

IGOR YA. SUBBOTIN

Dedicated to 75th birthday



Professor Igor Ya. Subbotin celebrated his 75th birthday on March 25, 2025. He embarked on his academic journey in 1967 by enrolling at Kyiv State Dragomanov University, and he graduated with top honors in 1972. In December 1972, his master's thesis was published in the esteemed journal *Mathematical Notes* (*Matematicheskie Zametki*). In 1978, Igor Subbotin earned his Ph.D. from the Institute of Mathematics of the National Academy of Sciences of Ukraine. His dissertation, which focused on finite group theory, was supervised by the renowned Professor S. N. Chernikov. In 1980, Igor Subbotin was appointed Associate Professor in the Department of Higher Mathematics at KPI – Kyiv Polytechnic Institute (Igor Sikorsky Kyiv National University of Technology), a role he held for 12 years. This period proved instrumental in refining his expertise in teaching university-level mathematics. He attributes much of his pedagogical development to the mentorship of Professor Fedor T. Baranowski, the Chair of the Department, whose

guidance profoundly influenced Igor's approach to teaching and academic growth.

In 1992, Igor Subbotin immigrated to the United States, where he began his teaching and research career at National University in California. Since then, he has served as a Full Professor and Academic Director of mathematics programs. He consistently expresses gratitude for the institution's unwavering support of his scholarly and instructional endeavors.

Professor Subbotin maintains an active and prolific research profile. His scholarly output includes over 180 research articles in algebra, published in leading mathematical journals across numerous countries, including Ukraine, the United States, Germany, Switzerland, the United Kingdom, Italy, Spain, China, Brazil, Hungary, the Czech Republic, Turkey, Poland. Additionally, he has authored 14 books on algebra and contributed more than 50 papers on mathematics education, further confirming his reputation as an esteemed mathematician and educator.

In the early 1970s, I. Subbotin commenced his research into various aspects of the normal structure of both finite and infinite groups – an area deeply rooted in the seminal works of R. Dedekind, O. Yu. Schmidt, S. N. Chernikov, R. Baer, and O. Taussky. Subbotin's investigations primarily concentrated on groups characterized by specific properties of their normal subgroups and its generalizations.

His initial contributions involved the study of generalizations of the well-known *T-groups*, which are defined by the transitivity of normality – a topic that has garnered considerable attention in that years. Much of this research revolves around diverse and intriguing types of subgroups, including those closely related to normal subgroups as well as their opposites. These subgroups play a particularly significant role in the theory of finite groups.

Subbotin was among the first to extend the exploration of such subgroup structures to infinite groups, where the theoretical framework diverges markedly from that observed in finite group theory. For instance, in certain classes of infinite groups, pronormal subgroups exhibit properties that are unattainable in their finite counterparts, thereby highlighting the distinct mathematical challenges and opportunities posed by infinite group structures.

In this context, it is worth highlighting a significant contribution by I. Subbotin and N. F. Kuzennyi, who provided a comprehensive description of all infinite groups in which every (abelian, primary) subgroup

is pronormal. These results represent a substantial advancement in the structural analysis of infinite groups.

In collaboration with L. A. Kurdachenko, N. F. Kuzennyi, J. Otal, G. Vincenzi, A. Russo, and others, I. Subbotin conducted extensive investigations into the fundamental properties of various subgroup types, including pronormal, Carter, abnormal, contranormal, and related subgroups, as well as their influence on the structural organization of infinite groups.

These studies revealed novel criteria for local nilpotency and nilpotency in infinite groups, linking such properties to the behavior and classification of these subgroups. Furthermore, this research led to the identification of a natural generalization of the Carter subgroup concept within the framework of infinite groups, thereby broadening the theoretical understanding of subgroup structures and their role in group theory.

Investigation of groups saturated with above mentioned subgroups and groups with transitivity of these subgroup properties have been described in this way.

These investigations were not confined to purely group-theoretic methodologies. In several instances, the research necessitated the application of module theory, which, in turn, often required significant expansion to address the emerging complexities. The results derived from these studies laid the foundation for two influential books co-authored by L. A. Kurdachenko, J. Otal, and I. Subbotin: *Groups with Prescribed Quotient Groups and Associated Module Theory* (World Scientific, New Jersey, London, Singapore, Hong Kong, 2002) and *Artinian Modules over Group Rings* (Frontiers in Mathematics, Birkhäuser, Basel, 2007).

Another area of algebra that demanded focused investigation was the theory of infinite-dimensional linear groups. While the theory of finite-dimensional linear groups is one of the most advanced domains in algebra, the corresponding theory for infinite-dimensional groups remains in its formative stages. The application of finite-dimensionality conditions proved particularly effective, especially in the context of finitary linear groups. A notable contribution to this field was the introduction of the concept of *groups of finite central dimension* by L. A. Kurdachenko, which has provided new avenues for classifying and describing certain classes of infinite-dimensional linear groups that closely resemble finite-dimensional counterparts.

Building upon this framework, significant progress in the study of infinite-dimensional linear groups has been achieved through collabora-

tions involving L. A. Kurdachenko, M. Evans, M. Dixon, I. Subbotin, J. Otal, and M. M. Semko.

Another promising approach focused on examining families of *G*-invariant subgroups. This method, implemented by L. A. Kurdachenko, M. R. Dixon and I. Subbotin resulted in a monograph on infinite-dimensional linear groups. This volume, co-authored by Kurdachenko, Dixon, and Subbotin, is published by CRC Press (Taylor & Francis) in 2020.

