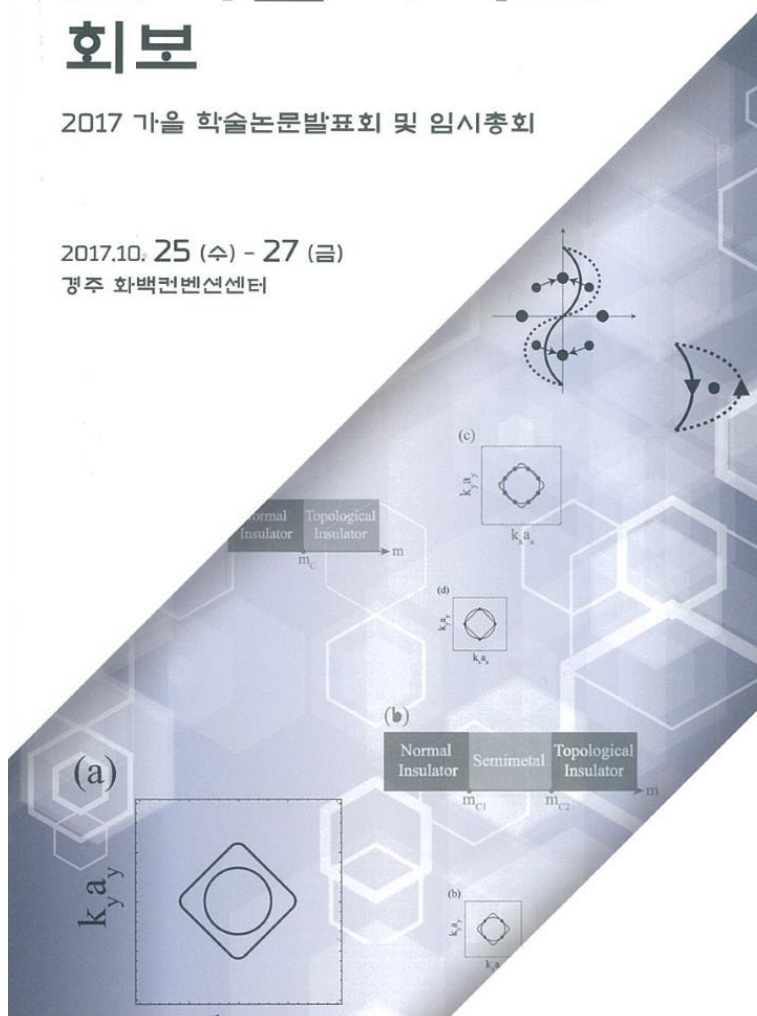K؟S 한국물리학회
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한국물리학회 회보

2017 가을 학술논문발표회 및 임시총회

2017.10. 25 (수) - 27 (금)
경주 화백컨벤션센터

2017 October 26(Thu) 14:00—15:48

[E1-pa] Accelerator-based particle physics experiments II
2017. 10. 26 Thursday 14:00 − 15:48
Room : 101
좌장 : 김 철 서울과기대

Chair : KIM Chul (Seoul National University of Science and Technology)

E1.01* [14:00 - 14:12]
Study of Drell-Yan differential cross section with 2016 data /
배달민[1], 유휘동[*1] ([1]서울대학교, 물리천문학부)

E1.02 [14:12 - 14:24]
Initial state radiation at LHC / CHOI Junho[1], KIM Junho[1], SEO Hyon San[1], PARK Jaegyun[1], ALMOND John Leslie[1], YANG Un-ki[*1] ([1]Department of Physics and Astronomy, Seoul National University)

E1.03 [14:24 - 14:36]
A study of Initial State gluon Radiation at Tevatron using CDF data / YU Geum Bong[1], SEO Hyon San[1], KIM Junho[1], CHOI Junho[1], YANG Un-ki[*1] ([1]Department of Phyiscs and Astronomy, Seoul National University)

E1.04* [14:36 - 14:48]
Differential cross section measurement of ttbb in the lepton + jets decay mode / AN Seo Hyun[*1], KIM Tae Jeong[1], GOH Jung Hwan[1], PARK Ji Won[1] ([1]Department of Physics, Hanyang University)

E1.05 [14:48 - 15:00]
Higgs to WW measurements with 15.2/fb of 13 TeV proton-proton collisions / 이상은[*1], 박상일[1] ([1]경북대학교, 물리학과)

E1.06* [15:00 - 15:12]
Quark Gluon Classification with Deep Learning / YANG Seungjin[1], PARK Inkyu[*1], LEE Jason Sang Hun[1], WATSON Ian James[1], LEE Yunjae[1], JANG Woojin[1] ([1]Department of Physics, University of Seoul)

