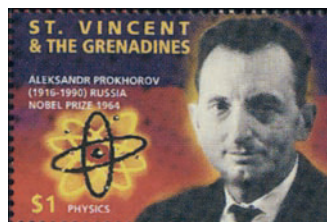


Aleksandr Prokhorov—Lasers and Masers

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The 1964 Nobel Prize in physics was shared by 3 physicists: Russians Aleksandr Mikhailovich Prokhorov (1916-2002) and Nikolay G. Basov (1922-2001) and American Charles H. Townes (1915-) for fundamental research in quantum electronics that led to the development of the maser and laser. Specifically, Basov and Prokhorov performed the basic research that led to the invention of laser and maser devices, which was accomplished independently by Townes and others. Maser stands for *microwave amplification by stimulated emission of radiation*; a laser is an optical maser. These devices collect energy waves, amplify them hundreds of times, and produce a beam of almost perfectly parallel waves with little or no interference or static. The principles of the laser and maser have been applied to many fields, including medicine.

Prokhorov was born of Russian parents on July 11, 1916, in Atherton in northeastern Queensland, Australia. His father had fled Russia in 1911 after escaping from exile in Siberia. After the Russian Revolution (1917), the family returned to the Soviet Union in 1923. Prokhorov studied physics at Leningrad State University, graduating with the baccalaureate degree in 1939. He then became a graduate student at the P. N. Lebedev Physical Institute in Moscow. However, his studies were interrupted by World War II (1939-1945). He served in the Russian Army from 1941 to 1944. After the war, he returned to school and received his doctorate in 1946 from the P. N. Lebedev Physical Institute in Moscow. After receiving his doctor-

ate, Prokhorov became a senior associate at the Institute. Here, he and Basov, who was Prokhorov's student, jointly suggested the maser principle of amplifying and emitting parallel electromagnetic waves that are all in phase and all on the same wavelength. About the same time, Townes, at Columbia University in New York City, was independently working out the principle of the maser. Townes was the first to actually build such a device (1954).

In 1954, Prokhorov became director of the Oscillation Laboratory at the P. N. Lebedev Institute, and later, he was appointed professor of physics at the M. V. Lomonosov State University in Moscow.

Beginning in the mid-1950s, Prokhorov concentrated on the development of masers and lasers and on the search for crystals with suitable spectral and relaxation properties. His detailed studies of ruby (one of the most useful crystals for lasers) led to its widespread use at microwave and optical wavelengths. Prokhorov also created paramagnetic masers and proposed the concepts of open resonators and gas dynamic lasers, and he further investigated the resonance and nonresonance interactions of laser radiation with matter. Prokhorov wrote a number of fundamental articles on the construction of infrared and visible light lasers and on non-linear optics. Prokhorov died of pneumonia in Moscow in 2002.

Prokhorov was honored on a stamp (Scott No. 2218j) issued by the island of St Vincent in 1995.

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