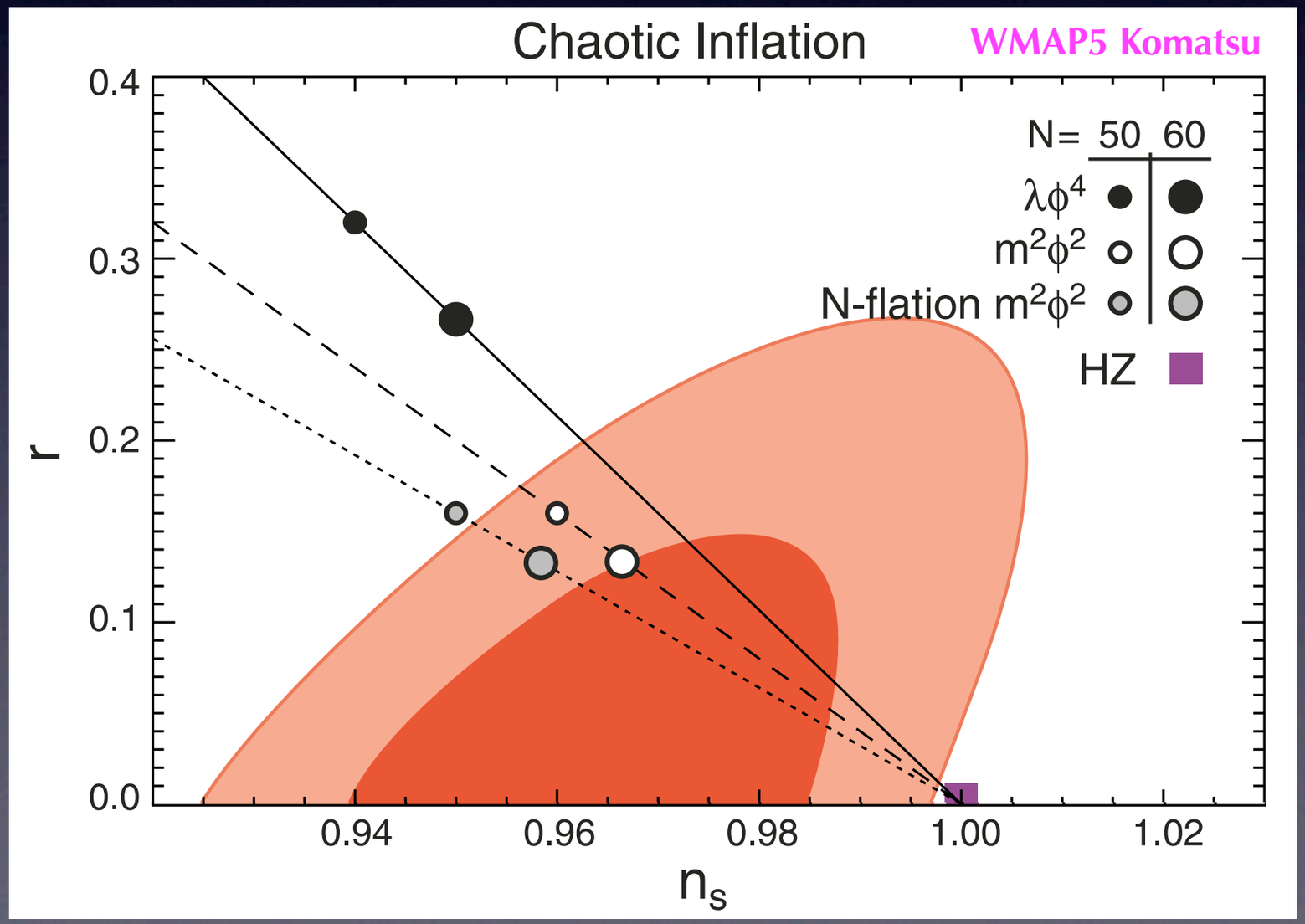
Lecture 2

Observational status of inflation



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- **Deriving observational predictions.**

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- **Constraining inflation with observational data.**

  Usually CMB data combined with others, either using slow-roll approximations or exact numerical calculations.

Slide from a review talk at Cosmo-01 (Rovaniemi, Finland)

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The Key Tests of Inflation

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This statement lists the key predictions of inflation that we would like to test. However some tests are more powerful than others, because some are predictions only of the simplest inflationary models.

Test: a useful test of a model is one which, if failed, leads to rejection of that model.

Supporting evidence is the verification of a prediction which, while not generic, is seen as indicative that the model is correct.

Slide from a review talk at Cosmo-01 (Rovaniemi, Finland)

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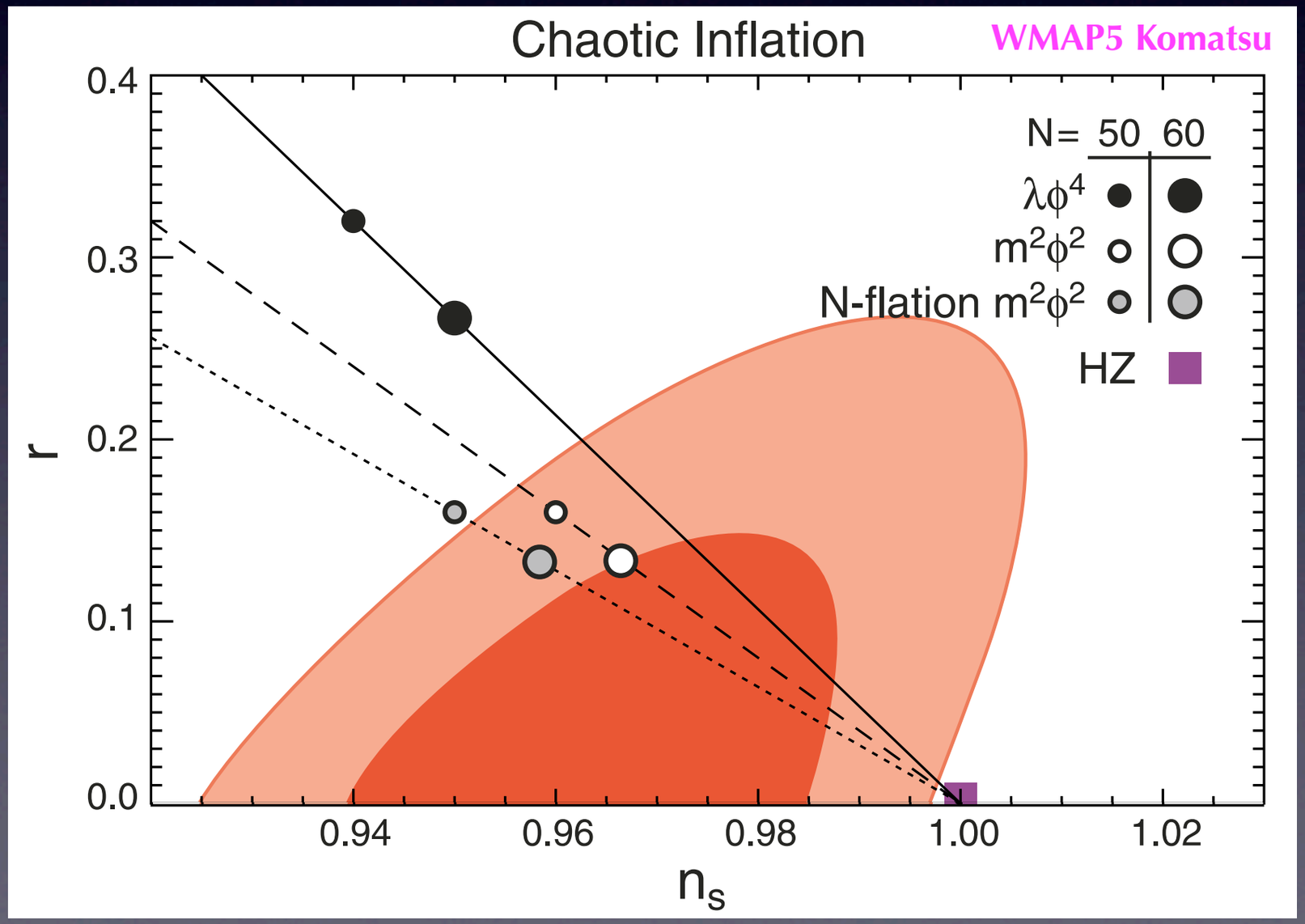

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- Isocurvature density perturbations (perturbations in the relative amount of different materials, leaving the total density unperturbed).

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The discussion centres around possible data analysis systematics — accurate modelling of large-angle statistical uncertainties, point source subtraction, WMAP beam profile, Sunyaev-Zel'dovich effect marginalization — and also around methods for robust definition of the standard cosmological model.

Is n different from 1?

