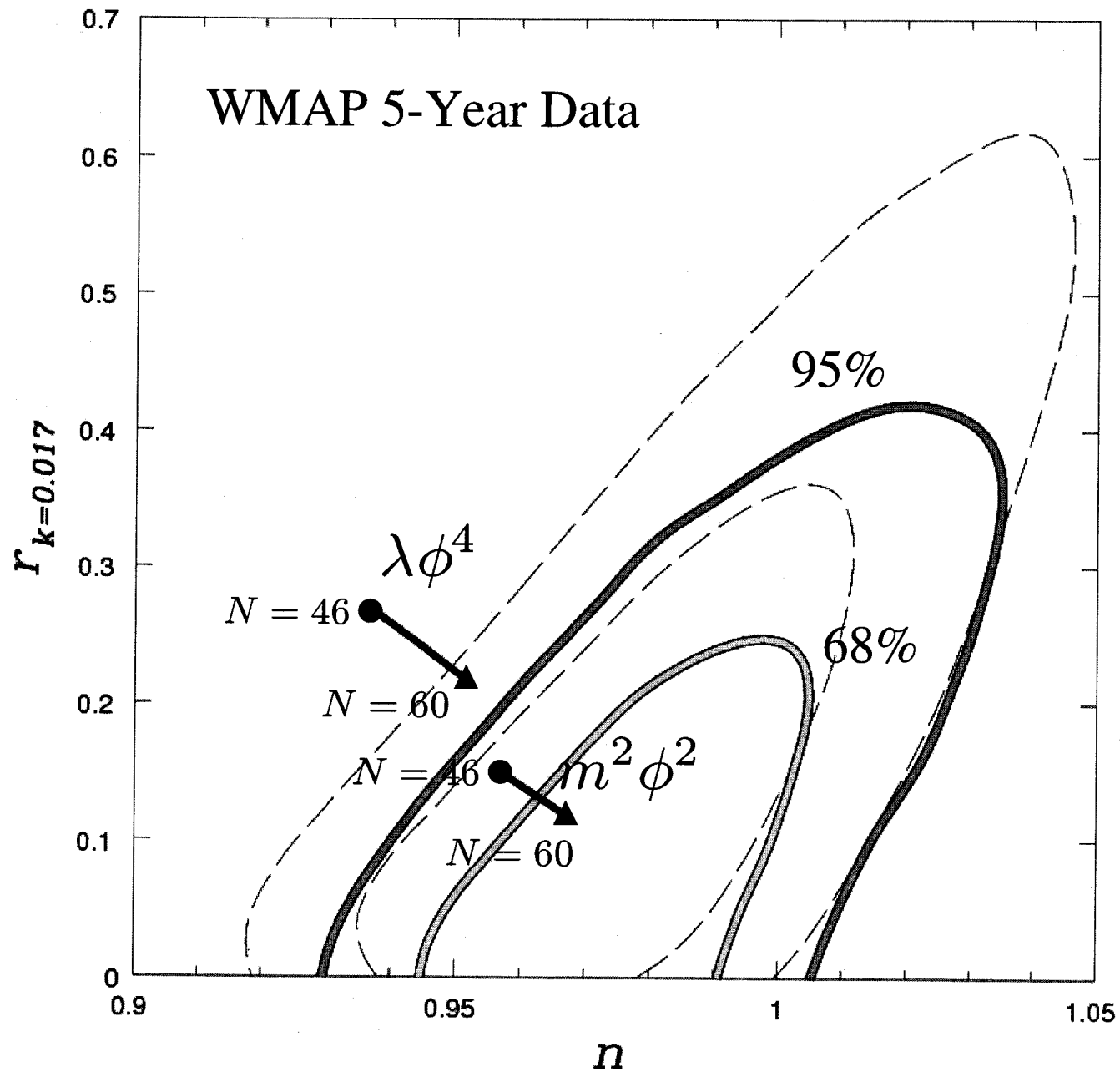
WMAP3 limits on inflation

(Kinney, Kolb, Melchiorri, Riotto, astro-ph/0605338)



