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POSTER PRESENTATIONS JULY 22 (MONDAY)

PP1-9-32 **The Evolution of Synaptic Weight Distribution of a Model Neuronal Network Subject to a "Δt Stimulation"**
Ho Jun Lee (Korea Univ, Korea)

PP1-9-33 **Limiting-Law Excess Sum Rule for Polyelectrolytes**
Yongjin Lee (Pohang Univ of Sci and Tech, APAC Ctr Theo Phys, Korea)

PP1-9-34 **Dynamics of the Spontaneous Brain Activities with Noise-Induced Population Model**
Dongmyeong Lee (Pohang Univ of Sci and Tech, Korea)

PP1-9-35 **Elastic Properties of Partly Denatured DNA**
Anmin Son (Sejong Univ, Korea)

PP1-9-36 **Sparsely Synchronized Brain Rhythm in a Small-World Neural Network**
Woochang Lim (Daegu Natl Univ of Education, Korea)

PP1-9-37 **Anisotropic Diffusion of Passive Particles in Bacterial Flow**
Wei-Hsuan Lin (Natl Central Univ, Taiwan)

PP1-9-38 **Random Forest-Based Protein Model Quality Assessment (RFMQA) Using Its Structural Features and Potential Energy Terms**
Balachandran Manavalan (Korea Inst Adv Study, Korea)

PP1-9-39 **Optimal Search in an Interacting Population. The Case of the Mongolian Gazelle.**
Ricardo Martinez-garcia (CSIC-UIB, Spain)

PP1-9-40 **On the Existence of Accessible Paths in Various Models of Fitness Landscapes**
Anders Martinsson (Chalmers Univ of Tech & Univ of Gothenburg, Sweden)

PP1-9-41 **Efficient Energy Transformation Inside a Cell from the Point of View of Statistical Physics**
Aleksei Melkikh (Ural Federal Univ, Russia)

PP1-9-42 **1-d Diffusion of a 100 nm Diameter Au Particle along the Thermally Fluctuating DNA**
Yoshihiro Murayama (Tokyo Univ of Agriculture and Tech, Japan)

PP1-9-43 **On the Amplitude Spectra of Fitness Landscapes**
Johannes Neidhart (Univ zu Koln, Germany)

PP1-9-44 **Gating Functions of Nuclear Pore Complexes by Biphasic Nature of Nucleoporins**
Sung-Sik Oh (Korea Adv Inst of Sci and Tech, Korea)

PP1-9-45 **Effects of Sugars on the Thermal Stability of a Protein**
Hiraku Oshima (Kyoto Univ, Japan)

PP1-9-36

Sparsely Synchronized Brain Rhythm in A Small-World Neural Network

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Sparsely synchronized cortical rhythms, associated with diverse cognitive functions, have been observed in electric recordings of brain activity. At the population level, cortical rhythms exhibit small-amplitude fast oscillations, while at the cellular level, individual neurons show stochastic firings sparsely at a much lower rate than the population rate. We study the effect of network architecture on sparse synchronization in an inhibitory population of subthreshold Morris-Lecar neurons (which cannot fire spontaneously without noise). Previously, sparse synchronization was found to occur for both cases of global coupling (i.e., regular all-to-all coupling) and random coupling. However, a real neural network is known to be non-regular and non-random. Here, we consider sparse Watts-Strogatz small-world networks (with predominantly short-range connections and rare long-range connections). We start from the regular network with only short-range connections, and then investigate emergence of sparse synchronization by increasing the rewiring probability p for the short-range connections. For $p = 0$, the average synaptic path length between pairs of neurons becomes long, and hence there appear only incoherent population states because the global efficiency of information transfer is low. However, as p is increased, long-range connections begin to appear, and global effective communication between distant neurons may be available via shorter synaptic paths. Consequently, as p passes a threshold, sparsely synchronized population rhythms emerge. However, with increasing p the network wiring length becomes longer. At an optimal value p^* of the rewiring probability, the ratio of the synchrony degree to the wiring cost is found to become maximal. In this way, an optimal sparse synchronization is found to occur at a minimal wiring cost in an economic small-world network through trade-off between synchrony and wiring cost.