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Primordial black hole formation during preheating?

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One of the main difficulties in scenarios involving primordial black holes (PBHs) are the rather special conditions required to produce them, typically demanding major tunings in the inflationary potential or very specific conditions following phase transitions. Some authors have found a promising alternative in the preheating epoch, just after inflation, when metric feedback would resonantly boost the growth of perturbations to the point of generically creating PBHs. This phenomenon could be followed by simply studying a quadratic approximation for the (post-accelerated expansion) inflaton potential. We revisit this issue, discussing the extent to which: i) This framework effectively eases the formation of PBHs. ii) The quadratic approximation for the inflaton potential generically captures the quantitative dynamics. iii) The inflaton self-potential beyond the quadratic approximation can be used to boost PBH formation.

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