Contribution ID: **131** Type: **not specified**

Improving the description of Schwinger pair production during axion inflation

Wednesday 25 September 2024 14:32 (16 minutes)

Axion inflation is a well-motivated inflationary model with many fascinating phenomenological consequences, for example, the production of large scalar perturbations, which could seed primordial black holes and source scalar-induced gravitational waves. Furthermore, the parity-violating nature of axion inflation implies the production of circularly polarized gravitational waves. The production of gauge fields during axion inflation also allows for a possible study of reheating after inflation.
Importantly, strong electromagnetic fields sourced during axion inflation can also lead to fermion production via the well-known Schwinger effect. This is especially relevant when the inflaton field couples to the U(1)-hypercharge gauge field, which is guaranteed to couple to fermionic charge carriers, i.e., the Standard Model fermions. In our study, we improve upon the current modeling of Schwinger pair production during axion inflation by explicitly accounting for the typical spatial separation of fermion pairs at the time of production. This introduces a new scale in the backreaction of Schwinger pair production which affects the damping of the gauge fields by the conducting medium. Furthermore, we demonstrate how moving away from the typical assumption of collinear hyperelectric and -magnetic fields allows one to simultaneously resolve an ambiguity that previously existed in the literature. This work therefore presents an important step forward towards a complete understanding of gauge-field production during axion inflation.

Primary authors: SCHMITZ, Kai (University of Münster); Dr SOBOL, Oleksandr (Institute for Theoretical Physics, University of Münster); VON ECKARDSTEIN, Richard (Institute for Theoretical Physics, University of Münster)

Presenter: VON ECKARDSTEIN, Richard (Institute for Theoretical Physics, University of Münster)

Session Classification: Parallel Wednesday Cosmo 2

Track Classification: Cosmology & Astroparticle Physics