



IV International Conference “Condensed Matter and Low-Temperature Physics 2024” (CM<P 2024)

Kharkiv, Ukraine, June 3–7, 2024

From June 3 to 7, 2024, the IV International Scientific Conference “Condensed Matter and Low Temperature Physics 2024 (CM<P 2024)” was held online at the B. I. Verkin Institute for Low Temperature Physics and Engineering, with the participation of researchers from institutions of the National Academy of Sciences of Ukraine, the Ministry of Education and Science of Ukraine, and foreign scientists.

The conference facilitated close scientific communication and the exchange of ideas between highly qualified researchers, experts in the fields of low-temperature physics, condensed matter physics, material science, nanophysics, and molecular physics, as well as young scientists. The conference program covered relevant areas of modern experimental and theoretical condensed matter physics, including low-temperature physics, superconductivity, magnetism, optics, nanophysics, biophysics, materials science, and related topics. CM<P 2024 served as a platform for scientists to share their knowledge, exchange new information and ideas, and find collaborators for joint projects.

Scientists from Ukraine and abroad presented over 180 oral and poster presentations. The international character of the conference was emphasized by the participation of

20 countries, including Austria, Switzerland, France, Israel, Georgia, Germany, India, Italy, Japan, Kazakhstan, Uzbekistan, Latvia, Poland, Portugal, Romania, Slovakia, Ukraine, Sweden, the United Arab Emirates, and the USA. Lively discussions during the oral and poster sessions facilitated the exchange of valuable information and the development of new ideas, particularly regarding possible future scientific collaboration.

One of the hottest topics of the conference was properties of various quantum systems: J. Amrit *et al.* “Two-mode dissipation of oscillating tuning fork in ^3He – ^4He superfluid mixtures LIMSI-CNRS (Université Paris-Saclay, Orsay, France), V. Unukovych *et al.* “Explicit symmetry breaking and effective spin models for four-component interacting Fermi gases in lattice potentials” (Karazin Kharkiv National University, Ukraine), M. Yu. Kovalevsky *et al.* “About influence of conformational degrees of freedom on spectra of collective excitations in disordered superfluid A-phase of ^3He (National Science Center “Kharkiv Institute of Physics and Technology”, Ukraine).

Features of the interaction of hydrogen with alloys, structure and thermal properties of solids, transport properties

and quantum effects in semiconductors, dielectrics and metal films were the topics of the group of talks: H. Ban *et al.* “Hysteresis phenomena in $\text{Cd}_2\text{P}_2\text{S}_6$ layered crystals (Department of the Physics of Semiconductors, Uzhhorod National University, Ukraine, WIGNER Research Center for Physics, Budapest, Hungary), I. R. Metskhvarishvili *et al.* “Effect of Dy_2O_3 on the phase formation and electrical properties of Tl-1223 HTS” (Institute of Physics and Technology, Tbilisi, Georgia), J. Sh. Abdullayev *et al.* “Theoretical analysis of incomplete ionization on the electrical behavior of radial p - n junction structures” (National Research University TIIAME, Department of Physics and Chemistry, Tashkent, Uzbekistan), K. S. Kuznetsova *et al.* “Optimization of the metal-dielectric metasurface unit cell for sensitivity enhancement in determination of IgG concentration in solutions” (Usikov Institute for Radiophysics and Electronics, Kharkiv, Ukraine), S. Udachan *et al.* “Influence of pressure on electrical properties of silver nanofilms” (Department of Physics, School of Advanced Sciences, KLE Technological University, Hubballi, India).

Magnetic properties of various systems were the subject of reports: M. M. Krupa “Tunnel magnetic contacts with perpendicular anisotropy of magnetic electrodes as promising elements for recording information” (Institute of Magnetism, Kyiv, Ukraine), M. Y. Kovalevsky and A. A. Rozhkov “On classification of equilibrium states of single-sublattice magnets with spin $s = 3/2$ and $\text{SU}(4)$ symmetry of exchange Hamiltonian” (National Science Center “Kharkiv Institute of Physics and Technology”, Ukraine).

Glasses, biosystems, optic spectroscopy, quantum optic and gas flow scattering were the topics of one more group of talks: V. M. Kryshenik *et al.* “Temperature-induced phase transformation in $(\text{As}_{1-x}\text{Bi}_x)_2\text{S}_3$ glasses (Institute of Electron Physics, Uzhhorod, Ukraine), N. V. Khmil *et al.* “Binding characteristics of systemic glucocorticoids to the SARS-CoV-2 spike glycoprotein: In-silico evaluation (Institute for Radiophysics and Electronics, Kharkiv, Ukraine), M. A. Bludov *et al.* “Observation of new band in stimulated luminescence of solid nitrogen” (ILTPE, Kharkiv, Ukraine), V. I. Kushnirenko *et al.* “Sensitized luminescence of samarium in terbium fluoride” (V. E. Lashkaryov Institute of Semiconductor Physics of the NAS of Ukraine),

T. Bezrodna *et al.* “Temperature-dependent operation of laser passive Q-switches based on the polyurethane matrix” (Institute of Physics, Kyiv, Ukraine, National Institute of Macromolecular Chemistry, Kyiv, Ukraine), A. I. Haysak and M. I. Haysak “Spectral characteristics of three-particle ionic molecular system of the exotic carbon atom in one-dimensional space” (Uzhhorod National University, Ukraine), N. I. Pavlyshche *et al.* “Optical properties of assemblies of disc-shaped metallic nanoparticles” (National University “Zaporizhzhia Politechnic”, Ukraine), A. V. Korotun “More on the size effects on the spectral figure of merit and enhancement of the local fields in the neighborhood of biconical and bipyramidal metallic nanoparticles” (National University “Zaporizhzhia Politechnic”, Ukraine), M. S. Maniuk *et al.* “Optical response of a chain of oblate metal nanospheroids on a dielectric substrate” (National University “Zaporizhzhia Politechnic”, Ukraine), S. P. Lukyanets and O. V. Kliushnichenko “Nonequilibrium protection effect and spatial localization of noise-induced fluctuations under gas flow scattering on partially penetrable obstacle” (Institute of Physics, Kyiv, Ukraine).

We are grateful to all the authors who submitted their papers to this special issue. The number of papers submitted was so great that some of them will be published in an additional section in a subsequent issue.

We would like to thank all the members of the Program and Advisory Committees for their efforts in the preparation and administration of the conference; with special thanks to the members of the International Organizing Committee, to all those who, in challenging times, found the strength and inspiration to promote the dissemination of advanced scientific ideas and, despite all obstacles, ensured scientific communication and the exchange of thoughts on the most pressing issues of modern physics and the possibilities of their practical application. We also thank all the people who help and defend Ukraine in this terrible Russian aggression.

We will be delighted to invite you to CM<P 2025!
Glory to Ukraine!

D. Hurova,
O. Dolbin