



# 한국 물리학회 회보

2012. 10 제30권 제2호

2012년

## 가을학술논문발표회 및 임시총회

보광휘닉스파크(평창)  
2012. 10. 24(수)~26(금)



KPS 한국물리학회  
The Korean Physical Society

**SESSION F****통계물리학분과회****[FG1] 통계물리학분과회 General Session: Complex system**

2012년 10월 25일 목요일 09:00 ~ 10:45

장소: 호텔2층 휴닉스 II  
좌장: 정우성 포항공대

FG-01 [09:00-09:15]

**Interplay of Social Reinforcement and Community Structure on Human Behavior Spread** / CHUNG Kihong, BAEK Yongjoo, KIM Daniel(Department of Physics, KAIST), HA Meesoon(Department of Physics Education, Chosun University), JEONG Hawoong(Department of Physics and Institute for the BioCentury, KAIST)

FG-02 [09:15-09:30]

**The Origin Of Discontinuous Jamming Transition In Packet Traffic On Complex Networks** / KANGHUN Kim, B. Kahng(Department of Physics and Astronomy, Seoul National University)

FG-03 [09:30-09:45]

**Characteristics of topological properties in seismic networks** / 김경식(부경대 물리학과), 강덕두, 이동인(부경대 환경대기학과)

FG-04\* [09:45-10:00]

**Statistical Approach on Google N-gram in Search of Science and Technology Trend** / YUN Jinhyuk(KAIST, Department of Physics), PAN-JUN Kim(Asia Pacific Center for Theoretical Physics) JEONG Hawoong(KAIST, Department of Physics)

FG-05\* [10:00-10:15]

**Large-Scale Quantitative Analysis of Painting Arts** / 김영호(KAIST 물리학과), 손승우(한양대 응용물리학과), 정하웅(KAIST 물리학과)

FG-06\* [10:15-10:30]

**Comparative advantage between traditional and smart navigation systems** / SHIN Jeongkyu(Pohang University of Science and Technology, Dept. of Physics), KIM Pan-Jun(Asia-Pacific Center for Theoretical Physics), KIM Seunghwan(Pohang University of Science and Technology, Dept. of Physics)

FG-07\* [10:30-10:45]

**Effect of Passenger Queue Arrangements on Scaling Behaviors of Airplane Boarding Time** / BAEK Yongjoo(Department of Physics, KAIST), HA Meesoon(Department of Physics Education, Chosun University), JEONG Hawoong(Department of Physics and Institute for the BioCentury, KAIST)

**통계물리학분과회****[FG2] 통계물리학분과회 General Session: Biophysics**

2012년 10월 25일 목요일 11:00 ~ 12:45

장소: 호텔2층 휴닉스 II  
좌장: 이덕선 인하대

FG-08 [11:00-11:15]

**Inhibitory coherence in a heterogeneous population of subthreshold and suprathreshold type-I neurons** / LIM Woochang(Daegu National University of Education, Department of Science Education), KIM Sang-Yoon(Kangwon National University, Department of Physics)

FG-09 [11:15-11:30]

**Two states of extension in highly bent short DNAs: The effects of local denaturation** / 성우경, 이오철, 김철희(포항공대 물리학과)

FG-10\* [11:30-11:45]

**Molecular Self-Assembly into Microrings** / KIM Myung-jin, SUNG Wokyung(Department of Physics, Pohang University of Science and Technology(POSTECH)), KIM Kimoon(Department of Chemistry, Pohang University of Science and Technology(POSTECH))

FG-11\* [11:45-12:00]

**What Happens to a Short dsDNA When Bent?** / SHIN Jaeoh, SUNG Wokyung(Department of Physics, POSTECH)

FG-12\* [12:00-12:15]

**Reliability of the blob scaling approach to confined polymer** / KIM Juin, JEON Chanil, JEONG Hawoong(KAIST, Department of Physics), JUNG Youngkyun(KISTI, Supercomputing Center), HA Bae-Yeon(University of Waterloo, Department of Physics and Astronomy)

FG-13\* [12:15-12:30]

**Single-molecule biophysical investigation of triple-helical H-DNA** / LEE ILBUEM(Department of Physics, Korea University), LEE NAM-KYUNG(Department of Physics, Sejong University), JOHNER ALBERT(Institute Charles Sadron, CNRS, Strasbourg, France), HONG SEOK-CHEOL(Department of Physics, Korea University)

FG-14\* [12:30-12:45]

**Correlation between auditory neural response of Drosophila and its antenna motion** / AHN Kang-Hun, LEE Woo-Seok(Department of Physics, Chungnam National University, Republic of Korea), LEE Jeongmi, CHUNG Yun Doo(Department of Life Sciences, University of Seoul), ROBERT Daniel(School of Biological Sciences, University of Bristol, UK)

## 초록내용

발표번호	FG-08[11:00-11:15]
분과	통계물리학분과 (Statistical Physics Division)
저자	LIM Woochang (발표자 일반), KIM Sang-Yoon <sup>1</sup> <i>Daegu National University of Education, Department of Science Education. <sup>1</sup>Kangwon National University, Department of Physics.</i>
제목	Inhibitory coherence in a heterogeneous population of subthreshold and suprathreshold type-I neurons
초록본문	<p>We study inhibitory coherence (i.e. collective coherence by synaptic inhibition) in a population of globally coupled type-I neurons, which can fire at arbitrarily low frequency. No inhibitory coherence is observed in a homogeneous population composed of only subthreshold neurons, which exhibit noise induced firings. In addition to subthreshold neurons, there exist spontaneously firing suprathreshold neurons in a noisy environment of a real brain. To take into consideration the effect of suprathreshold neurons on inhibitory coherence, we consider a heterogeneous population of subthreshold and suprathreshold neurons and investigate the inhibitory coherence by increasing the fraction of suprathreshold neurons <math>P_{\text{supra}}</math>. As <math>P_{\text{supra}}</math> passes a threshold <math>P^*_{\text{supra}}</math>, suprathreshold neurons begin to synchronize and play the role of coherent inhibitors for the emergence of inhibitory coherence. Thus, regularly oscillating population averaged global potential appears for <math>P_{\text{supra}} &gt; P^*_{\text{supra}}</math>. For this coherent case, suprathreshold neurons exhibit sparse spike synchronization (i.e. individual potentials of suprathreshold neurons consist of coherent sparse spikings and coherent subthreshold small-amplitude hoppings). By virtue of their coherent inhibition, sparsely synchronized suprathreshold neurons suppress the noisy activity of subthreshold neurons. Thus, subthreshold neurons exhibit hopping synchronization (i.e. only coherent subthreshold hopping oscillations without spikings appear in the individual potentials of subthreshold neurons). We also characterize the inhibitory coherence in terms of the 'statistical-mechanical' spike-based and correlation-based measures, which quantify the average contributions of the microscopic individual spikes and individual potentials</p>