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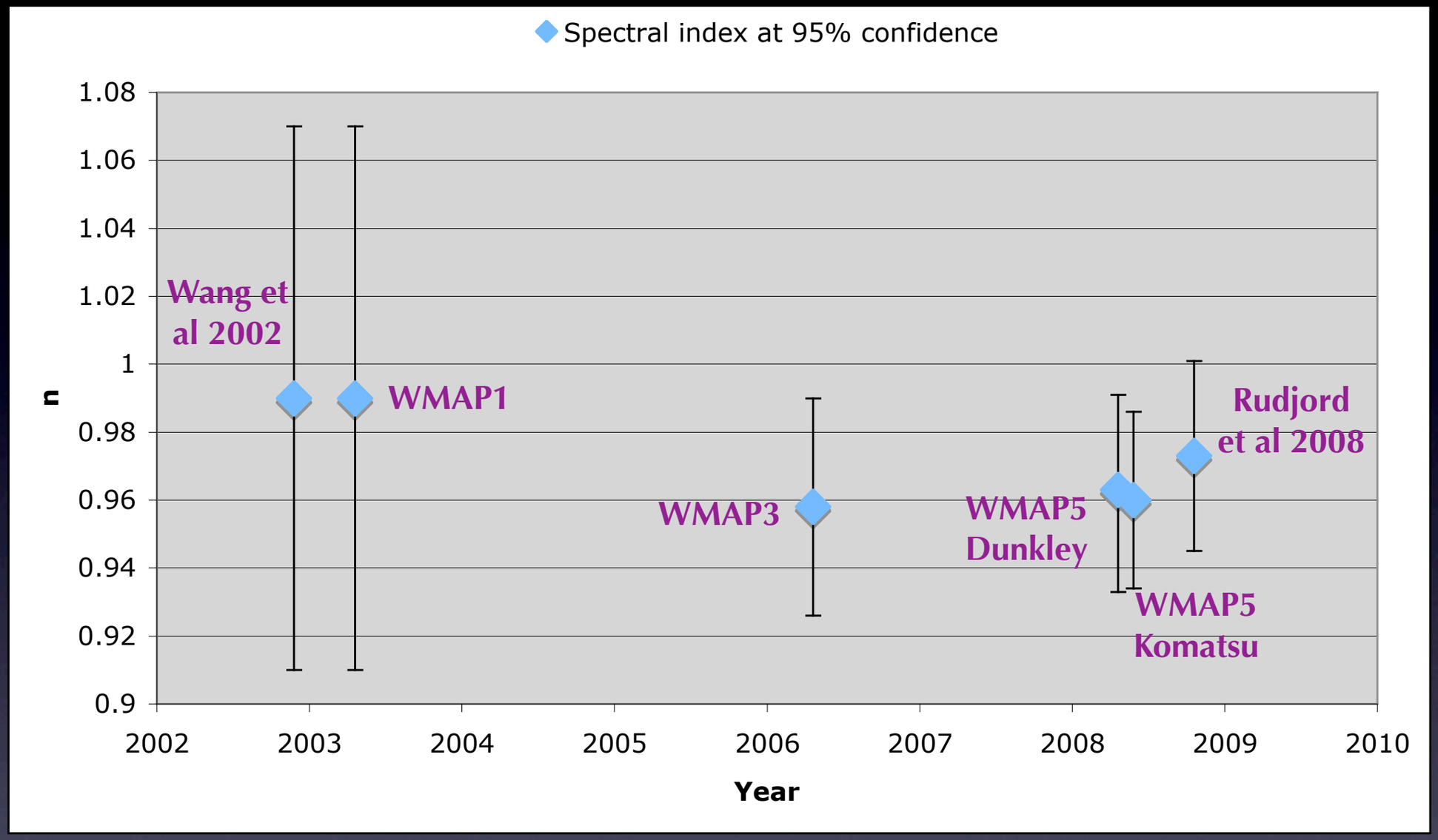

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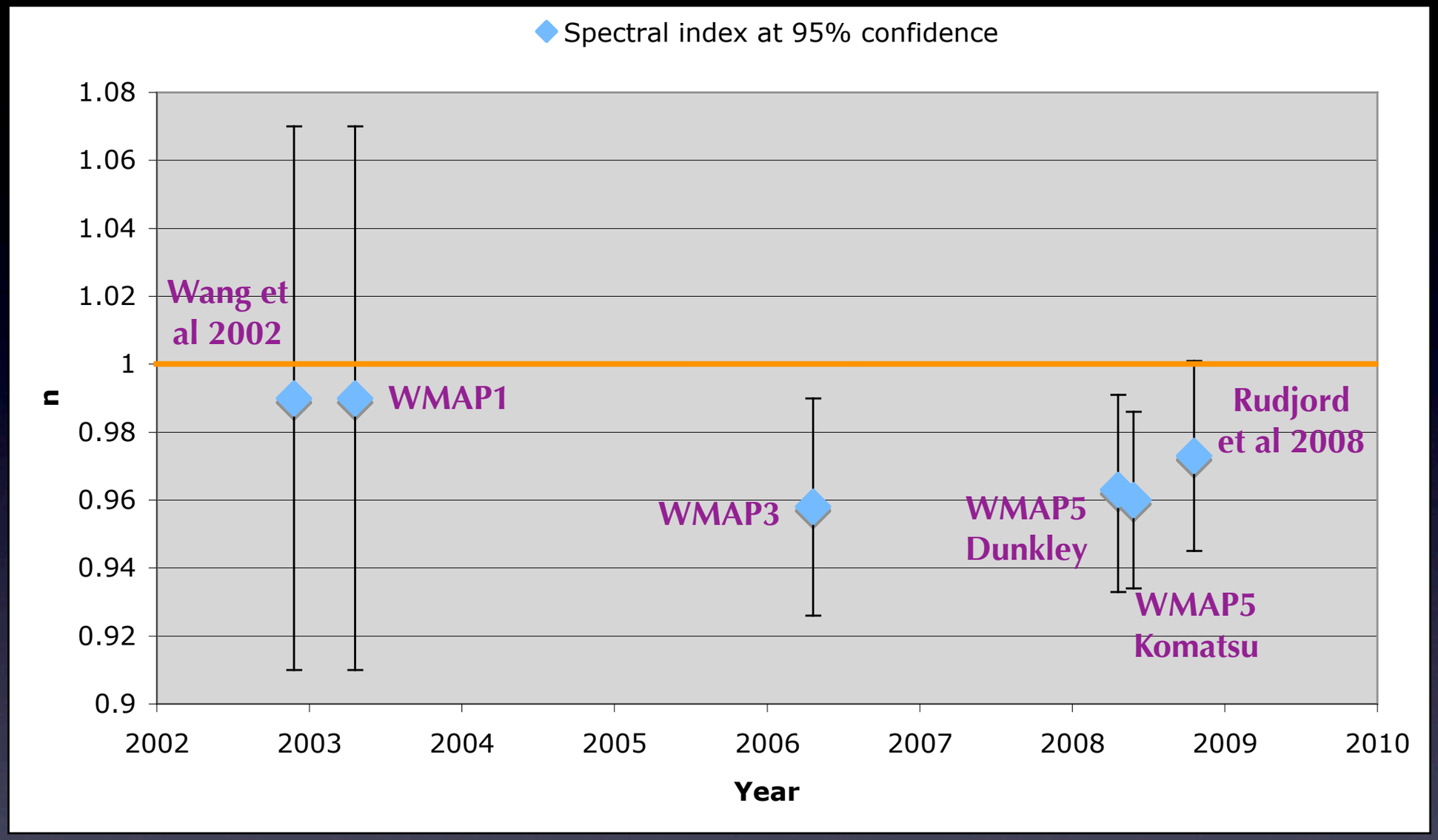

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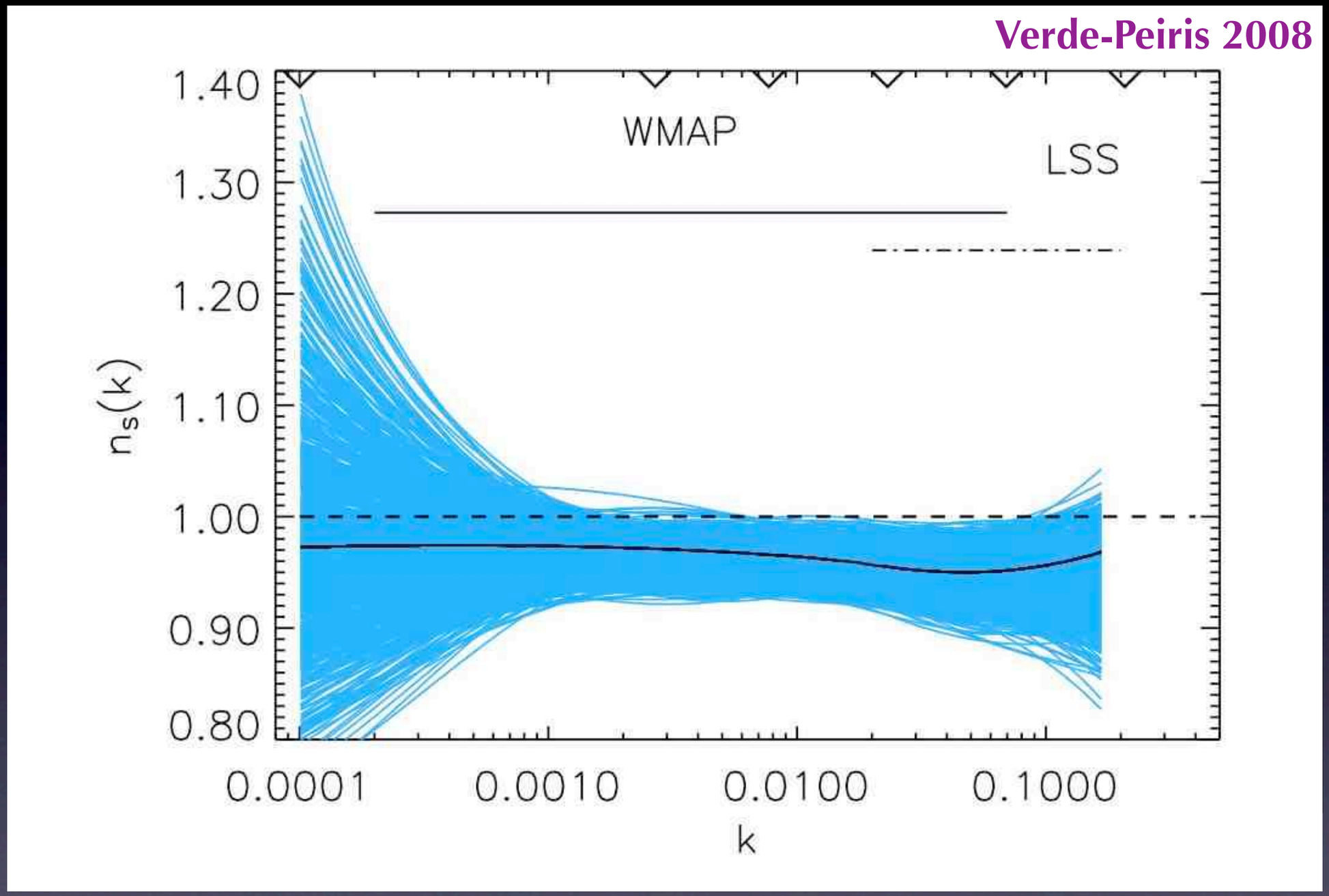

