Contribution ID: **97** Type: **Contributed Oral**

Photon-Dark Photon Conversion with Multiple Level Crossings

Saturday, 17 February 2024 21:30 (15 minutes)

Dark photons can oscillate into Standard Model (SM) photons via kinetic mixing. The conversion probability depends sensitively on properties of the ambient background, such as the density and electromagnetic field strength, which cause the SM photon to acquire an in-medium effective mass. Resonances can enhance the conversion probability when there is a level-crossing between the dark photon and background-dependent SM photon states. In this work, we show that the widely used Landau-Zener (LZ) approximation breaks down when there are multiple level-crossings due to a non-monotonic SM photon potential. Phase interference effects, especially when the dark photon mass is close to an extremum of the SM photon effective mass, can cause deviations from the LZ approximation at the level of a few orders of magnitude in the conversion probability. We present an analytic approximation that is valid in this regime and that can accurately predict the conversion probabilities in a wide range of astrophysical environments.

Your Email

nirmalya.brahma@mail.mcgill.ca

Supervisor

Katelin Schutz

Supervisor Email

katelin.schutz@mcgill.ca

Affiliation

McGill University

Your current academic level,

PhD student

Primary author: BRAHMA, Nirmalya (McGill University)

Presenter: BRAHMA, Nirmalya (McGill University)

Session Classification: Evening 4 - Feb. 17, 2024