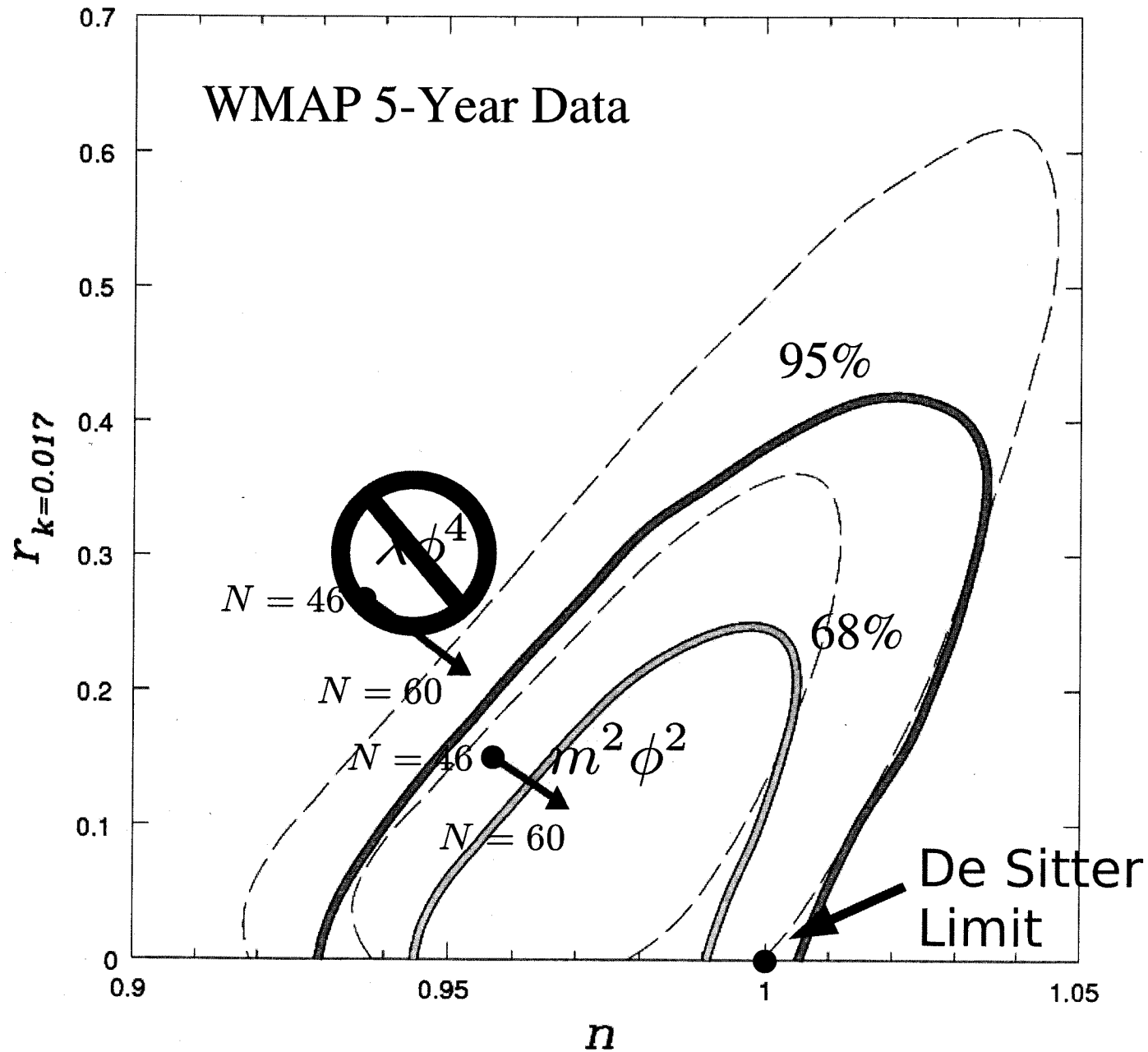
WMAP5 limits on inflation

(Kinney, Kolb, Melchiorri, Riotto, arXiv:0805.2966)