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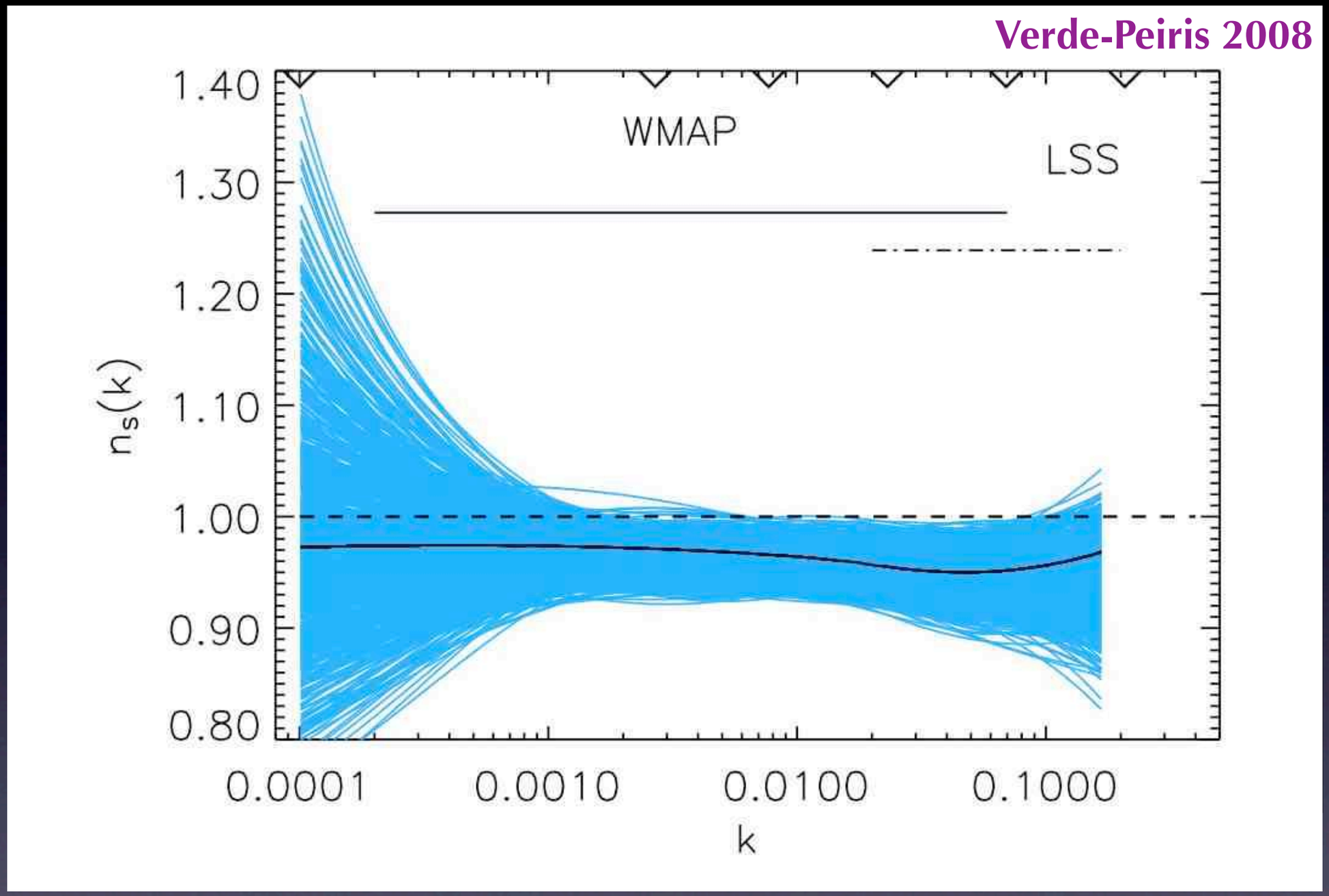

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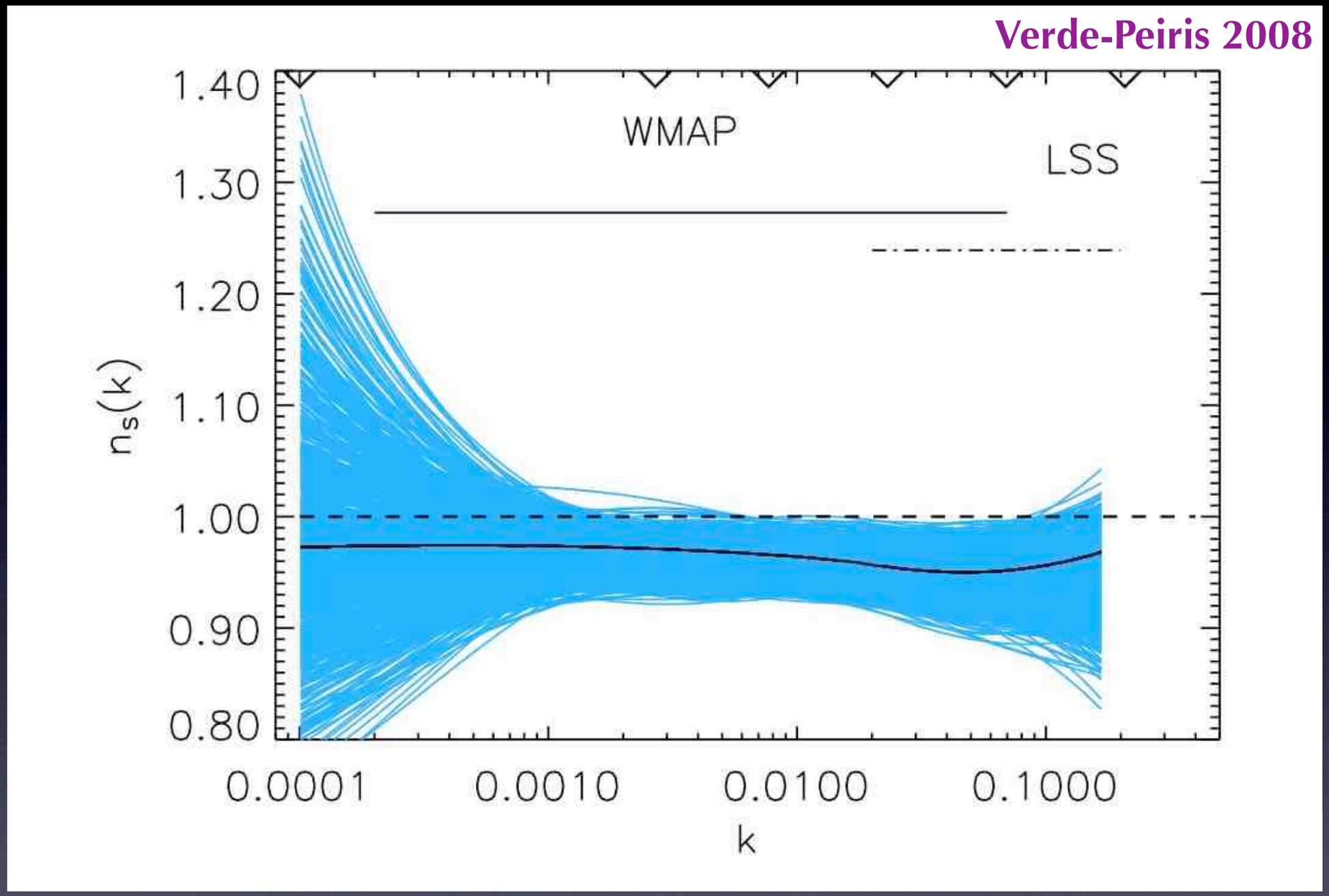

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But is that the right question to ask?

