Condensed Matter Physics, 2014, Vol. 17, No 3, 30001: 1–4
DOI: 10.5488/CMP.17.30001
http://www.icmp.lviv.ua/journal

CONDENSED MATTER PHYSICS

Editorial

Self-organization and collective behaviour in complex systems

It is our great honour to present the CMP special issue devoted to self-organization and collective behaviour in complex systems. A complex system is a system whose emergent properties are not simple sums of the properties of its components. Since complex systems involve cooperative behaviour of many interconnected components, the field of statistical physics provides a perfect conceptual and mathematical framework for their quantitative understanding. Critical phenomena and complexity have counterparts in many branches of natural and social sciences. Therefore, some of the papers presented in this issue are strongly interdisciplinary in character. However, using different approaches — analytical, empirical data analyses as well as computer simulations — the authors of this issue share a common goal: To investigate how collective behaviour arises, develops and changes in physical, social, and cultural complex systems.

A part of activities behind the research presented in this collection of papers is due to the European 7^{th} Framework Programme, IRSES project No 612707 “Dynamics of and in Complex Systems” (DIONICOS). By joining them together we also attempt to show an evolution of the project as a centre of a web of activities for its experienced and young researchers, facilitating an exchange of knowledge and ideas as well as research culture inside and outside the EU and developing multilateral international research cooperations.

By this special issue colleagues and friends pay tribute to Professor Alexandr Olemskoi, who passed away in 2011 being on the peak of his scientific activities and who would have marked his 65^{th} birthday this year. An outstanding Physicist, a recipient of the Order of Merit in Science and Technology (Ukraine), foreign member of the Russian Academy of Natural Sciences, he made essential contributions to the theory of structural phase transitions in non-equilibrium condensed matter, statistical theory of hierarchical systems, supersymmetrical theory of disordered systems, and statistical description of complex self-similar and self-organized systems. Some important dates of his life and a principal reference list are given below.

Yurij Holovatch, Wolfhard Janke, Stefan Thurner
Lviv–Leipzig–Vienna, 27.06.2014

Alexandr Olemskoi (1949–2011)

1949, September 19	Born in Ekatirinovka, Voronezh province (Russia)
1973	Graduated from Voronezh Polytechnical Institute (diploma with highest honours)
1977	Candidate of science degree (PhD) in physics and mathematics (Voronezh)
1977–1984	Lecturing in general and theoretical physics in Saratov and Kursk polytechnic institutes (Russia)
1984–1988	Head of the laboratory in the Siberian Physico–Technical institute (Tomsk, Russia)
1987	Doctor of science degree (Dr. hab.) in physics and mathematics (Moscow State University)
1988	Organizer and head of the Department of Theoretical Physics of the Sumy division of the Institute of Physics of Metals, Acad. Sci. of Ukraine (now – the Institute of Applied Physics of the National Acad. Sci. of Ukraine)
1995	Head of the Chair for Physical Electronics of Sumy State University (Ukraine)
1997	Soros professor
1999	C.I. Pekar Prize of the National Acad. Sci. of Ukraine
2004	Order of Merit in Science and Technology (Ukraine)
2005	Foreign member of the Russian Academy of Natural Sciences
2006	Head of the Laboratory of Microstructural Research of Reactor Materials of the Institute of Applied Physics
2009	Medal of the National Acad. Sci. of Ukraine for scientific achievements
2011, August 3	Passed away, buried in Kolybelka, Voronezh province (Russia)

Principal publications

BOOKS:

A.A. Katsnelson, A.I. Olemskoi. Microscopic Theory of Nonhomogeneous Structures, Moscow State University Publ. House, Moscow, 1987, 334 pp. [AIP Translation: Mir Publishers, Moscow (1991)].

A.I. Olemskoi. Theory of Structure Transformations in Non–equilibrium Condensed Matter, NOVA Science, New York, 1999, 285 pp.

A.I. Olemskoi, A.V. Khomenko. Synergetics of Condensed Matter: A Textbook for University Students, Sumy State University Publ. House, Sumy, 2002, 372 pp. (in Russian).

A.I. Olemskoi, A.A. Katsnelson. Synergetics of Condensed Matter. Editorial URSS Publ. House, Moscow, 2003, 335 pp. (in Russian).