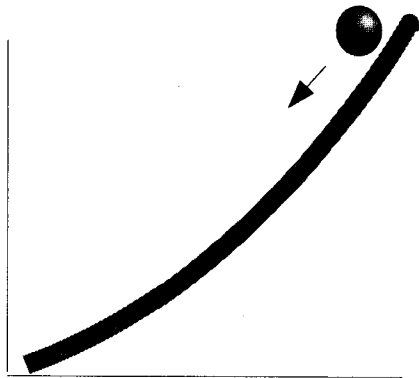


WMAP5 limits on inflation

(Kinney, Kolb, Melchiorri, Riotto, arXiv:0805.2966)



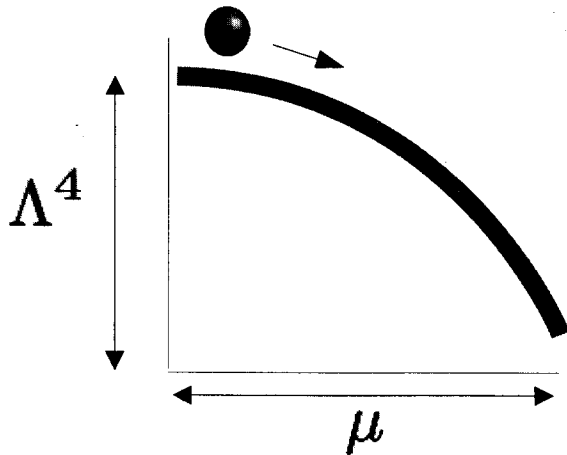
WMAP3 Constraints



Large field

$$V(\phi) = \Lambda^4 (\phi/\mu)^p$$

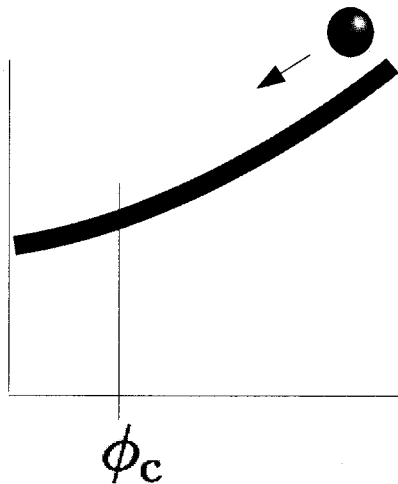
$$V(\phi) = \Lambda^4 e^{\phi/\mu}$$



Small field

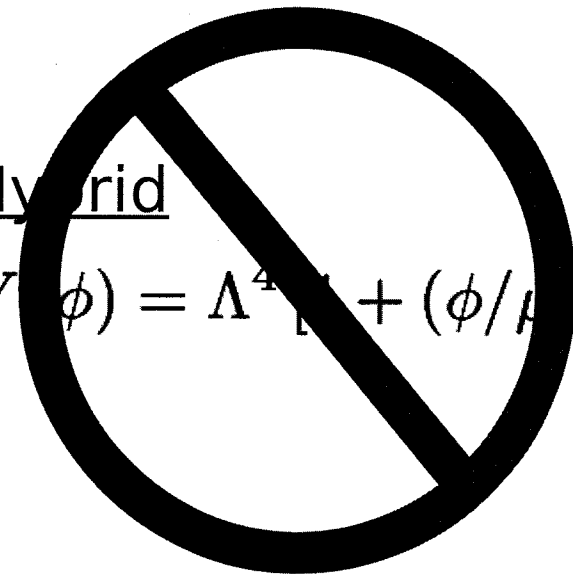
$$V(\phi) = \Lambda^4 [1 - (\phi/\mu)^p]$$

$r = 0$
 $n > 1$



Hybrid

$$V(\phi) = \Lambda^4 [1 + (\phi/\mu)^p]$$



Known knowns

Things we know:

- Inflation fits the data *really well*.
- $\lambda\phi^4$ / tree-level hybrid models ruled out.

