

## CONTENTS

Preface	v
International Symposium on <i>Topological Aspects of Critical Systems and Networks</i>	xi
Group Photo	xiii
<b>I. General Properties of Networks</b>	
Physics of Network Security <i>Y.-C. Lai, X. Wand and C. H. Lai</i>	3
Multi-State Interacting Particle Systems on Scale-Free Networks <i>N. Masuda and N. Konno</i>	11
Homotopy Reduction of Complex Networks <i>Y. Hiraoka and T. Ichinomiya</i>	18
Analysis of the Susceptible-Infected-Susceptible Model on Complex Network <i>T. Ichinomiya</i>	24
<b>II. Complexity in Social Science</b>	
Innovation and Development in a Random Lattice <i>J. Lahtinen</i>	33
Long-Tailed Distributions in Biological Systems: Revisit to Lognormals <i>N. Kobayashi, K. Kohyama, O. Moriyama, Y. Sasaki, M. Matsushita and S. Matsushita</i>	40

Two-Class Structure of Income Distribution in the USA: Exponential Bulk and Power-Law Tail	49
<i>V. M. Yakovenko and A. Christian Silva</i>	

Power Law Distributions in Two Community Currencies	59
<i>N. Kichiji and M. Nishibe</i>	

### III. Patterns in Biological Objects

Stoichiometric Network Analysis of Nonlinear Phenomena in a Reaction Mechanism for TWC Converters	67
<i>M. Marek, O. Hadač, I. Schreiber, M. Schejbal and M. Kubíček</i>	

Collective Movement and Morphogenesis of Epithelial Cells	82
<i>H. Haga and K. Kawabata</i>	

Indecisive Behavior of Amoeba Crossing an Environmental Barrier	86
<i>S. Takagi, Y. Nishiura, T. Nakagaki, T. Ueda and K.-I. Ueda</i>	

Effects of Amount of Food on Path Selection in the Transport Network of an Amoeboid Organism	94
<i>T. Nakagaki, T. Saigusa, A. Tero and R. Kobayashi</i>	

Light Scattering Study in Double Network Gels	101
<i>M. Fukunaga, M. Takesada, A. Onodera, R. Kuwadara, J. P. Gong, Y. Osada and T. Yagi</i>	

Blood Flow Velocity in the Choroid in Punctate Inner Choroidopathy and Vogt–Koyanagi–Harada Disease; and Multifractal Analysis of Choroidal Blood Flow in Age-Related Macular Degeneration	106
<i>K. Yoshida, W. Saito, H. Fujii and K. Yakubo</i>	

Topological Analysis of Placental Arteries: Correlation with Neonatal Growth	114
<i>H. Yamada and K. Yakubo</i>	

### IV. Criticality in Pure and Applied Physics

Droplets in Disordered Metallic Quantum Critical Systems	125
<i>A. H. Castro Neto and B. A. Jones</i>	

Importance of Static Disorder and Inhomogeneous Cooperative Dynamics in Heavy-Fermion Metals	135
<i>O. O. Bernal</i>	
Competition between Spin Glass and Antiferromagnetic Phases in Heavy Fermion Materials	143
<i>S. Süllow</i>	
Emergent Phases via Fermi Surface Reconstruction near the Metamagnetic Quantum Critical Point in $U(\text{Ru}_{1-x}\text{Rh}_x)_2\text{Si}_2$	151
<i>K. H. Kim, Y. S. Oh, N. Harrison, P. A. Sharma, M. Jaime, H. Amitsuka and J. A. Mydosh</i>	
Continuous Evolution of the Fermi Surface of $\text{CeRu}_2\text{Si}_2$ Across the Metamagnetic Transition	159
<i>R. Daou, C. Bergemann and S. R. Julian</i>	
Phase Transition between the Itinerant and the Localized f-electron States in Heavy Fermion Antiferromagnet $\text{Ce}(\text{Ru}_{0.9}\text{Rh}_{0.1})_2(\text{Si}_{1-y}\text{Ge}_y)_2$	166
<i>Y. Tabata, C. Kanadani, R. Yamaki, T. Taniguchi and S. Kawarazaki</i>	
Relation between Magnetism and Metal-Insulator Transition in Mn-Doped $\text{SrRuO}_3$	172
<i>M. Yokoyama, C. Satoh, K. Fujita, Y. Nishihara, H. Kawanaka and H. Bando</i>	
Magnetization Study of Pairing and Vortex States in $\text{Sr}_2\text{RuO}_4$	178
<i>K. Tenya, R. Yamahana, A. Ishii, H. Amitsuka, M. Yokoyama, K. Deguchi and Y. Maeno</i>	
Single-Site Effects of Pr Ions Doped in $\text{ThRu}_2\text{Si}_2$	184
<i>A. Morishita, Y. Saito, K. Matsuda, T. Wakabayashi, I. Kawasaki, K. Tenya and H. Amitsuka</i>	
$^{51}\text{V}$ -NMR Studies of Heisenberg Triangular System V15 Cluster	190
<i>Y. Furukawa, Y. Nishisaka, K. Kumagai and P. Kögerler</i>	
Menger Sponge-like Fractal Body Created with a Designed Template Method	195
<i>H. Mayama and K. Tsujii</i>	

Nonlinear Lattice Relaxation Mechanism for Photoexcited Dimetal-Hallide Chain Compounds	202
<i>J. Ohara and S. Yamamoto</i>	
Real Space Renormalization Group Analysis with the Replica Method for the Two-Dimensional Ising Spin Glass	208
<i>T. Hasegawa and K. Nemoto</i>	
Quantum Network Models and Their Symmetry Properties	214
<i>T. Ohtsuki and K. M. Slevin</i>	
Fractality of Critical Percolation Networks	220
<i>M. Mitobe and K. Yakubo</i>	
Ising Phase Transition on Curved Surfaces	226
<i>Y. Sakaniwa, I. Hasegawa and H. Shima</i>	
Quantum Confinement in Deformed Cylindrical Surfaces	233
<i>H. Taira and H. Shima</i>	
Topological Spin Currents due to Nonadiabatic Quantum Pumping	239
<i>K. Yakubo and M. Morikawa</i>	
Charge Density Wave State in Topological Crystal	245
<i>T. Nogawa and K. Nemoto</i>	
Spatiotemporal Mapping of Symmetrical Surface Acoustic Fields on Crystals and Periodic Microstructures	249
<i>T. Tachizaki, O. B. Wright, O. Matsuda and Y. Sugawara</i>	
Clean Optical Vortex Beam Generation for Large Topological Charge	253
<i>J. Hamazaki, Y. Mineta and R. Morita</i>	
Spherically Symmetric Black Hole in a Topological Universe: A Toy Model	258
<i>K. Konno, T. Matswura, S. Tanda and T. Matsuyama</i>	
Author Index	265