E1.07* [15:12 - 15:24]
Update on a Level-1 pixel based trigger feasibility study for HL-LHC / 김준호[1], SAVOY-NAVARRO Aurore[*3], MOON Chang-Seong[2], YU Geumbong[1], KIM Jaesung[1], YANG Un-Ki[1] ([1]서울대학교, 물리학과, [2]경북대학교, 물리학과, [3]Department of Physics, Paris Diderot University,)

E1.08* [15:24 - 15:36]
Muon ID for CMS Phase II Upgrade / PARK Inkyu[*1], LEE Jason Sang Hun[1], JEON Dajeong[1] ([1]Department of Physics, University of Seoul)

E1.09* [15:36 - 15:48]
Improving Muon Isolation for CMS Phase II Upgrade / KO Byeonghak[1], PARK Inkyu[*1], LEE Jason Sang Hun[1] ([1]Department of Physics, University of Seoul,)

[E2-st] Biophysics
2017. 10. 26 Thursday 14:00 − 15:24
Room : 102
좌장 : 조 정 효 고등과학원
Chair : JO Junghyo (KIAS)

E2.01 [14:00 - 14:24]
Algebraic Test of Material Conservation in Mean Field Theory of Polymers and the Use of Finite Volume Method / KIM Jaeup[*1], YONG Daeseong[1] ([1]Department of Physics, UNIST)

E2.02 [14:24 - 14:36]
Stretching elasticity of a hinged wormlike chain / BENETATOS Panayotis[*1] ([1]Department of Physics, Kyungpook National University)

E2.03 [14:36 - 14:48]
Modeling on target search problem in chromosomes / 이성민[*1], DURANG Xavier[2], 이상훈[2], LIZANA Ludvig[3], 전재형[4] ([1]성균관대학교, 에너지과학과, [2]한국고등과학원, 물리학과, [3]Department of Physics, Umea University, [4]포항공과대학교, 물리학과)

E2.04 [14:48 - 15:00]
Probing live cell mechanics and dynamics with multimodal optical force microscopy / LEE Ga-Young[1], JANG You-Na[2], LEE Kea Joo[2], KIM Kipom[*1] ([1]Korea Brain Research Institute, Research Equipment Core Facility Team, [2]Korea Brain Research Institute, Department of Structure & Function of Neural Network)

E2.05 [15:00 - 15:12]
How to build an optimal nose: Toward the statistical design principles of the olfactory receptor system / BAK Ji Hyun[*1] ([1]KIAS, School of Computational Sciences)

E2.06 [15:12 - 15:24]
Stochastic Burst Synchronization in A Scale-Free Neural Network with Spike-Timing-Dependent Plasticity / LIM Woochang[*1], KIM Sang-Yoon[1] ([1]Institute for Computational Neuroscience and Department of Science

Education, Daegu National University of Education)

E3.01 [14:00 - 14:12]

Stability of Horizon in Kerr-Sen Black Hole / 곽보근(Bogeun Gwak)[*1]
([1]세종대학교, 물리천문학과)

E3.02 [14:12 - 14:24]

Exact Solution of Wormhole Embedded in Expanding Universe / KIM Sung-Won[*1] ([1]Department of Science Education, Ewha Womans University)

E3.03 [14:24 - 14:36]

Revisiting the Blandford-Payne Process / KIM Dong-Hoon[1], KIM Hongsu[*2] ([1]Department of Physics and Astronomy - Astronomy Program, Seoul National University, [2]Optical Astronomy Division, Korea Astronomy and Space Science Institute)

E3.04 [14:36 - 14:48]

Cosmic observables as building blocks of Modified gravities / 이석천[*1], 현영환[2], 김윤배[2] ([1]경상대학교, 기초과학연구소, [2]성균관대학교, 물리학과)

E3.05 [14:48 - 15:00]

Heat capacity of a self-gravitating spherical shell of radiations / 김형찬[*1] ([1]한국교통대학교, 교양학부)

E3.06 [15:00 - 15:12]

Cosmological Constraint on Anisotropic Conformal Gravity in Five Dimensions / KOUWN Seyen[1], OH Phillial[*2], PARK Chan-Gyung[3] ([1]Center for Theoretical Astronomy, Korea Astronomy and Space Science Institute, [2]Department of Physics, Sungkyunkwan University, [3]Division of Science Education and Institute of Fusion Science, Chonbuk National University)

E3.07 [15:12 - 15:24]

General Relativity and Closed String Field Theory / LEE Taejin[*1] ([1]Physics, Kangwon National University)

E3.08 [15:24 - 15:36]

Entropy evolution of moving mirrors and the information loss problem / YEOM Dong-han[*1] ([1]Physics, Asia Pacific Center for Theoretical Physics)