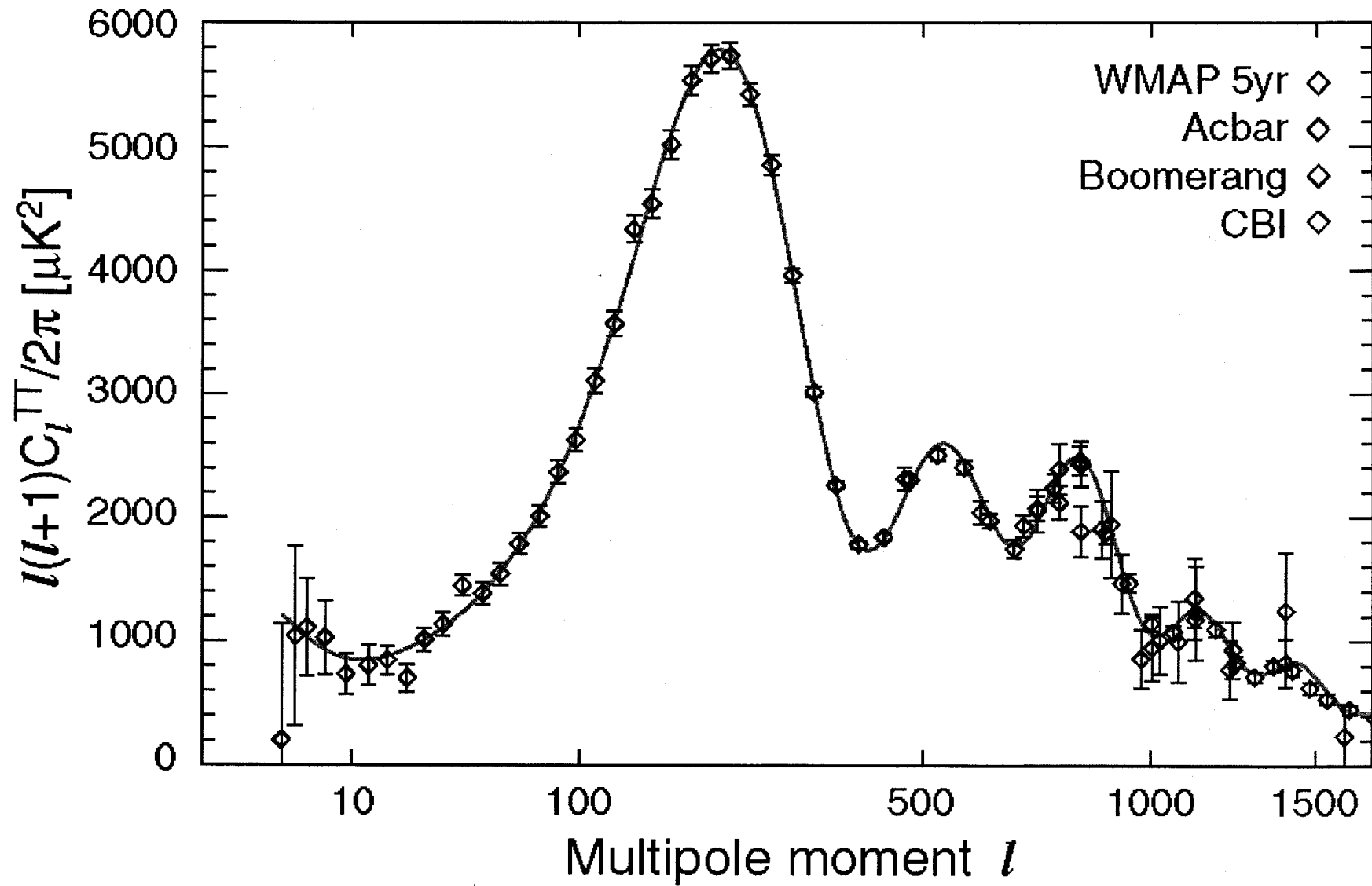
Known knowns

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