On the prior dependence of constraints on the tensor-to-scalar ratio

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We investigate the prior dependence of constraints on cosmic tensor perturbations. Commonly imposed is the strong prior of the single-field inflationary consistency equation, relating the tensor spectral index nT to the tensor-to-scalar ratio r. Dropping it leads to significantly different constraints on nT, with both positive and negative values allowed with comparable likelihood, and substantially increases the upper limit on r on scales k = 0.01 Mpc^-1 to 0.05 Mpc^-1, by a factor of ten or more. Even if the consistency equation is adopted, a uniform prior on r on one scale does not correspond to a uniform one on another; constraints therefore depend on the pivot scale chosen. We assess the size of this effect and determine the optimal scale for constraining the tensor amplitude, both with and without the consistency relation.

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