

Sergei Mikhailovich Rytov (on his seventieth birthday)

S. A. Akhmanov, F. V. Bunkin, A. G. Vinogradov, A. V. Gaponov, D. L. Goryshnik, Yu. A. Kravtsov, M. L. Levin, A. M. Prokhorov, V. I. Tatarskii, I. L. Fabelinskii, and Z. I. Feizulin

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Sergei Mikhailovich Rytov, a prominent Soviet physicist and Corresponding Member of the USSR Academy of Sciences, observed his seventieth birthday on July 3, 1978. His creative career, which already spans nearly fifty years, has been uncommonly multi-faceted and productive. One cannot but admire the breadth of his scientific interests, which encompass many different branches of physics, and especially those related to oscillatory, wave, and fluctuation phenomena. Rytov's studies in optics, electrodynamics, acoustics, and radioengineering had a significant effect on the emergence of radiophysics and opened up broad prospects for its further development. Quoting Academician A. L. Mints: "Radiophysics is what Rytov works on," and this humorous definition reflects Rytov's contribution to modern radiophysics very accurately.

Although it is not possible here to present an anywhere nearly complete analysis of Rytov's work, some of his studies have been so important for the emergence of radiophysics as a science that they cannot be overlooked. We should refer first of all to his doctorate dissertation on "Modulated Oscillations and Waves" (1938; published in the "Trudy Fiz. Inst. Akad. Nauk SSSR" in 1940), which had an enormous influence on the development of the theory of oscillations and clearly demonstrated the productivity of a consistent oscillations approach to various problems of physics. This classical paper is just as pertinent today as when it was published.

Rytov also studied problems of oscillation and wave theory later on, deriving important results in the theory of self-oscillatory systems of the Thomson type, in the theory of betatron and synchrotron oscillations, and in the theory of parametric oscillators and amplifiers (1948-1963). The research in these areas has been developed successfully by many of Rytov's students and successors.

Another of Rytov's fundamental efforts was his study of the diffraction of light by ultrasound [Izv. Akad. Nauk SSSR Ser. Fiz., No. 2, 223 (1937)]. The results of this investigation have now acquired particular importance with the rapid development of a new applied field of radiophysics—acousto-optics. In the same study, Rytov developed an efficient method for analysis of waves in smoothly inhomogeneous media, which now bears his name. This method has become the most important analytic tool in one of the basic problems of radiophysics—wave propagation in randomly inhomogeneous media.

Studies of thermal fluctuations occupy an important



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position in Rytov's biography. Two of his monographs were devoted to these fluctuations (The Theory of Electrical Fluctuations and Thermal Emission, 1953; The Theory of Equilibrium and Thermal Fluctuations in Electrodynamics, 1967; the latter volume was jointly authored with M. L. Levin). Rytov's theory gives a consistent description of the thermal fluctuations of the electromagnetic field over the entire frequency range and is widely used in various branches of physics. These results were later generalized to fluctuation fields of arbitrary nature (1973).

Rytov originated the most general phenomenological theory of the spectral composition of molecular light scattering, including the spectrum of depolarized radiation, the Mandel'shtam-Brillouin spectrum, and the scattering spectrum governed by entropy fluctuations (1955-1970). This theory has been strongly confirmed by numerous experiments and is now generally recognized.

Rytov has also worked productively in recent years on problems in radio propagation in the ionosphere and on a theory of fluctuation phenomena in the propagation and diffraction of waves in randomly inhomogeneous media. Some of these results have been summarized in well-known reviews that were published in Uspekhi Fiziches-

kikh Nauk (1970 and 1975).

Rytov's fruitful scientific work has been inseparably bound to teaching activity, which he began even before he graduated from the University. He has a continuous thirty-year tenure as head of the Radiophysics Department that he created at the Moscow Physico-Technical Institute (MFTI). Everyone who has had the good fortune to hear Rytov has admired his mastery as a speaker and the consistent fine finish and ultimate clarity of his presentation, whether of a lecture, a paper, or a brief note. The lectures on statistical radiophysics that he gave at the MFTI served as a basis for the world's only textbook on the subject—the "Introduction to Statistical Radiophysics" (1966), which immediately became a scientific best seller. The "Introduction to Statistical Radiophysics" is an indispensable reference work not only for students majoring in radiophysics, but also for all Soviet radiophysicists. This book is now being published as a two-volume set (Part I, "Random Processes," appeared in 1976, and Part II, "Random Fields," which was coauthored with Yu. A. Kravtsov and V. I. Tatarskiĭ, will appear this year) that reflects new results obtained during the last ten years.

In his scientific and teaching work, Rytov is keeping alive the best traditions of the school founded by his teacher, Academician L. I. Mandel'shtam, which was distinguished by deep penetration into the physical nature of the phenomena studied, the ability to formulate a problem succinctly, the encyclopedic spirit, boundless devotion to science, and an extreme unwillingness to compromise. Rytov constantly instills these excellent traditions into scientific youth. His monumental work in assembling, polishing, and editing Mandel'shtam's lectures has made them a legacy to the young generation of physicists.

The All-Moscow Radiophysics Seminar, which he founded and at whose sessions (first at the FLAN, since 1971 at the USSR Academy of Sciences Institute of Atmospheric Physics) the most significant work done in radiophysics and related areas of science is heard and discussed, has had a tremendous influence on the development of Soviet radiophysics. Rytov's seminar enjoys such high prestige that it long ago became essen-

tially an All-Union rather than an All-Moscow seminar; scientists from Gor'kiĭ, Khar'kov, Leningrad, Tomsk, and other cities participate in its work. It has already held over five hundred sessions. It reflects Rytov's knack for quick and accurate evaluation of a delivered paper, with comments as to its strong and weak points. His opinion is generally decisive, especially when established views are being reevaluated. Representatives of contiguous specialties—radio astronomers, opticians, specialists in geophysics and biophysics, and others—often turn to him for advice. This is facilitated also by a special atmosphere of sincere interest in science, friendliness, and gentle good humor that Rytov creates at his seminars. It is therefore no surprise that not only his immediate students and colleagues, but also many other scientists who have benefited by association with Rytov, are proud to count themselves members of his school.

Rytov's scientific-community and organizational activity is not limited to his supervision of the seminar. He is on the editorial staff of the journal "Radiotekhnika i Élektronika," Chairman of the USSR Academy of Sciences Scientific Council Section on the area of "Statistical Radiophysics," a member of the USSR Academy of Sciences Scientific Council office on the complex problem "Radiopropagation," a member of the Methodological Council of the All-Union Society "Znanie" on the physicomathematical sciences, etc.

Rytov's outstanding service to Soviet science is widely recognized. He has been awarded the A. S. Popov Gold Medal and the L. I. Mandel'shtam Prize. He has been honored with three Orders of the Red Banner of Labor, the "Badge of Honor," and medals of the USSR.

Rytov has reached the age of seventy at the peak of his creative strength. As ever before, he is full of energy and new ideas. We wish Sergeĭ Mikhaĭlovich further success in all of his endeavors from the bottom of our hearts.

Translated by R. W. Bowers