

Gauge invariant quantum backreaction in U (1) axion inflation

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We evaluate the quantum backreaction due to a gauge field coupled to a pseudo scalar field driving a slow-roll inflationary stage, the so-called axion inflation. The backreaction is evaluated for the first time using a gauge invariant approach, going to second order in perturbation theory and considering inflaton fluctuations as well as scalar perturbations of the metric. Within our gauge invariant, but observer-dependent approach, we naturally consider as physical observer the one comoving with the inflaton field. Looking at the effective expansion rate and slow-roll parameter we show how the backreaction of the gauge field quickly becomes non-negligible and brings the system out of the perturbative regime, towards what is often called the strong backreaction regime.

Primary authors: CAMPANELLA GALANTI, Davide; CONZINU, Pietro (Istituto Nazionale di Fisica Nucleare & Università di Pisa); MAROZZI, Giovanni (Istituto Nazionale di Fisica Nucleare); SANTOS DA COSTA, Simony (Istituto Nazionale di Fisica Nucleare)

Presenter: SANTOS DA COSTA, Simony (Istituto Nazionale di Fisica Nucleare)