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How robust are axion isocurvature constraints in high-scale inflation?

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Axions are a well-motivated candidate to solve the strong CP problem and may also make up the observed dark matter energy density. But if the axion is massless during inflation, it gets fluctuations of order the Hubble parameter, which are later imprinted in the cosmic microwave background (CMB) as isocurvature fluctuations. Near-future experiments will seek to detect primordial gravitational waves imprinted in the tensor modes of the CMB. Any detection would signal that inflation occurred at a high scale. This, along with the present non-detection of isocurvature modes, would then place severe constraints on axion models with Peccei-Quinn breaking scales larger than the Hubble parameter during inflation. I will discuss whether it is possible to alleviate such constraints by generating a large mass for the axion during inflation.

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