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Cosmological adiabatic conversion between QCD axion and ALP

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We study the adiabatic conversion between the QCD axion and axion-like particle (ALP) at level crossing which occurs when their masses become close to each other in the early universe. This is similar to the Mikheyev-Smirnov-Wolfenstein effect in neutrino oscillations. I explain a scenario where the ALP produced by the adiabatic conversion of the QCD axion explains the observed dark matter abundance. Interestingly, the ALP-photon coupling is enhanced by a few orders of magnitude, which is advantageous for the on-going and future axion search experiments using the axion-photon coupling.

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