

On M. Bogolyubov manuscripts at the Institute of Mathematics

M. Bogolyubov was officially admitted by the Institute of Mathematics as a senior researcher on March 1, 1945. On April 1, he assumed the head of the Department of Asymptotic Methods and Statistical Mechanics. The dismissal order, dated November 1, 1956, was signed by his student Yu.O. Mitropolsky, who was at that time the deputy acting director of the institute, O.S. Parasyuk. However, M. Bogolyubov's fate was intertwined with the Institute long before. He was a student of Professor D.O. Grave, who founded the Institute of Mathematics at the Ukrainian Academy of Sciences in March 1920. From the age of thirteen, M. Bogolyubov became a participant in the well-known mathematical seminar of D.O. Grave. Under its influence, he is forming as a scientist in the field of mathematical and theoretical physics. Later in June 1925, at the request of D.O. Grave, the Small Presidium of UkrGolovnauka decided to consider M. Bogolyubov as a graduate student of the research department of mathematics in Kyiv. In 1928, he defended his doctoral dissertation.

The list of references below includes the scientific masterpieces created by Bogolyubov at the Institute of Mathematics.

In his renowned monograph "Problems of Dynamic Theory in Statistical Physics" [1], which was a manuscript of a report for 1945 at the Institute of Mathematics in Kyiv, M. Bogolyubov formulated a consistent approach to the problem of deriving kinetic equations from the dynamics of many particles. Using perturbation theory methods, a strategy was developed for constructing a generalization of the Boltzmann equation, known as the Bogolyubov kinetic equation, and for the first time, other kinetic equations were substantiated. This work clarified the mechanism of irreversibility in the evolution of many-particle systems, whose dynamics are described by time-reversible fundamental evolution equations. These results were extended to quantum many-particle systems [3],[7]. In the pioneering work [6] the superfluidity phenomenon was first described employing the quantum kinetic equation. A little later, in the Proceedings of the Institute of Mathematics [8], M. Bogolyubov published an article on deriving hydrodynamic equations from the Bogolyubov-Born-Green-Kirkwood-Yvon hierarchy of fundamental evolution equations.

The ideas conceived by Bogolyubov at the Institute of Mathematics have laid the groundwork for the theory of kinetic equations and became the cradle of modern statistical mechanics, as noted in our time.

References

- [1] M. M. Bogolyubov. Problems of Dynamic Theory in Statistical Physics. Gostekhizdat, 1946. (*IM report 1945, 7.02.1046*)
- [2] M. M. Bogolyubov. On Some Statistical Methods in Mathematical Physics. Kyiv: AN USSR, 1945.
- [3] M. M. Bogolyubov. Kinetic equations. *JETP*, 1946, **10** (3), 265–274. (*07.1945*)
- [4] M. M. Bogolyubov. Expansions by powers of a small parameter in the theory of statistical equilibrium. *JETP*, 1946, **16** (8), 681–690.
- [5] M. M. Bogolyubov. The method of functional derivatives in statistical mechanics. *Proc. Inst. Math.*, 1947, **8**, 177–189. (in Ukrainian) (*25.12.1944*)
- [6] M. M. Bogolyubov. On the theory of superfluidity. *Proc. Inst. Math.*, 1947, **9**, 89–103. (in Ukrainian) (*24.09.1946*)
- [7] M. M. Bogolyubov, K. P. Gurov. Kinetic equations in quantum mechanics. *JETP*, 1947, **17** (7), 614–628. (*26.10.1947*)
- [8] M. M. Bogolyubov. Hydrodynamics equations in statistical mechanics. *Proc. Inst. Math.*, 1948, **10**, 41–59. (in Ukrainian) (*25.03.1947*)
- [9] M. M. Bogolyubov, B. I. Khatset. On some mathematical questions of the theory of statistical equilibrium. *Reports of Acad. Sci. USSR*, 1949, **66** (3), 321–324.
- [10] M. M. Bogolyubov. Lectures on Quantum Statistics. Problems of Statistical Mechanics of Quantum Systems. Kyiv: Rad. Shkola, 1949. (in Ukrainian) (*Preface 30.12.1948*)

Primary author: Prof. GERASIMENKO, Viktor (Institute of Mathematics NAS of Ukraine)

Presenter: Prof. GERASIMENKO, Viktor (Institute of Mathematics NAS of Ukraine)

Session Classification: MATHEMATICS

Track Classification: MATHEMATICS