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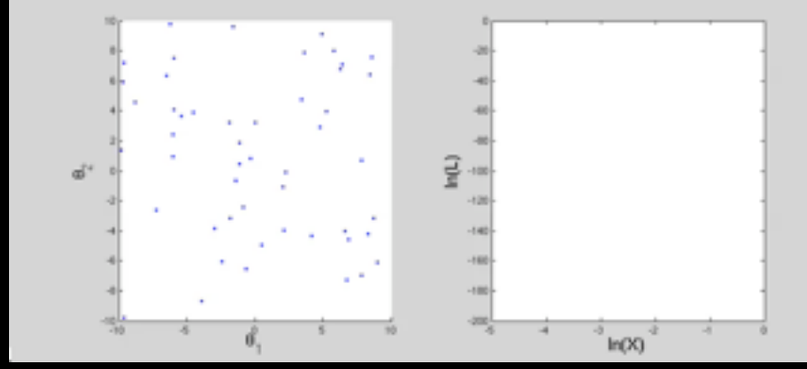

Parkinson, Mukherjee and Liddle, PRD, astro-ph/0605003

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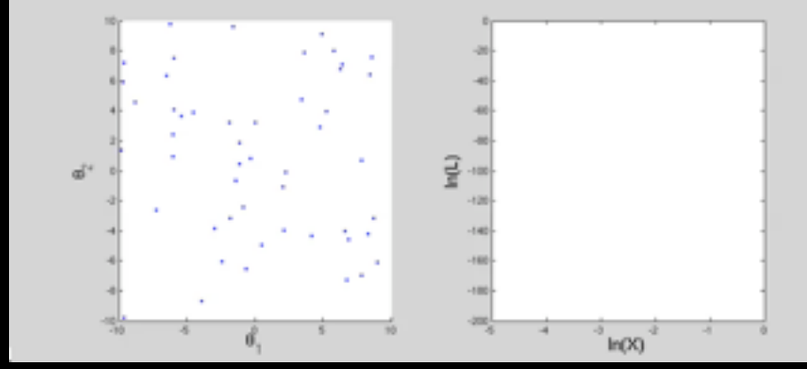

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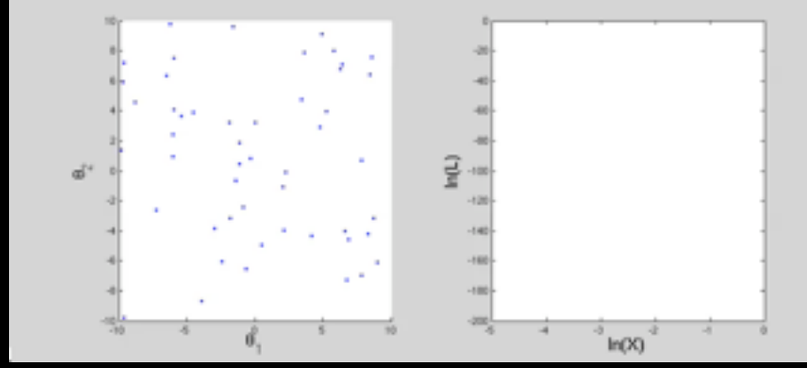

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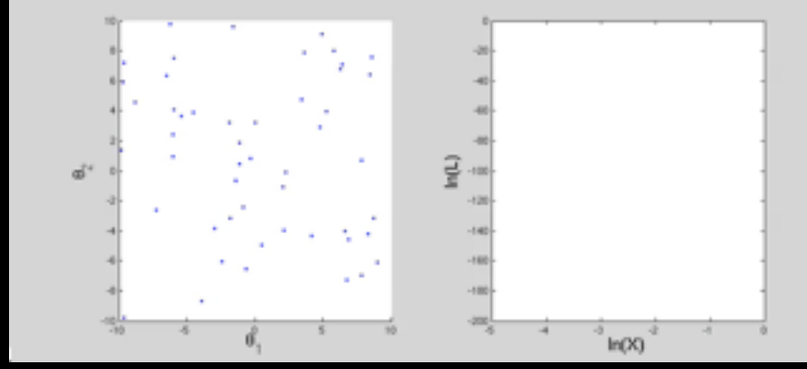

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The most useful divisions are 2.5 (odds ratio of 12:1) and 5 (odds ratio of 150:1).

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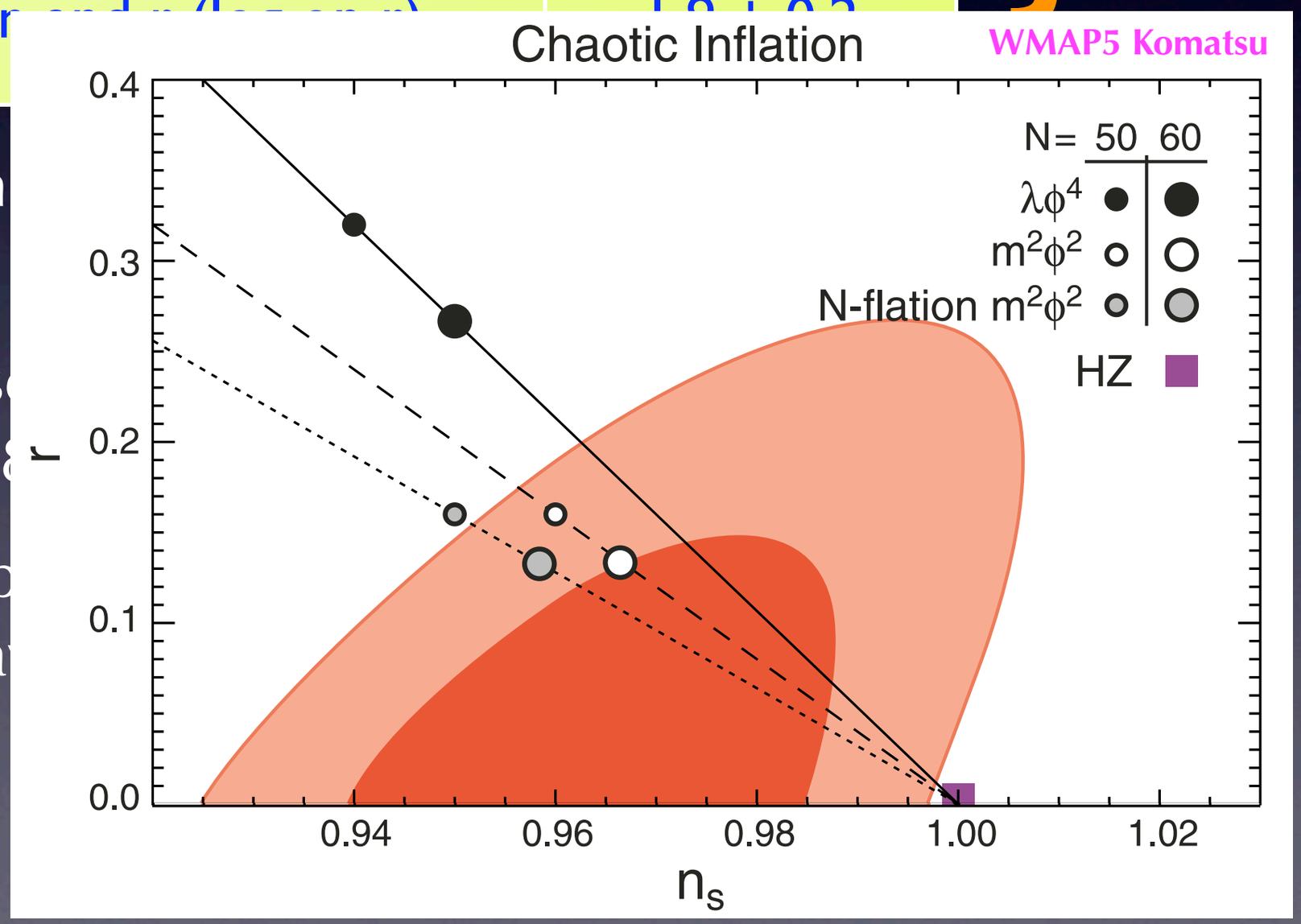

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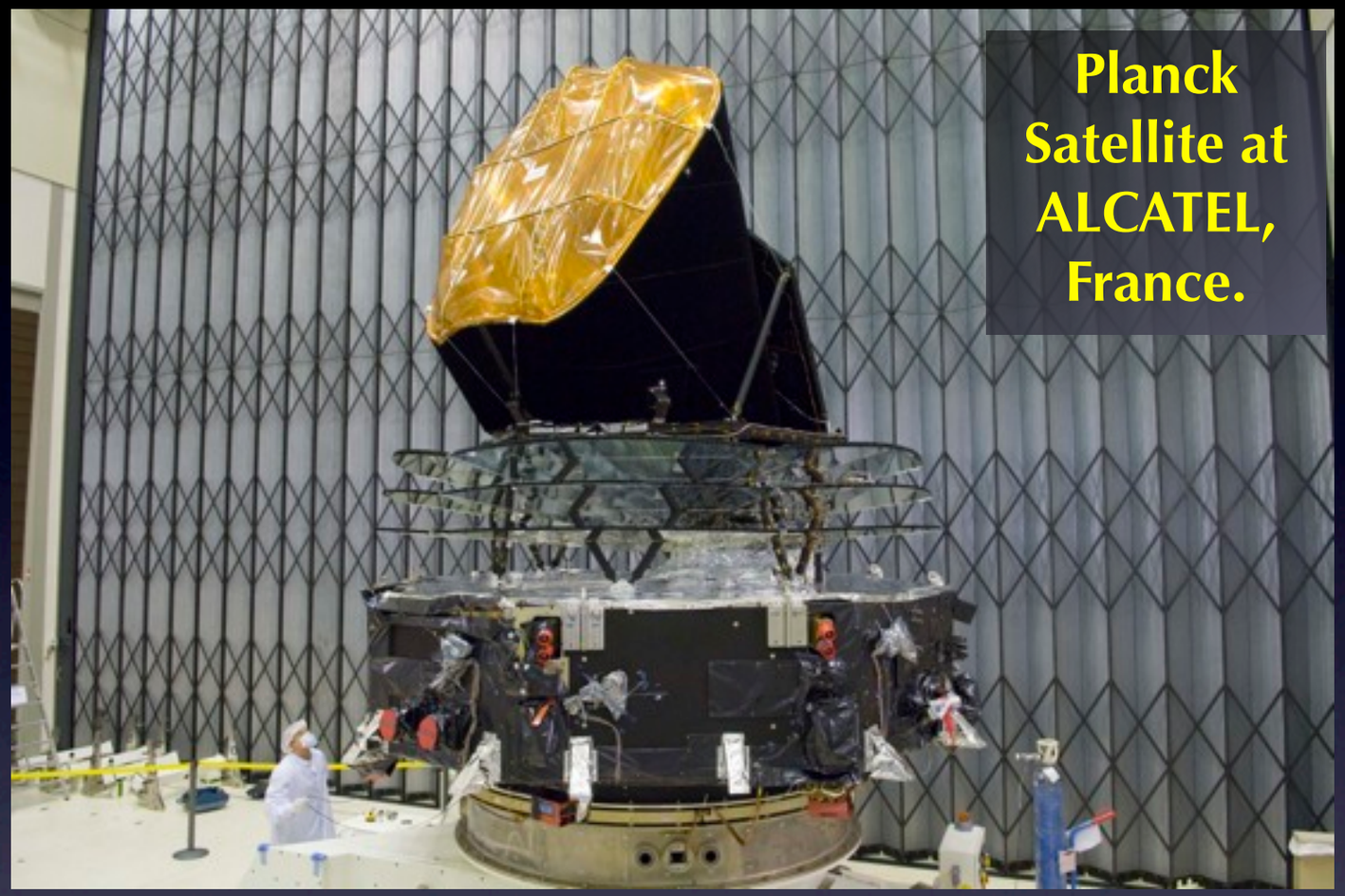
Planck Satellite



