



Primordial gravitational waves

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Inflation: Theory and Observations

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Inflation: Theory and Observations

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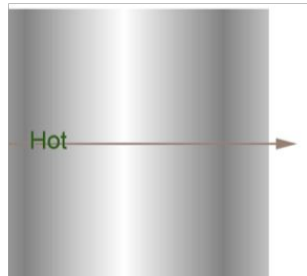
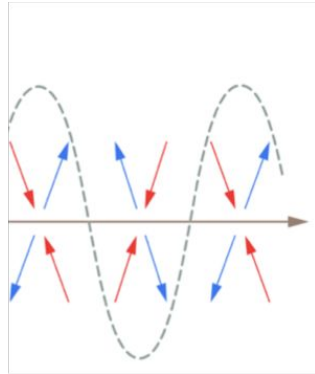
CMB B-mode polarization is window to PGW

Perturbation of metric at inflation

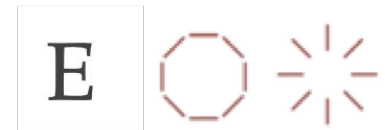
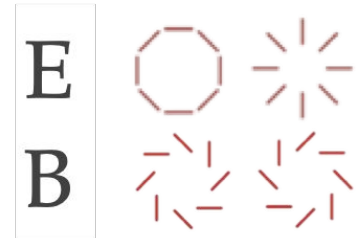
tensor perturbations

scalar perturbations

Classical waves generated



CMB polarization type generated



PGW: theoretical significance

- Tensor metric fluctuations during inflation are primordial gravitational waves.
- Observation of a non-zero tensor amplitude (tensor-to-scalar ratio r).
 - Glimpse of **quantum gravity** at work.
- In simple models:
 - Related to **energy scale** of inflation,
 - Constrains **distance traversed by the inflaton**.

PGW: theoretical targets

- $r \gtrsim 0.01$:
 - Super-Planckian inflaton field excursion,
 - Evidence for approximate shift symmetry in quantum gravity.
- $r \gtrsim 0.001$:
 - Evidence for the simplest models of inflation which naturally n_s predict observed n_s and have a characteristic scale $> M_p$.
(cf. Starobinsky's R^2 inflation, Higgs inflation, α -attractors, ...).
- Non-detection:
 - Vast restriction of inflationary model space,
 - Insights into physics at very high scales.

CMB-S4 will detect or rule out targets

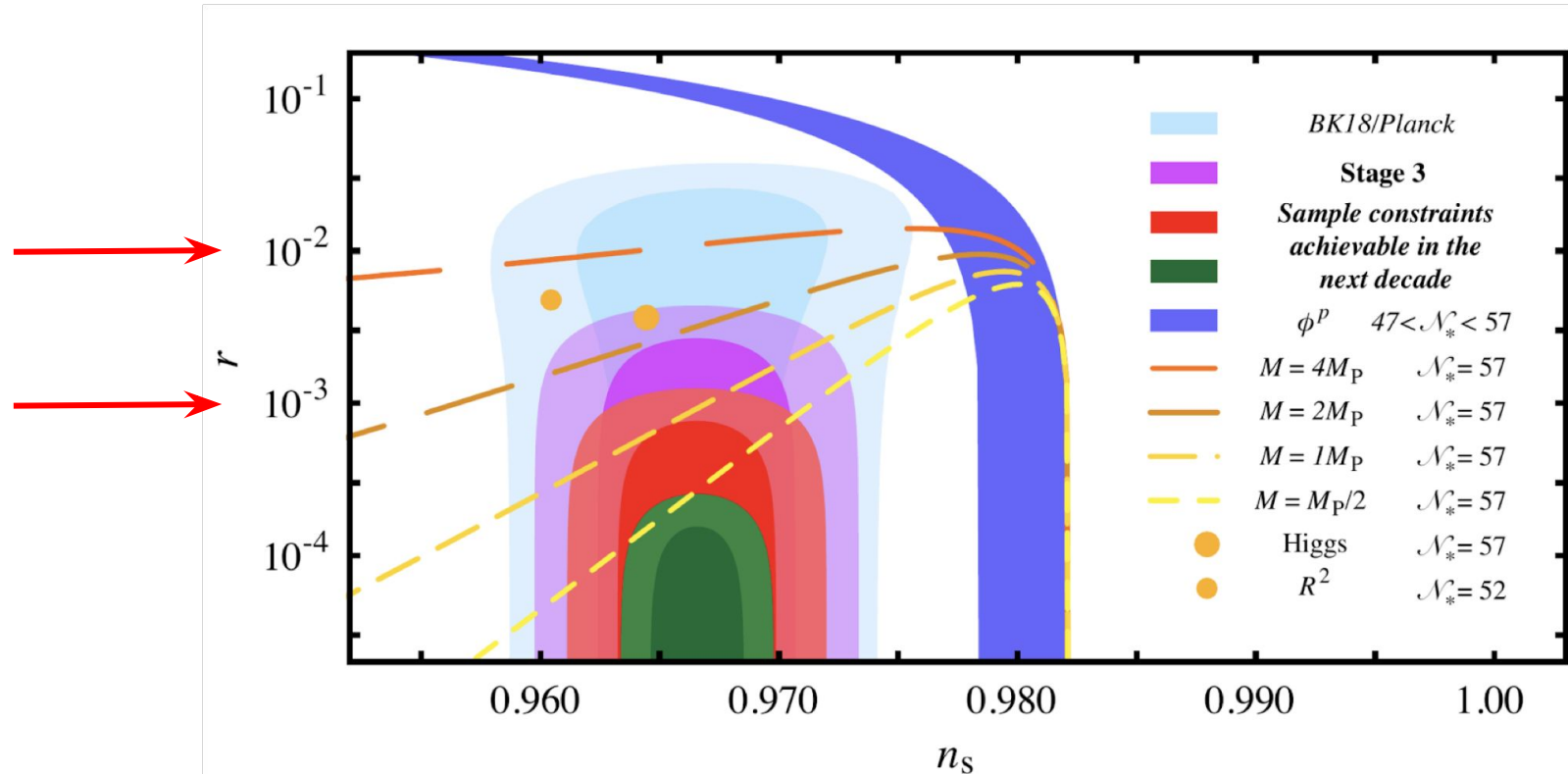


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