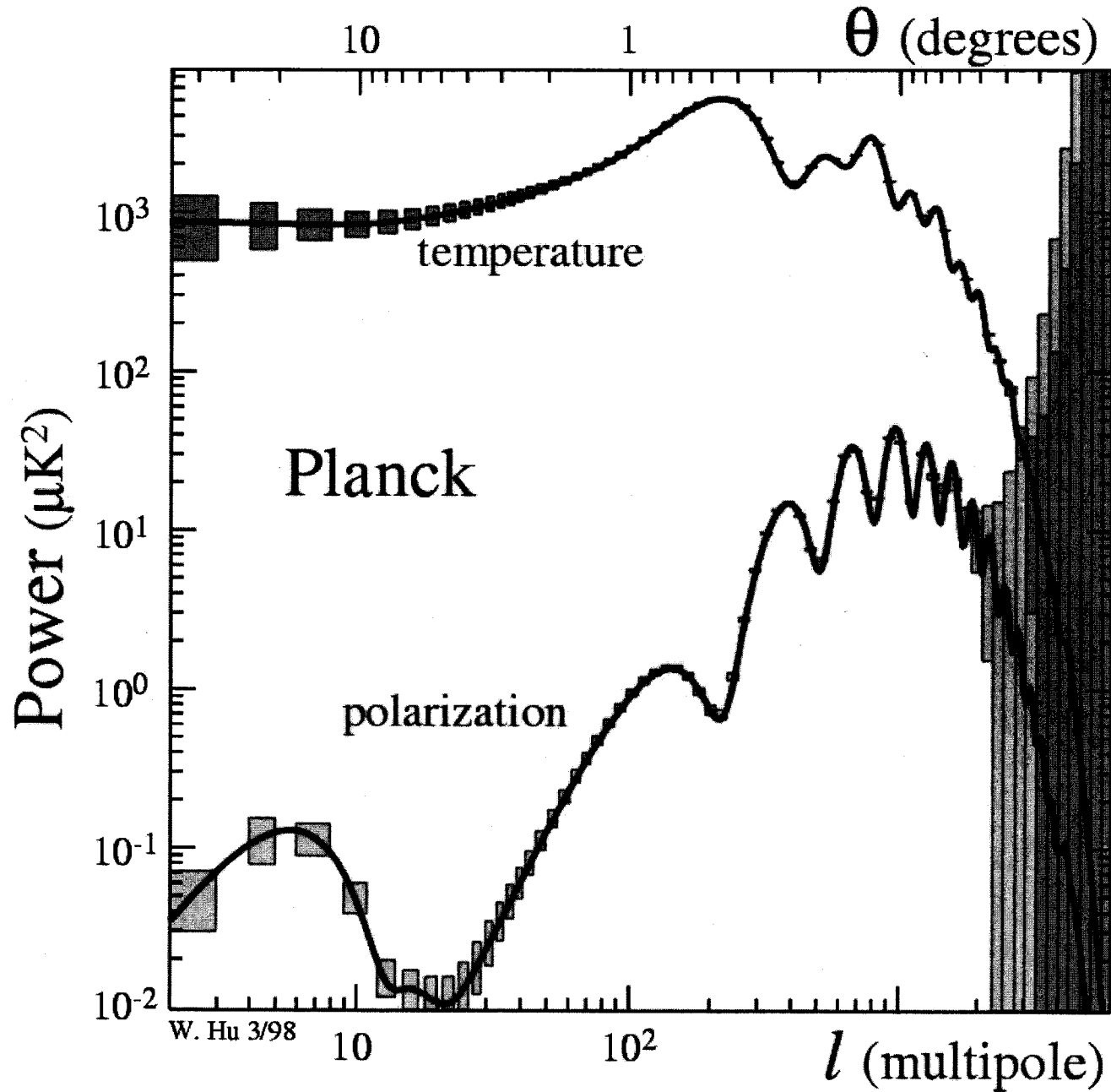
What can future measurements tell us?