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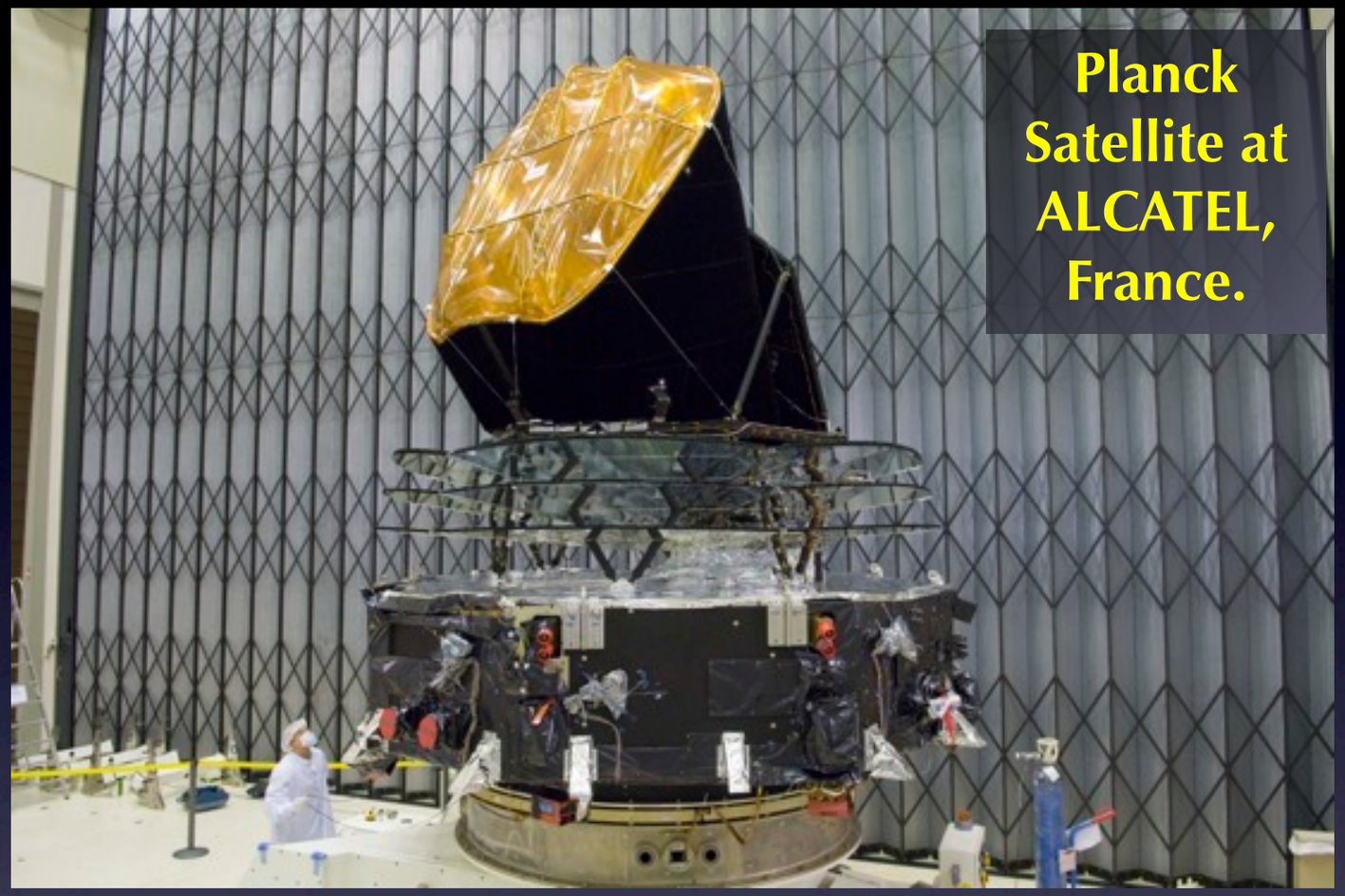
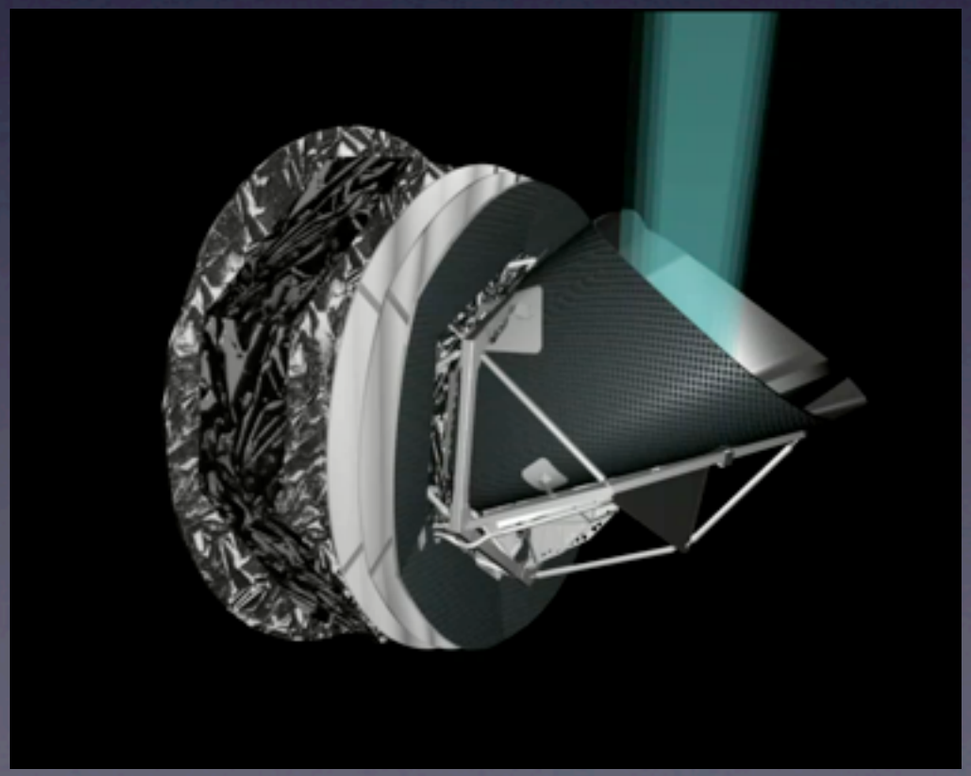


Planck Satellite at ALCATEL, France.



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Model selection forecasts for Planck

Pahud, Liddle, Mukherjee, and Parkinson, MNRAS, astro-ph/0701481

Zones of certainty/uncertainty for *n* and $\alpha = dn/d\ln k$.

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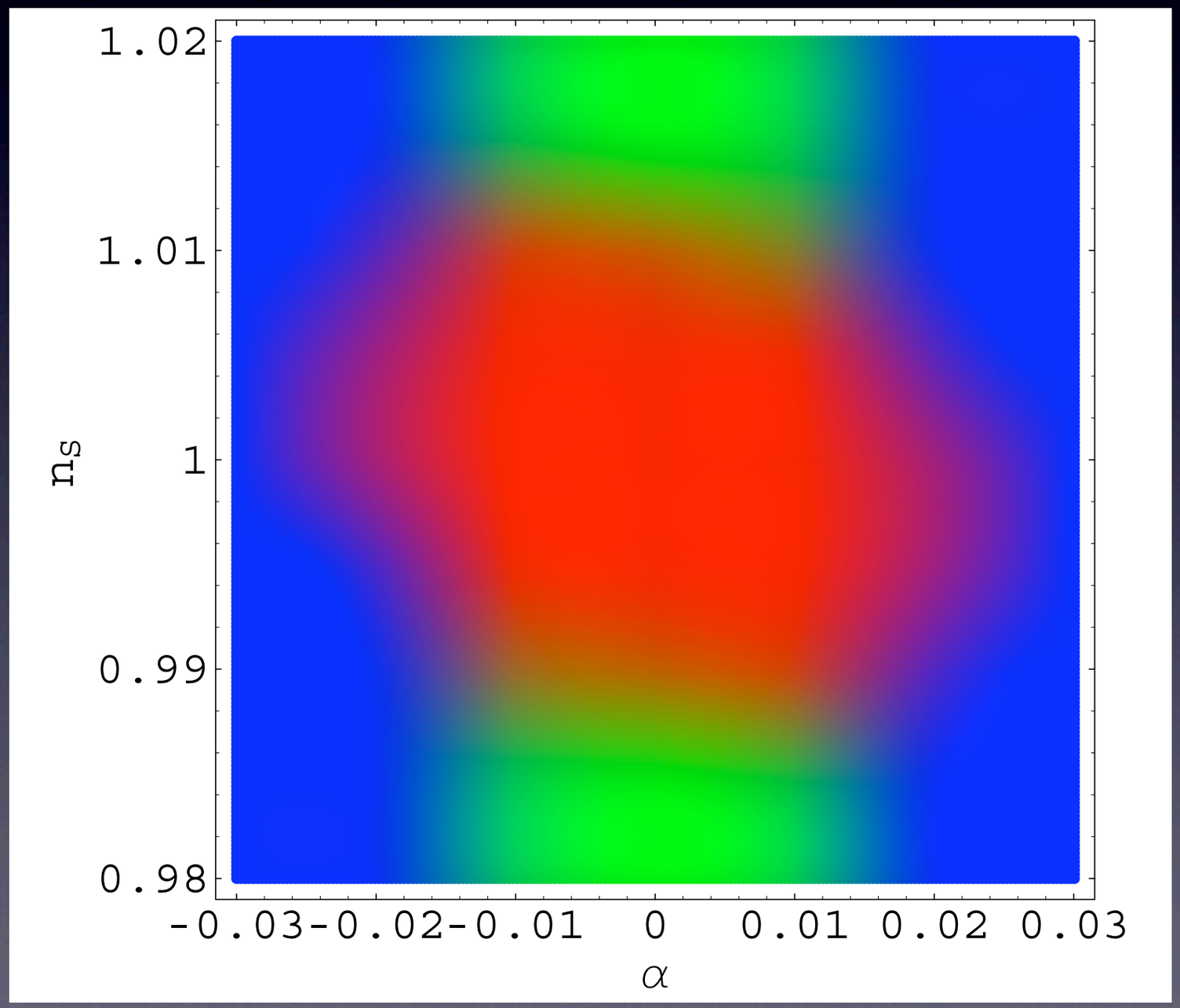

