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広島大学極限宇宙研究拠点セミナー

Hiroshima University CORE-U Seminar

講師: 横崎 統三氏 (浙江大学)

Speaker: Prof. Norimi Yokozaki (Zhejiang University)

Title:
Spontaneous CP violation, sterile neutrino dark matter
and leptogenesis

Date : 13th.May.2025 (Tue) (14:35-16:05)
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Place: 広島大学理学部E211教室 (ハイブリッド)

Room E211, Faculty of Science, Hiroshima University

Abstract: See the other side of the poster

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(Oral in Japanese, Slides in English)

Teams Link :

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世話人 連絡先 広島大学素粒子ハドロン理論研究室 両角卓也

Contact Takuya Morozumi, Theoretical Particle and Hadron physics Group, Hiroshima University

morozumi_at_hiroshima-u.ac.jp (_at_ は@に変更ください: change _at_ to @)

広島大学極限宇宙研究拠点 (Core-U) セミナー 世話人

山口頼人、水野恒史、両角卓也

Organizers : Yorito Yamaguchi, Tsunefumi Mizuno ,Takuya Morozumi

Abstract

The remaining challenges of the Standard Model are to address the strong CP problem and explain the origins of dark matter and the baryon asymmetry of the universe. To tackle these issues, we have developed a model of spontaneous CP symmetry breaking in a five-dimensional space-time, which has the potential to resolve the strong CP problem. Additionally, we introduce three right-handed neutrinos and a $U(1)_{B-L}$ gauge interaction in the bulk to account for the nature of dark matter and the baryon asymmetry of the universe.

The wave-function profiles in the fifth dimension can suppress dangerous operators allowed by symmetries, and the scale of spontaneous CP symmetry breaking and the reheating temperature can be sufficiently large to be consistent with thermal leptogenesis. The lightest right-handed neutrino acts as dark matter with a mass of $O(10)$ keV. This small mass and the necessarily small mixing are explained by the exponentially localized wave-function in the fifth dimension due to a bulk mass term. The correct relic abundance is achieved thanks to the $U(1)_{B-L}$ gauge interaction, even with the small mixing.