CMB: Current State of the Art

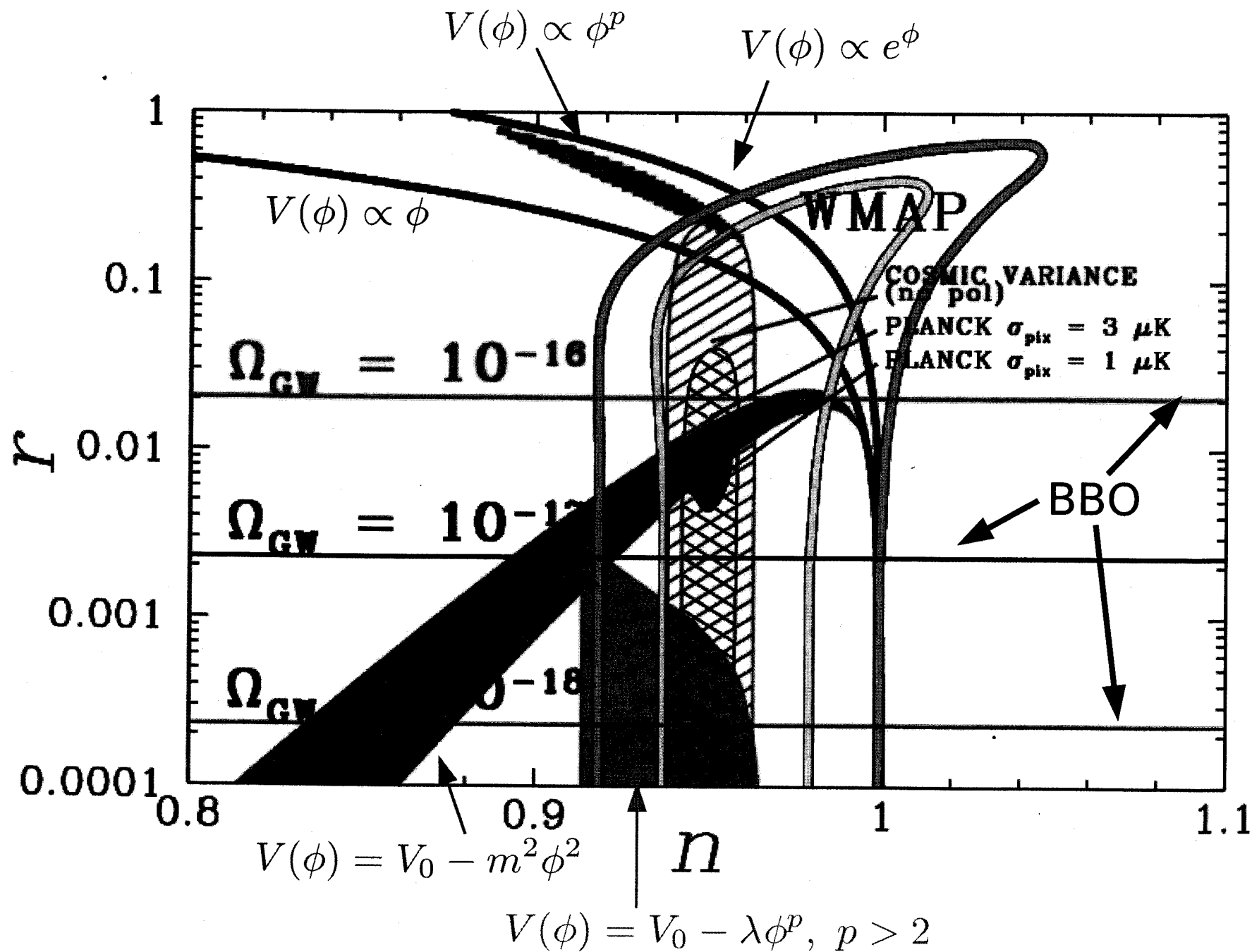


(Hinshaw, *et al.*, astro-ph/0603451)

Planck: launching 2008



Future CMB measurements vs. models



What to look for

Possible signals of new physics

- Tensor modes
Energy scale of inflation, Transplanckian physics
- Features / running in power spectrum
Non-slow roll dynamics, landscape inflation
- Non-Gaussianity
Non-slow roll dynamics, DBI / string inflation
Curvaton, Ekpyrotic models
- Isocurvature modes
Curvaton, multi-field inflation