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PBH formation during preheating

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We examined the production of large curvature perturbations that may lead to PBH formation in the early universe, in particular during preheating. At this stage, large non-linear dynamics lead to the exponential amplification of field perturbations that can ultimately collapse into a black hole or form semi-stable configurations such as oscillons (DM candiate). The details of this phenomenon are directly linked to the features of the inflaton potential and type of inflation. We aim at easing the apparent confusion in the community regarding this issue and provide a consistent view of the conditions that actually lead to PBH formation. Many promising avenues follow from the previous approach, for instance the fate of single oscillons, the evolution of clusters of oscillons or the formation of PBHs in multi-field inflation scenarios to name a few, all of them reserch directions that might be important for the PBH community. This is a work in collaboration with Guillermo Ballesteros (IFT), Marco Taoso (INFN) and Pasquale Serpico (LAPTh/CNRS).

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