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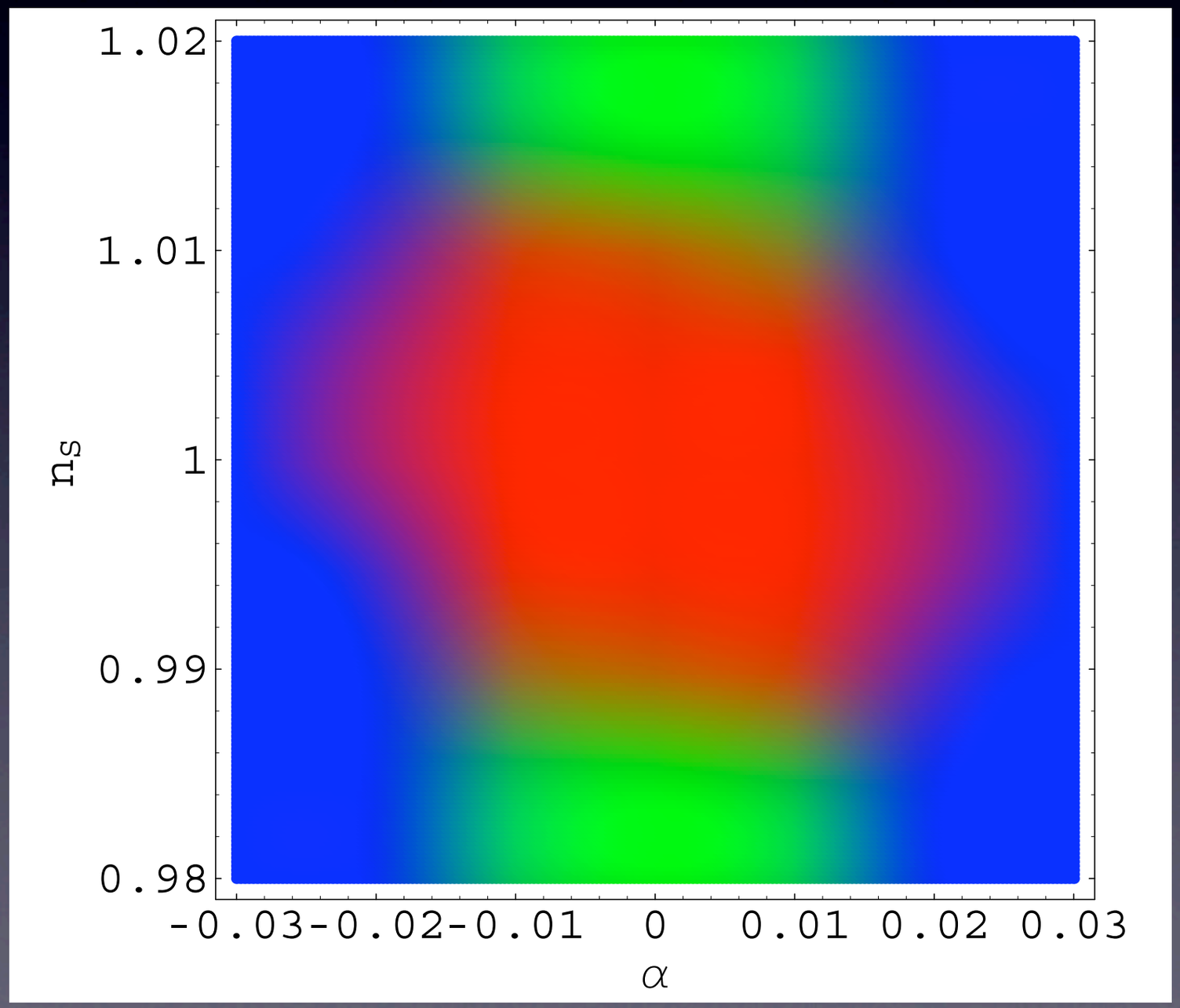

Red: HZ model preferred
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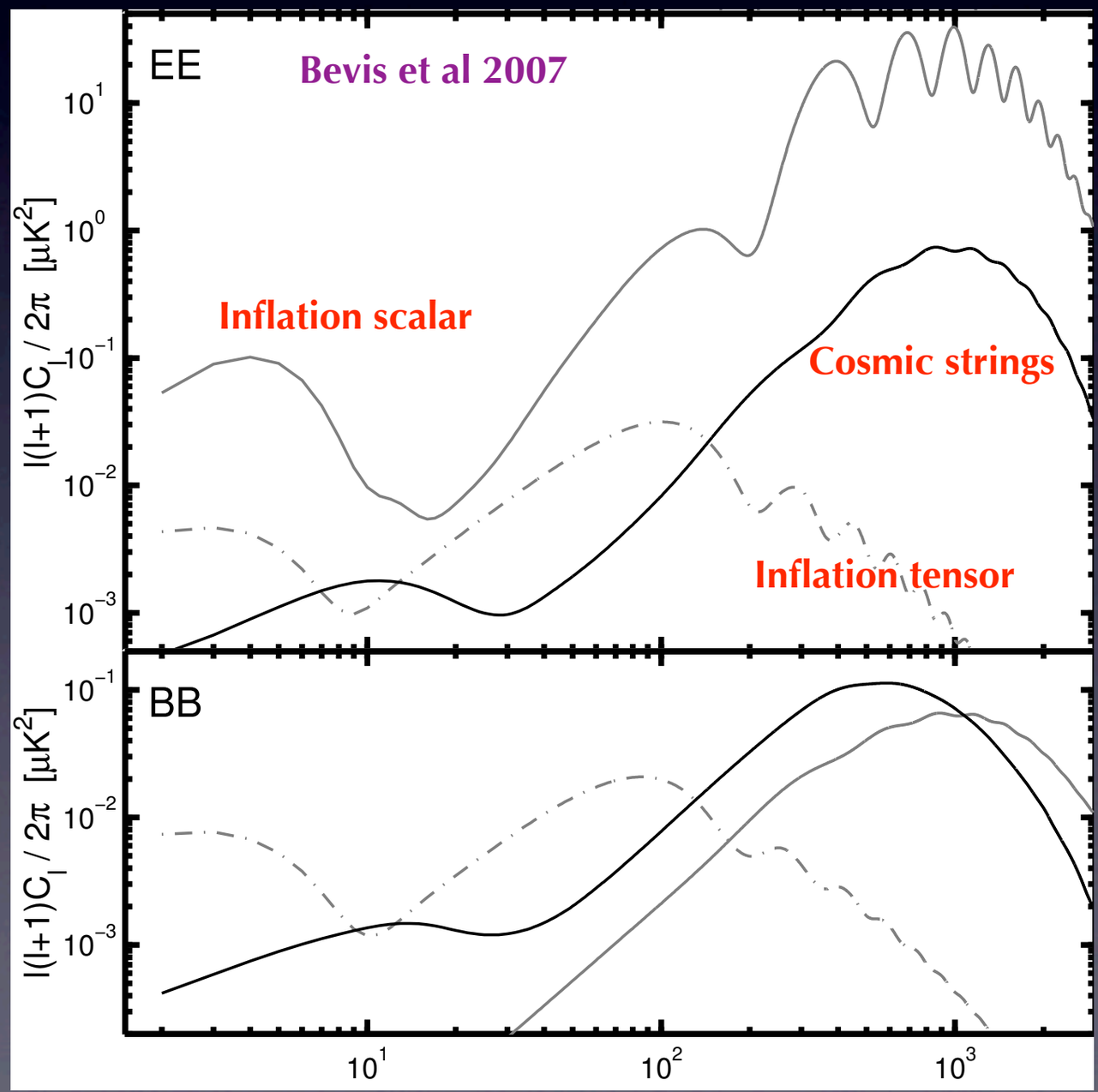

