

Personalia**The 70th Birthday of DSc Oksana Patsahan**

Doctor of Sciences Oksana Patsahan — a renowned Ukrainian scholar in the fields of phase transition theory and physics of fluids — is celebrating her 70th birthday. A leading researcher in the Department for Computer Simulations of Many-Particle Systems at the Yukhnovskii Institute for Condensed Matter Physics (ICMP) of the National Academy of Sciences of Ukraine, she also serves as an active member of the Editorial Board for the Condensed Matter Physics journal.

Oksana Patsahan (née Vitenko) was born on February 15, 1956, in Kremenets, in the Ternopil region of Ukraine. She received her secondary education at Lviv Secondary School No. 70, graduating in 1973 with a gold medal for academic excellence. That same year, she enrolled in the Physics Department of Ivan Franko State University of Lviv, where she specialized in theoretical physics. While still a student, she began working as a laboratory assistant at the Department of Theoretical Physics, a position she held after her graduation.

In 1984, she commenced her PhD studies at the same department, supervised by the eminent scientist Prof. Ihor Yukhnovskii, the founder of the Lviv school of statistical physics. Her research focused primarily on the phase behaviour of multicomponent fluids and the development of phase transition theory for such systems. In 1988, she successfully defended her PhD thesis, titled “The Application of the Collective Variables Method to the Description of Second-Order Phase Transitions in Binary Systems”. This work proposed a theory that enabled the calculation of both universal and non-universal characteristics of binary fluids near a phase separation transition.

Oksana Patsahan continued her career at the Lviv Division (Institute for Condensed Matter Physics of the National Academy of Sciences of Ukraine since 1990, named after Yukhnovskii in 2025). There, she advanced her research on multicomponent fluids characterized by competing short- and long-range interactions. Systems with Coulomb interactions became a primary focus of her work. At the time, existing theories for these systems were predominantly limited to the mean-field level. Even for the Restricted Primitive Model (RPM) — arguably the simplest model in this class — it had not been possible to develop

a satisfactory theory that aligned with computer simulation data. Utilizing the collective variables method, Oksana Patsahan was the first to derive the effective Ginzburg-Landau-Wilson Hamiltonian. Her work demonstrated that this model belongs to the Ising universality class and provided calculations for the corresponding phase diagrams that accounted for charge fluctuation contributions. Furthermore, for the charge-asymmetric fluid model, she provided an explanation for experimental observations regarding how the ratio of solvophobic to Coulomb interactions influences the size of the crossover region. These significant results formed the basis of her habilitation thesis, “Statistical Theory of Multicomponent Mixtures: Phase Transitions and Critical Behaviour,” which she defended in 2008 at the ICMP.

Subsequently, Oksana Patsahan was the first to theoretically calculate the critical point parameters of an ionic liquid model without relying on approximation parameters or assumptions regarding ionic association. Her results demonstrated good agreement with computer simulation data. She also calculated the Ginzburg temperature as a function of the interaction intensity ratio, showing that values typical for the RPM are reached when Coulomb interactions dominate. In realistic systems, she noted the importance of accounting for the solvent’s influence, which determines the dielectric permittivity and, consequently, the intensity of Coulomb interactions. Furthermore, her investigations into the effects of charge and ion-size asymmetries revealed that for ions with a fixed charge ratio, the critical temperature and density can exhibit non-monotonic behaviour as size asymmetry changes. Oksana Patsahan also explored the impact of asymmetry on spatially inhomogeneous mesostructures in charged particle systems. She identified topologically distinct phase diagrams, indicating the potential for both classical ionic crystals and crystalline structures characterized by the periodic ordering of large particles surrounded by “clouds” of small, oppositely charged ions. Finally, she analyzed various scenarios of periodic ordering in asymmetric systems across a range of applications, including electrolytes, ionic liquids, charged globular proteins, and nanoparticles in aqueous solutions.

Over the past decade, Oksana Patsahan has expanded her research into two innovative directions: incorporating the molecular structure of solvents into theoretical models and investigating the phase behaviour of fluids within spatially confined and porous media. This work has produced a wealth of significant insights, documented in more than 20 articles across top-tier scientific journals. Her complete body of work is extensive, comprising nearly 200 scientific publications.

Oksana Patsahan maintains close collaborations with colleagues across Ukraine and numerous countries worldwide. She has served as a leader or coordinator for various international initiatives; notably, from 2017 to 2021, she was the project coordinator for Ukraine under the EU Horizon 2020 Research and Innovation program (MSCA-RISE, Grant No. 73426, “The Impact of Confined Space on Heterogeneous Systems”). Her contribution to the *Condensed Matter Physics* journal is monumental. Having served as the Managing Editor more than 20 consecutive years, her dedication has been vital to the journal’s operations. She remains an active and esteemed member of the Editorial Board to this day.

In recognition of her significant contributions to both scientific research and organizational leadership, Oksana Patsahan has been honored with several prestigious accolades. These include the Certificate of Honor from the National Academy of Sciences (NAS) of Ukraine and the Western Scientific Center of the NAS and Ministry of Education and Science of Ukraine. Furthermore, she is a recipient of the Lviv Regional State Administration Award “For Outstanding Achievements in Science” and the NAS of Ukraine’s award “For Professional Achievements”.

The Editorial Board of the *Condensed Matter Physics* journal, together with her colleagues and friends, extend their warmest congratulations to Oksana Patsahan on the occasion of her 70th birthday. We wish her continued prosperity, good health, and every success in all her future endeavors.