



2) “QCD Axion Dark Matter: Enhanced Abundance via Level Crossing”

by Yuma Narita (Tohoku University)

Time and Date: 13:00-15:30, Feb 17, 2025

Place: Room 745, Science Complex B (H-03) (hybrid)

Registration: "<https://us02web.zoom.us/meeting/register/3eUGLMGbTh-nexYxiw4dlg>"

We investigate the level-crossing phenomenon in two-axion systems, where the mass eigenvalues intersect as the mass of one axion increases with the cooling of the universe. This phenomenon can significantly alter the abundance of axions in the early universe. Our study focuses on its impact on the QCD axion and an axion-like particle, identifying viable regions of axion mass and decay constant that explain the observed dark matter. Furthermore, we derive an improved expression for the adiabatic condition that overcomes limitations in earlier formulations and we numerically validate its effectiveness. Our analysis reveals specific relations between axion masses and axion-photon couplings within the viable region. These relations could potentially serve as a smoking gun signal for this scenario if confirmed experimentally.

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