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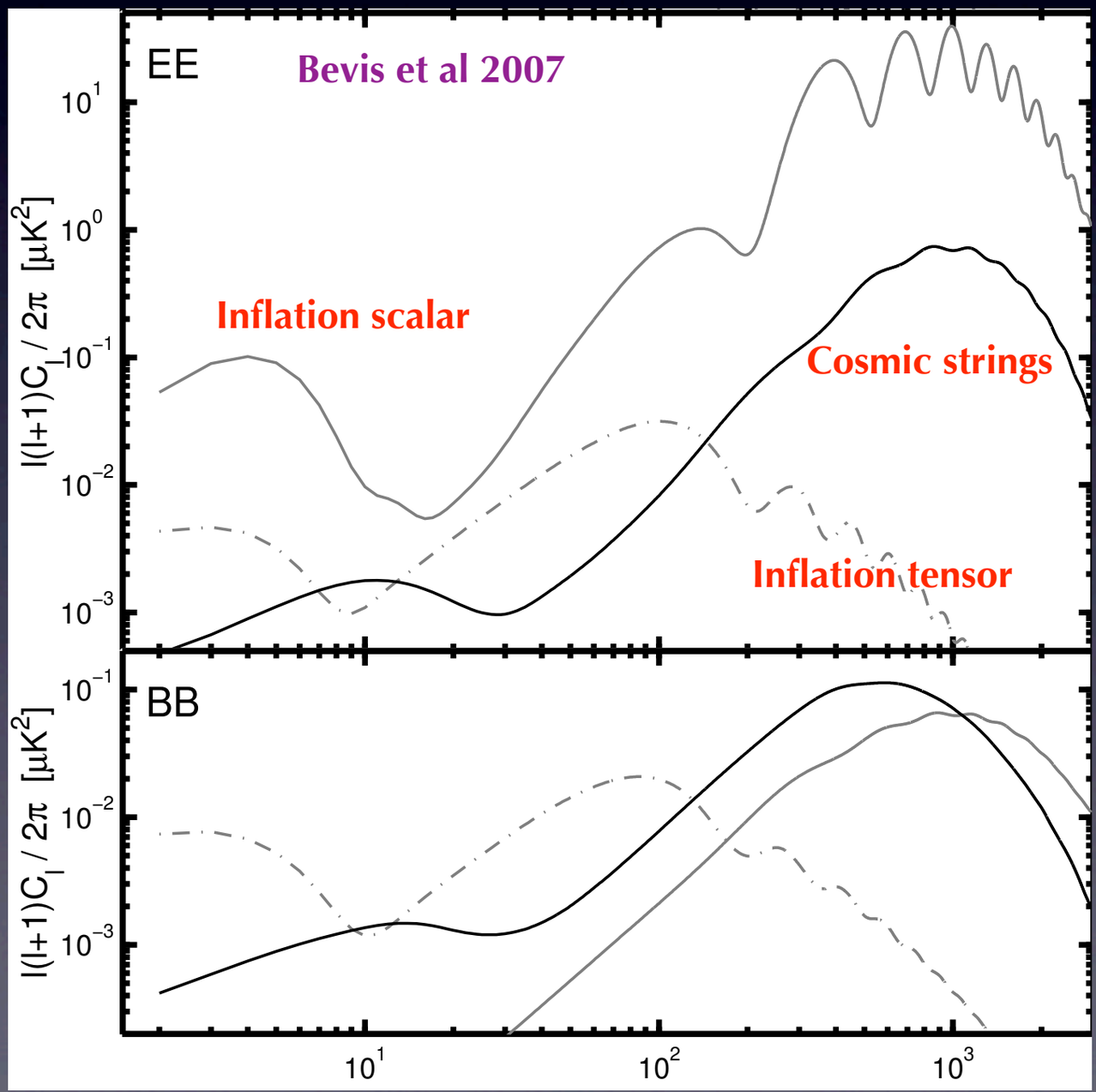

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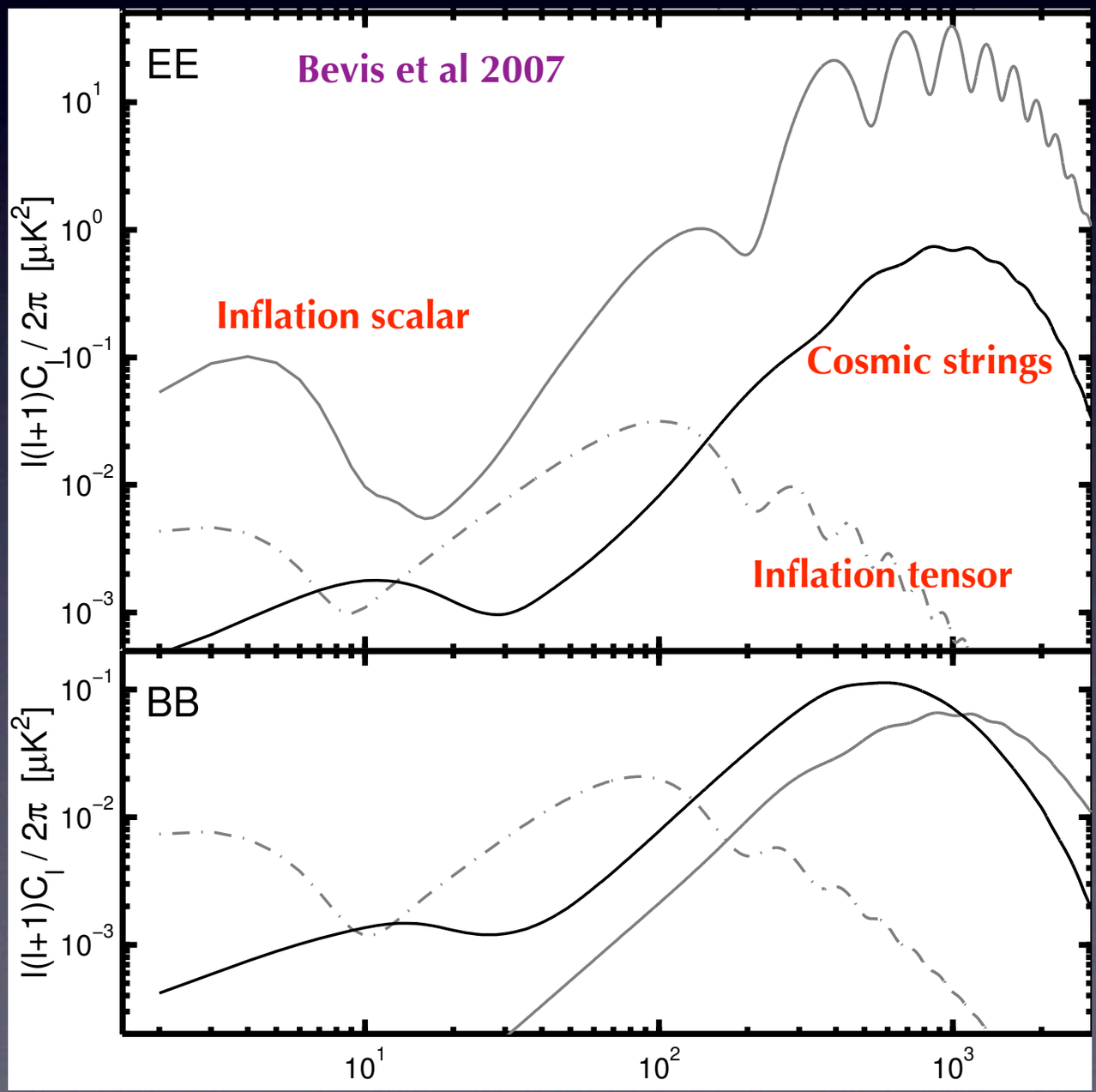

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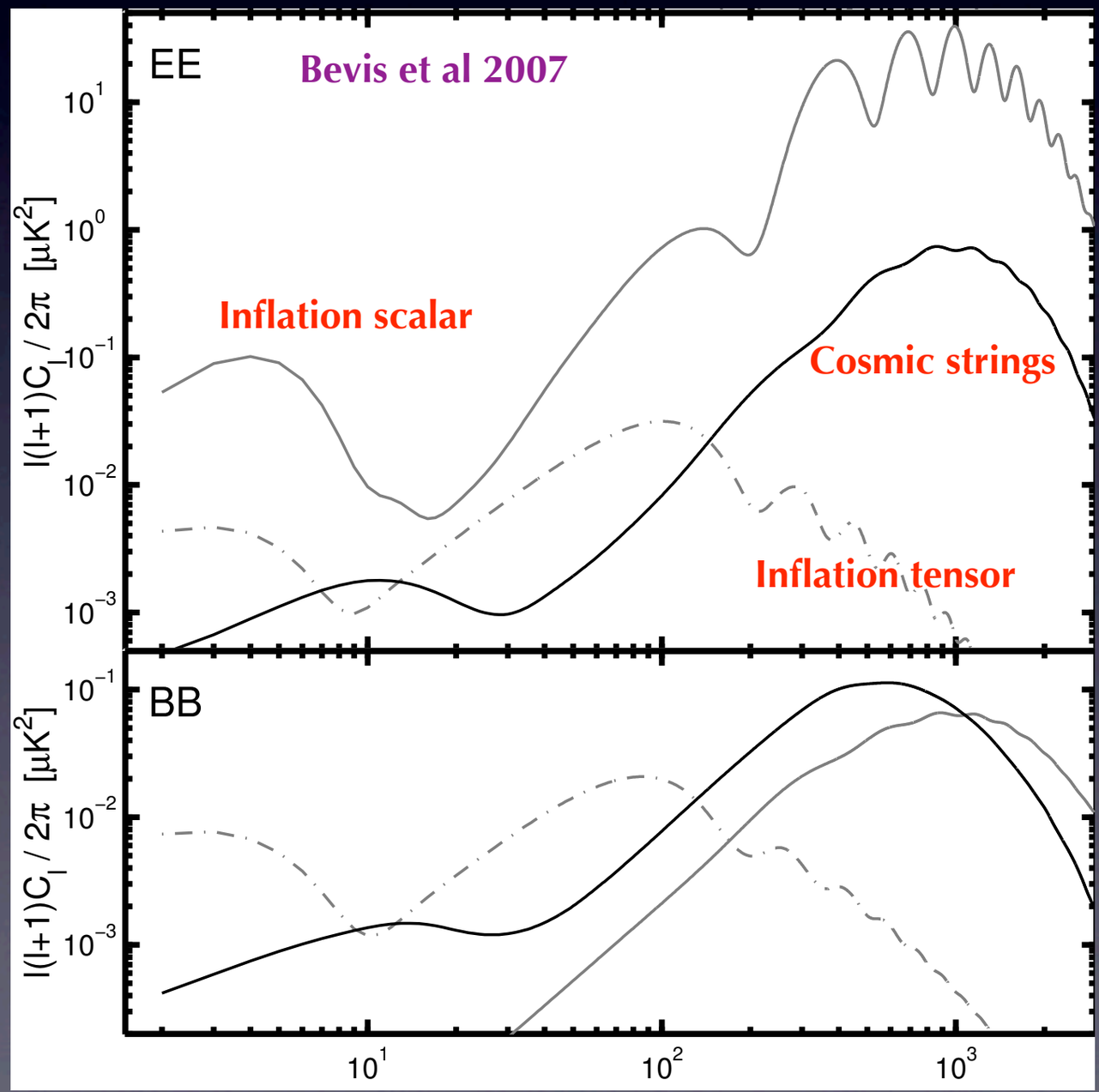