The partnership with M. Dixon and L. Kurdachenko happened to be exceptionally productive, yielding among others several notable textbooks, including:

- *Ranks of Groups: The Tools, Characteristics, and Restrictions* (John Wiley & Sons, Hoboken, New Jersey, 2017);
- *An Introduction to Essential Algebraic Structures* (John Wiley & Sons, Hoboken, New Jersey, 2014);
- *Algebra and Number Theory: An Integrated Approach* (John Wiley & Sons, Hoboken, New Jersey, 2010).

One of the most notable projects involving Igor Subbotin is his participation in the development of the book written by him in collaboration with L. Kurdachenko and M. Dixon *Infinite Groups: A Roadmap to Selected Classical Areas*, published in 2023 by CRC. This book provides a comprehensive overview of the theory of classical infinite groups, focusing on concepts and auxiliary results essential for understanding key theorems, without delving into detailed proofs. Essentially, it serves as an extensive guide and reference to some of the most well-established areas within the study of infinite groups.

In recent times, I. Subbotin has shifted his research focus to the study of Leibniz algebras. The primary objective of this line of inquiry is to develop a theoretical framework that parallels existing algebraic structures, opening new perspectives in this emerging field.

Thus, together with L. A. Kurdachenko, O. O. Pypka, M. M. Semko, V. S. Yashchuk, and V. A. Chupordya, I. Subbotin embarked on a thorough exploration of Leibniz algebras, addressing challenges that arise across multiple algebraic structures. A major result of their collaboration is the monograph *General Theory of Leibniz Algebras* written by L. A. Kurdachenko, O. O. Pypka, and I. Subbotin, Synthesis Lectures on Mathematics & Statistics, Springer Nature, 2024. This detailed work consolidates significant advances in Leibniz algebra research over the

past twenty years, offering both established findings and new directions for investigation.

A key issue explored in the book is the identification of properties that distinguish Leibniz algebras from Lie algebras. It investigates specific classes of Leibniz algebras that deviate significantly from Lie algebras, highlighting notable structural differences. Considerable advancements have been made in this area. The monograph draws comparisons between Leibniz and Lie algebras, akin to the relationship between non-abelian and abelian groups, providing a comprehensive view of their structural connections.

I. Subbotin has made significant contributions to mathematics education and applied mathematical research. He played a key role in the development of the *Iterative Instructional Model*, investigated applications of *Fuzzy Logic* in assessment methodologies, and explored the theoretical foundations of essential topics in high school and college mathematics. His interest in *Fuzzy Logic* led him to pursue research in the theory of fuzzy groups and fuzzy rings. In collaboration with L. A. Kurdachenko and others, he introduced innovative approaches to the theory of fuzzy groups. Notably, his works, co-authored with L. A. Kurdachenko and V. S. Yashchuk, successfully reformulated the theory of fuzzy groups and fuzzy rings, translating it from a functional framework into the language of traditional algebraic structures.

Subbotin's research in algebra has received international recognition and support, including prestigious grants such as the 2010-2013 funding from the *Dirección General de Investigación* of MICINN (Spain), the *Department of Science and Technology* of the Government of Aragón (Spain), and *FEDER* funds from the European Union. Earlier, in 1996, he was awarded a research grant from *Volkswagenstiftung*. His scholarly excellence has been acknowledged by *National University* through four *Distinguished Researcher Awards*.

Beyond research, Subbotin has been a pioneer in online mathematics education. He was among the first instructors to teach mathematics courses online. His dedication to teaching earned him the *National University Distinguished Teaching Award* in 2013.

Igor Subbotin has actively fostered and maintained close professional relationships with leading Ukrainian mathematicians, contributing significantly to their research, editorial endeavors, educational initiatives, and other academic activities. In addition to numerous research collaborations, he has delivered plenary lectures at several Ukrainian algebra

conferences, served on the program committees of some of these conferences, and participated as a board member for international journals published in Ukraine, he has contributed to the development of young talent by serving on the committee of the International American-Ukrainian Competition for young Ukrainian mathematicians. Notably, in 2021, he delivered a semester-long lecture on-line course on group theory for students at Kyiv State Dragomanov University.

This brief overview provides only a glimpse into I. Subbotin's extensive research achievements, as many of his significant contributions could not be included in this summary.

I. Subbotin exemplifies the qualities of an energetic and passionate mathematician, educator, and researcher, whose work continues to inspire and advance the field.

Outside of academia, he is a devoted husband, father, and grandfather.

We extend our heartfelt congratulations to Professor Subbotin on his 75th birthday, wishing him continued good health, happiness, and further success in his academic endeavor.

*O. D. Artemovych, A. Ballester-Bolínches,
O. O. Bezushchak, M. M. Bilotskii, V. M. Bondarenko,
M. R. Dixon, R. Esteban-Romero, R. I. Grigorchuk,
L. A. Kurdachenko, P. Longobardi, T. D. Lukashova,
M. Maj, A. S. Oliynyk, B. V. Oliynyk, J. Otal,
A. P. Petravchuk, M. V. Pratsiovytyi, O. O. Pypka,
A. Russo, M. M. Semko, P. Shumyatsky, R. A. Zatorsky,
E. I. Zelmanov, A. V. Zhuchok, Yu. V. Zhuchok*