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New developments in the inflationary scenario

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The present upper limit on the amount of tensor perturbations (primordial gravitational waves) generated during inflation, the tensor-to-scalar ratio r < 0.03, excludes many inflationary models popular in the past, like those with a power-law inflaton potential ('chaotic inflation'). However, a number of viable inflationary models still remain including the three one-parametric models: the pioneer R^2 one, the Higgs and the mixed R^2-Higgs models whose unambiguous target prediction is $r = 3(1 - n_s)^2 = 0.004$. New developments in these models are mostly related to their behaviour after inflation including creation and heating of usual matter. I consider one possibility of relating the purely geometrical R^2 model to realistic baryogenesis after inflation by adding three families of right-handed Majorana neutrinos with a large mass to the matter sector of the Standard Model. Another trend in the inflationary scenario is to think what was before inflation. This is natural since duration of the inflationary epoch was finite inside our past light-cone. I discuss different possibilities proposed historically with the main emphasis on isotropic bounce due to positive spatial curvature, or even in its absence, or alternatively, generic anisotropic singularity with curvature much exceeding that during the observable part of inflation.

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