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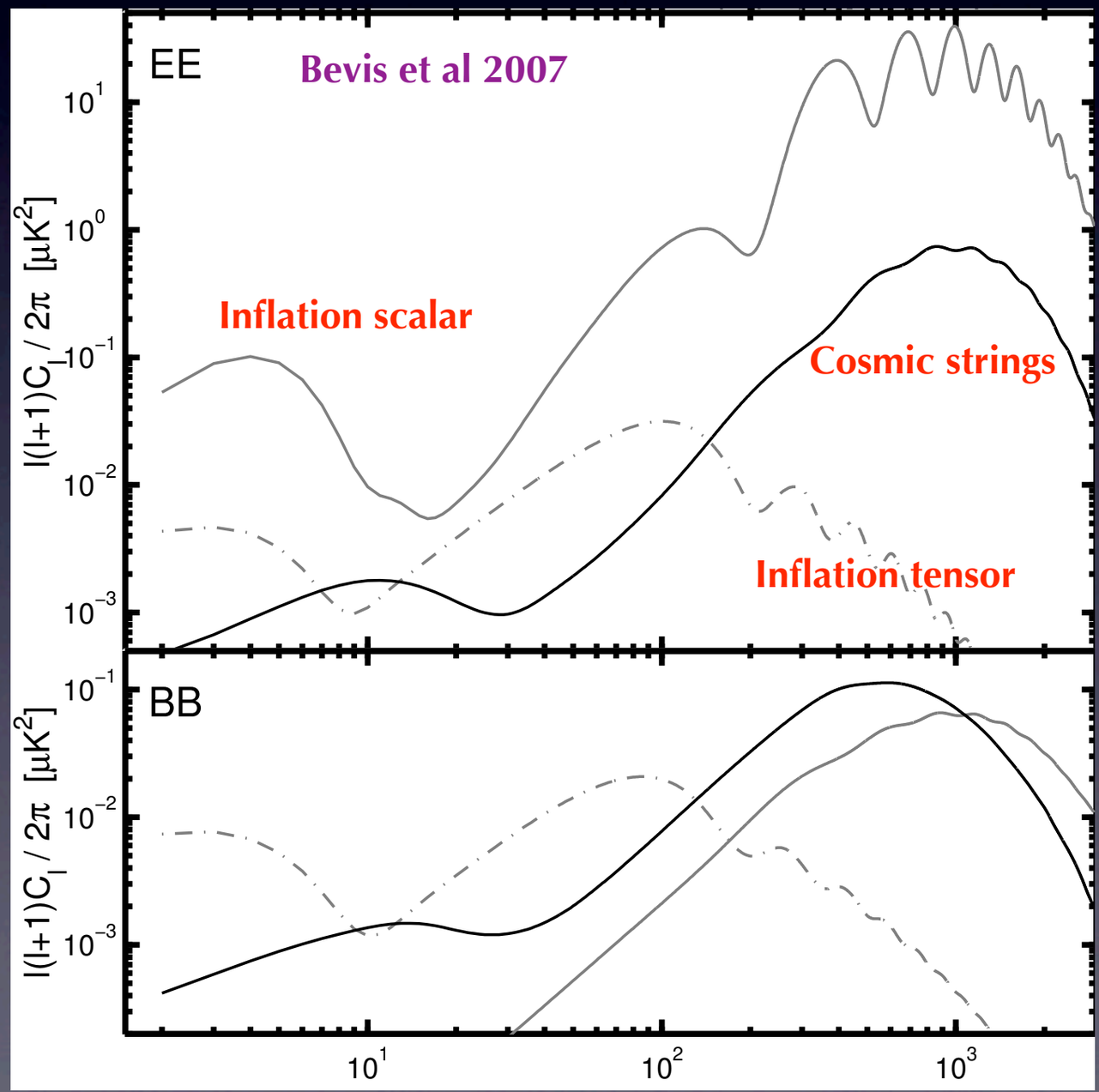

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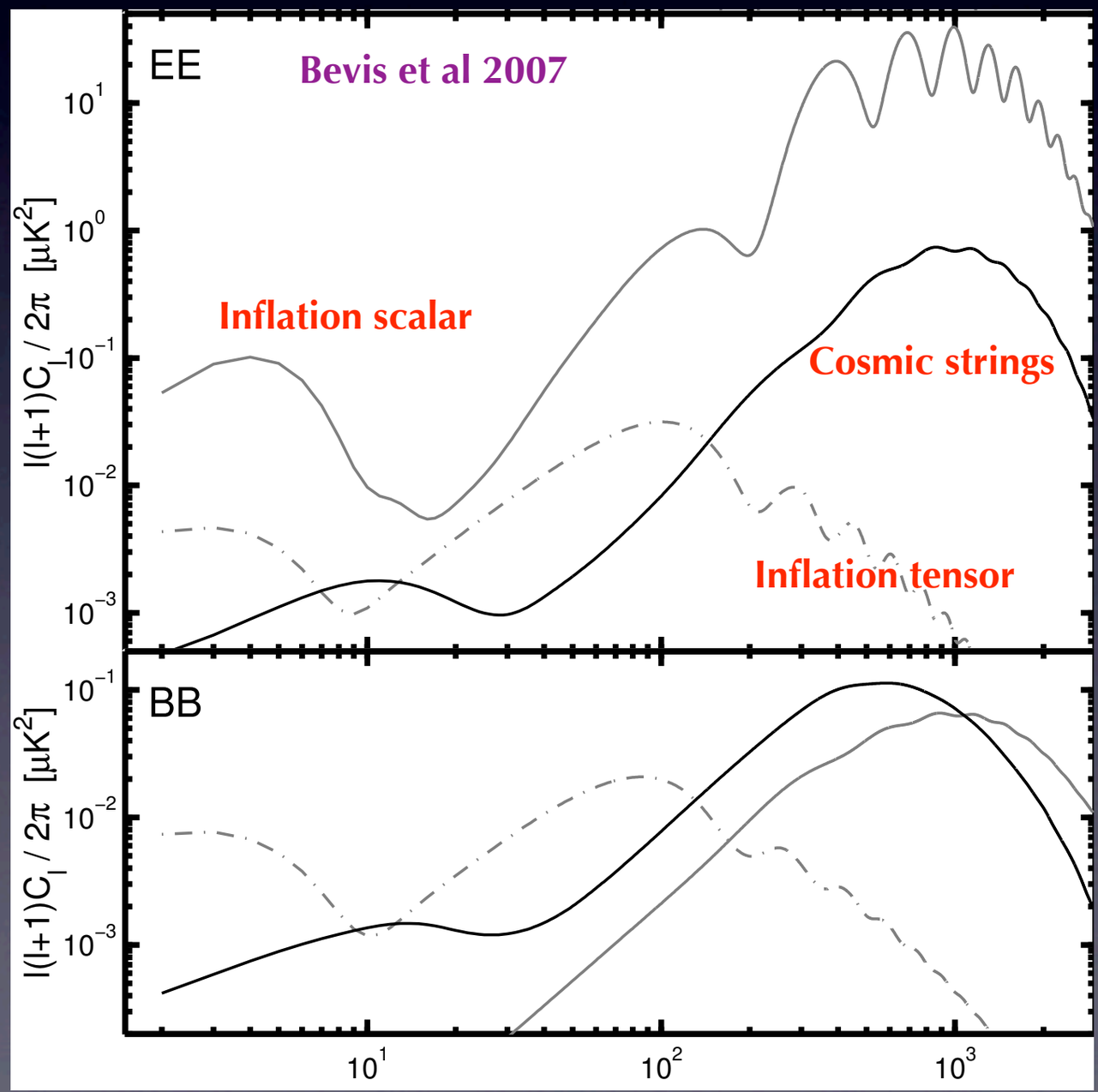

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- Confirmation of scale-dependence of the perturbations ($n \neq 1$) would be a strong indicator of a dynamical origin of perturbations, but is not yet secure.
- Ultimately, only relatively limited information may be available from data to constrain a very wide model space.