European Physical Journal D 2014 vol.68 N6

Axion-induced oscillations of cooperative electric field in a cosmic magneto-active plasma

Balakin A., Muharlyamov R., Zayatsa A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We consider one cosmological application of an axionic extension of the Maxwell-Vlasov theory, which describes axionically induced oscillatory regime in the state of global magnetic field evolving in the anisotropic expanding (early) universe. We show that the cooperative electric field in the relativistic plasma, being coupled to the pseudoscalar (axion) and global magnetic fields, plays the role of a regulator in this three-level system; in particular, the cooperative (Vlasov) electric field converts the regime of anomalous growth of the pseudoscalar field, caused by the axion-photon coupling at the inflationary epoch of the universe expansion, into an oscillatory regime with finite density of relic axions. We analyze solutions to the dispersion equations for the axionically induced cooperative oscillations of the electric field in the relativistic plasma.

http://dx.doi.org/10.1140/epjd/e2014-50131-6