A.I. Olemskoi, D.O. Kharchenko. Self-organization of Self-similar Stochastic Systems, NITs RKhD, Moscow, Izhevsk, 2007, 230 pp. (in Russian).

A.I. Olemskoi. Synergetics of Complex Systems: Phenomenology and Statistical Theory, KRASAND Publ. House, Moscow, 2009, 384 pp. (in Russian).

A.I. Olemskoi, I.A. Shuda. Statistical Theory of Self-organized Complex Systems, Sumy State University Publ. House, Sumy, 2010, 376 pp. (in Russian).

REPRESENTATIVE REVIEW PAPERS:

A.I. Olemskoi, I.A. Sklyar, Evolution of the defect structure of a solid during plastic deformation, Physics–Uspekhi, 1995, **35**, 455–480 [Uspiekhi Fiz. Nauk, 1992, **162**, 29–79].

A.I. Olemskoi, A.Ya. Flat, Application of fractals in condensed–matter physics, Physics–Uspekhi, 1993, **36**, 1087–1128 [Uspiekhi Fiz. Nauk, 1993, **163**, 1–50].

A.A. Katsnelson, A.I. Olemskoi, G.P. Revkevich, I.V. Sukhorukova, Self-oscillation processes during the structure relaxation of palladium–metal alloys (Pd–W) saturated with hydrogen, Physics–Uspekhi, 1995, **38**, 317–323 [Uspiekhi Fiz. Nauk, 1995, **38**, 331–338].

A.I. Olemskoi, I.V. Koplyk, The theory of spatiotemporal evolution of nonequilibrium thermodynamic systems, Physics–Uspekhi, 1995, **38**, 1061–1097 [Uspiekhi Fiz. Nauk, 1995, **165**, 1105–1144].

A.I. Olemskoi, Fractals in condensed matter physics — In: Physics Reviews, Vol. 18, Part 1, I.M. Khalatnikov (Ed.), Gordon & Breach, London, 1996, 1–171.

A.I. Olemskoi, Self-consistent theory of localization within site and wave approaches, Physics–Uspekhi, 1996, **39**, 651–668 [Uspiekhi Fiz. Nauk, 1996, **196**, 697–715].

A.I. Olemskoi, Theory of stochastic systems with singular multiplicative noise, Physics–Uspekhi, 1998, **41**, 269–301 [Uspiekhi Fiz. Nauk, 1998, **168**, 287–321].

A.I. Olemskoi, The Fokker-Planck equation, Physics–Uspekhi, 1998, **41**, 411–416 [Uspiekhi Fiz. Nauk, 1998, **168**, 475–480].

A.I. Olemskoi, V.F. Klepikov, The theory of spatiotemporal pattern in nonequilibrium systems, Phys. Rep., 2000, **338**, 571–677.

A.I. Olemskoi, Supersymmetric field theory of a nonequilibrium stochastic system as applied to disordered heteropolymers, Physics–Uspekhi, 2001, **44**, 479–513 [Uspiekhi Fiz. Nauk, 2001, **171**, 503–538].

A.I. Olemskoi, A.V. Khomenko, Synergetics of plastic deformation, Prog. Phys. Metals, 2001, **2**, 189–263 (in Russian).

A.I. Olemskoi, D.O. Kharchenko, Theory of self-similar stochastic systems. Part 1, J. Phys. Stud., 2002, **6**, 253–288 (in Ukrainian).

A.I. Olemskoi, D.O. Kharchenko, Theory of self-similar stochastic systems. Part 2, J. Phys. Stud., 2003, **7**, 1–26 (in Ukrainian).

A.I. Olemskoi, A. Savelyev, Theory of microphase separation in homopolymer–oligomer mixtures, Phys. Rep., 2005, **419**, 145–205.

Yu. Holovatch, C. von Ferber, A. Olemskoi, T. Holovatch, O. Mryglod, I. Olemskoi, V. Palchykov, Complex networks, J. Phys. Stud., 2006, **10**, 247–291 (in Ukrainian).

A.I. Olemskoi, D.O. Kharchenko, Representations of self-organized criticality — In: Order, Disorder, and Criticality, Vol. 2, Yu. Holovach (Ed.), World Scientific, Singapore, 2007, 181–230.