

In this paper, we consider a spectator scalar field along with an inflaton field without having any direct coupling between them. In this context the spectator field have a subdominant contribution to the total energy density, which helps to surpass the existence of a short-lived, fine-tuned ultra-slow roll (USR) phase as appearing in the case of single-field models of inflation necessarily required for PBH formation at a certain scale. Here the framework is constructed with a scalar spectator field in addition to a speed breaker/bump induced α -attractor model of inflation, which further helps to resolve the well-known long-standing fine-tuning problem of PBH production by allowing a new tachyonic instability-induced prolonged phase originating from isocurvature perturbations, instead of a USR phase. In this framework a considerable amount of power is transferred from isocurvature to curvature perturbation modes. Such construction further helps to reduce the amount of fine-tuning propagated in the production of primary and scalar-induced gravitational waves (SIGWs) through power amplification. Last but not the least, by allowing a bilinear quadratic coupling between the inflaton and spectator field and a Yukawa-type non-minimal coupling between gravitational sector and spectator field, which are active at the end or later stage of inflation, we finally study the enhancement in the baryon asymmetry parameter compared to its background value, which is at par with its observed value.