E4.01 [14:00 - 14:27]

Direct measurement of the 7Be(n,α)4He reaction cross sections for the cosmological Li problem / KAWABATA Takahiro[*1], FURUNO T.[1], HASHIMOTO T.[1], ICHIKAWA M.[1], ITOH M.[2], IWASA N.[3], KANADA-EN'YO Y.[1], KOSHIKAWA A.[1], KUBONO S.[4], MIYAWAKI E.[1], MIZUTANI K.[1], MORIMOTO T.[1], MURATA M.[1], NANAMURA T.[1], NISHIMURA S.[4], SAWADA R.[5], TAKEDA T.[1], TSUMURA M.[1], WATANABE K.[1], YOSHIDA S.[6] ([1]Department of Physics, Kyoto University, [2]Research Reactor Institute, Nuclear Engineering Science Division, Kyoto University, [3]Department of Physics, Tohoku University, [4]Japan, RIKEN, [5]Department of Astronomy, Kyoto University, [6]Department of Physics, The University of Tokyo)

E4.02 [14:27 - 14:54]

Big Bang Nucleosynthesis and Beyond / CHEOUN Myung-Ki[*1], KUSAKABE Motohiko[2], KAJINO T.[3], MATHEWS G.[4] ([1]Physics, Soongsil University, [2]Physics, Beihang Unviersity, Peking, China, [3]Theoretical Dept., NAOJ, Japan, [4]Physics, U. of Nortre Dame)

E4.03 [14:54 - 15:21]

γ-ray spectroscopy in the closest vicinity of 78Ni at RIBF / NIIKURA Megumi[*1] ([1]Department of Physics, the University of Tokyo)

E4.04 [15:21 - 15:48]

Nuclear structure study on iodine and tellurium isotopes using in-beam and β-delayed γ-ray spectroscopy / MOON Byul[1], MOON Chang-Bum[*2], HONG Byungsik[1] ([1]Department of Physics, Korea University, [2]Department of Physics, Hoseo University)

E5.01 [14:00 - 14:12]

중학생들의 '운동' 관련 그래프 문제 해결 과정에서의 시선이동 분석 / 송혜영[1], 윤은정[2], 박윤배[*2] ([1]월배중학교, [2]경북대학교, 물리교육과)

E5.02 [14:12 - 14:24]

한국물리학회 여고생 물리캠프 참여 경험에 대한 여학생의 인식 조사 / 강남화[*1], 이나리[1], 정란주[2] ([1]한국교원대학교, 물리교육과, [2]광운대학교,

Stochastic Burst Synchronization in A Scale-Free Neural Network with Spike-Timing-Dependent Plasticity

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[1]Daegu National University of Education, Institute for Computational Neuroscience and Department of Science Education

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Abstract :

We consider an excitatory population of subthreshold Izhikevich neurons which cannot fire spontaneously without noise. As the coupling strength passes a threshold, individual neurons exhibit noise-induced burstings. This neuronal population has adaptive dynamic synaptic strengths governed by the spike-timing-dependent plasticity (STDP). In the absence of STDP, stochastic burst synchronization (SBS) between noise-induced burstings of subthreshold neurons was previously found to occur over a large range of intermediate noise intensities through competition between the constructive and the destructive roles of noise. Here, we study the effect of additive STDP on the SBS by varying the noise intensity D in the Barabasi-Albert scale-free network (SFN) with symmetric preferential attachment with the same in- and out-degrees. This type of SFN exhibits a power-law degree distribution (i.e., scale-free property), and hence it becomes inhomogeneous one with a few "hubs" (i.e., super-connected nodes). Occurrence of a "Matthew effect" in synaptic plasticity is found to occur due to a positive feedback process. Good burst synchronization gets better via long-term potentiation (LTP) of synaptic weights, while bad burst synchronization gets worse via long-term depression (LTD). Consequently, a step-like rapid transition to SBS occurs by changing D, in contrast to the relatively smooth transition in the absence of STDP. Emergence of LTP and LTD of synaptic weights are investigated in details via microscopic studies based on both the distributions of time delays between the nearest burst onset times of the pre- and the post-synaptic neurons and the pair-correlations between the pre- and the post-synaptic IIBRs (instantaneous individual burst rates). We also investigate the effect of network architecture on SBS for a fixed D in the following two cases: (1) variation in the symmetric attachment degree and (2) asymmetric preferential attachment of new nodes with different in- and out-degrees. Finally, a multiplicative STDP case depending on the states is also investigated in comparison with the above additive STDP case (independent of the states).

Keywords :

Spike-Timing-Dependent Plasticity, Stochastic Burst Synchronization, Scale-Free Network, Subthreshold Neurons