

Varying couplings in the early universe: correlated variations of α and G

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The Cosmic Microwave Background anisotropies provide a unique opportunity to constrain simultaneous variations of the fine-structure constant α and Newton's gravitational constant G . Those correlated variations are possible in a wide class of theoretical models. In this brief paper we show that the current data, assuming that particle masses are constant, gives no clear indication for such variations, but already prefers that any relative variations in α should be of the same sign of those of G for variations of $\sim 1\%$. We also show that a cosmic complementarity is present with Big Bang Nucleosynthesis and that a combination of current CMB and BBN data strongly constraints simultaneous variations in α and G . We finally discuss the future bounds achievable by the Planck satellite mission.

Comments: 6 pages, 5 figures; one author added, now includes discussion of BBN constraints

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