KPS 한국물리학회

2023 KPS Fall Meeting

2023년 가을 학술논문발표회 및 임시총회

일시 : 10월 24일(화) ~ 27일(금)

장소 : 창원컨벤션센터(CECO)

- 2023.10 제41권 제2호
- Bulletin of the Korean Physical Society
- 한국물리학회 회보

후원 경상남도 GYEONGNAM 창원시 GNTO 경남관광재단 GYEONGNAM TOURISM ORGANIZATION

F9.05 [15:24 - 15:36]
Effect of Adult-Born Immature Granule Cells on Pattern Separation in A Biological Network of The Hippocampal Dentate Gyrus / KIM Sang-Yoon[1], LIM Woo-chang*[1] ([1]Daegu National University of Education)

[F10-co] Focus: Topological Phenomena in Mesoscopic Physics
2023. 10. 26 Thursday 14:00~15:48
Room: 700A
좌장 : 명노준 조선대학교
Chair: MYOUNG Nojoon (Chosun University)

F

F10.01 [14:00 - 14:24]
Braiding of anyons at a quantum point contact / SIM Heung-Sun*[1] ([1]Department of Physics, KAIST)

F10.02 [14:24 - 14:48]
Topological edge modes and band-crossings from compact localized states / RHIM Jun Won*[1] ([1]Department of Physics, Ajou University)

F10.03 [14:48 - 15:12]
Topological Magnonics: Hall, Spin Hall, and Orbital Hall Effects of Magnons / KIM Se Kwon*[1], GO Gyungchoon[1] ([1]Department of Physics, KAIST)

F10.04 [15:12 - 15:36]
Strong interlayer coupling and stable topological flat bands in twisted bilayer photonic Moiré superlattices / YI Chang-Hwan*[1] ([1]Center for Theoretical Physics of Complex Systems, IBS)

F10.05* [15:36 - 15:48]
Revealing inverted chirality of hidden domain wall states in multiband systems without topological transition / CHEON Sang Mo*[1,3], KIM Tae-Hwan[2], HAN Sang-Hoon[1,3], JEONG Seung-Gyo[2] ([1]Department of Physics, Hanyang University, [2]Department of Physics, POSTECH, [3]Research Institute for Natural Science and High Pressure, Hanyang University)

Effect of Adult-Born Immature Granule Cells on Pattern Separation in A Biological Network of The Hippocampal Dentate Gyrus

학술대회 명 2023 KPS Fall Meeting | **접수일** 2023-08-08

발표분야 Statistical Physics | **서브발표분야** Complex Systems

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Presentation materials There is no data.

Abstract:

Young immature granule cells (imGCs) appear via adult neurogenesis in the hippocampal dentate gyrus (DG). In comparison to mature GCs (mGCs) (born during development), the imGCs exhibit two competing distinct properties such as high excitability (increasing activation degree) and low excitatory innervation (reducing activation degree). We develop a spiking neural network for the DG, incorporating both the mGCs and the imGCs. The mGCs are well known to perform "pattern separation" (i.e., a process of transforming similar input patterns into less similar output patterns) to facilitate pattern storage in the hippocampal CA3. In this paper, we investigate the effect of the young imGCs on pattern separation of the mGCs. The pattern separation efficacy (PSE) of the mGCs is found to vary through competition between high excitability and low excitatory innervation of the imGCs. Their PSE becomes enhanced (worsened) when the effect of high excitability is higher (lower) than the effect of low excitatory innervation. In contrast to the mGCs, the imGCs are found to perform "pattern integration" (i.e., making association between dissimilar patterns). Finally, we speculate that memory resolution in the hippocampal CA3 might be optimally maximized via mixed cooperative encoding through pattern separation and pattern integration.

Keywords:

Hippocampal dentate gyrus, Adult neurogenesis, Immature granule cells, High excitability, Low excitatory innervation