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Axion-photon-dark photon oscillation and its implication for 21 cm observation

Wednesday 4 December 2019 15:00 (30 minutes)

We examine the resonant conversion of axion-like particle (ALP) or dark photon to the electromagnetic photon in the early Universe, which takes place due to the ALP-photon-dark photon oscillations in background dark photon gauge fields. It is noted that the corresponding conversion probability can have an unusual spectral feature which allows strong conversion at low frequency domain, but has negligible conversion at high frequencies above certain critical frequency which is determined by the ALP coupling to dark photon and the strength of background dark photon gauge field. We apply this scheme to heat up the 21 cm photons without affecting the Cosmic Microwave Background, which can explain the tentative absorption signal of 21 cm photons detected recently by the EDGES experiment.

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