



Citation

Conception of Distributed Feedback Lasers and Pioneering Contributions to Wide-Band and Multi-Wavelength Optical Fiber Communication Systems

Dr. Herwig Kogelnik

Position and Organization:

Adjunct Photonics Systems Research Vice President,
Bell Laboratories, Lucent Technologies

Doctorate :

Ph. D. (Oxford Univ. 1960)
Doctor of Technology (Technische Hochschule Wien 1955)

Date of Birth : June 2, 1932

Brief Biography :

- 1955 Dipl. Ing. Technische Hochschule Wien, Austria
- 1955 Assistant Professor at Institut für Hochfrequenztechnik, Wien, Austria
- 1958 Doctor of Technology Degree, Technische Hochschule Wien, Austria
- 1960 Ph.D. Oxford University, Oxford, England
- 1961 Bell Laboratories (earlier owned by AT&T, currently by Lucent Technologies)
- 1967 Head of Coherent Optics Research Department
- 1976 Director of Electronics Research Laboratory
- 1982 Visiting McKay Lecturer of University of California at Berkeley
- 1983 Director of Photonics Research Laboratory
- 1997 Adjunct Photonics Systems Research Vice President

Main Awards and Honors :

- 1984 OSA Frederic Ives Medal
- 1989 IEEE David Sarnoff Award
- 1990 Joseph Johann Ritter von Prechtel Medal from Technical University of Vienna, Austria
- 1991 IEEE / LEOS Quantum Electronics Award
- 2001 IEEE Medal of Honor
- 2001 Marconi International Fellowship Award in Telecommunications
- 2002 New Jersey Inventors Hall of Fame

- 1978 Member of National Academy of Engineering (NAE)
- 1989 President of Optical Society of America (OSA)
- 1992 Honorary Fellow of St. Peter's College at Oxford University
- 1994 Member of National Academy of Sciences (NAS)
- 1999 Chairman of Engineering Sciences Section of NAS
and many others

Main Achievements :

Since 1961, Dr. Kogelnik has explored the realization of optical fiber communications at Bell Laboratories.

One of the biggest impact on industry and academia in the recent 50-year-history of telecommunications has come from the technology for high-capacity, long-distance optical fiber transmission in the 1.5 micron band as described in Dr. Suematsu's Main Achievements. The pioneering and on-going

research on single-mode semiconductor lasers by both Dr. Kogelnik and Dr. Suematsu continues to have an enormous influence not only in academic society but also, through industrialization and the building of a public information infrastructure, on researchers and engineers throughout the world.

The achievements for which Dr. Kogelnik are being honored with this Okawa Prize include his proposal of the basic principle of the distributed feedback (DFB) laser achieved with a collaborator, Dr. C. V. Shank. This idea and theoretical analysis are based upon his Ph. D. work on traveling-wave tube at Oxford University. This principle, after 1980, became the basis for the later practical realization of the single-mode semiconductor laser, a key technology for enabling long-distance, wide-band communications over optical fiber.

Dr. Kogelnik presented a foundational paper on the DFB laser in 1971. That was the starting point for research in many other organizations on DFB lasers. By around 1981, the theory had been implemented in the form of a 1.5 micron semiconductor laser using an InP semiconductor, by groups at KDD, NTT, Hitachi and elsewhere.

Starting in the early 1960s, Dr. Kogelnik made extensive contributions on optical beam theory and optical waveguide theory. The significance of those contributions is attested to by more than a thousand citations of his papers. His proposals and the verification of their underlying principles laid the foundation for today's wide-band and wavelength division multiplexing optical fiber communications systems, and offered promising next-generation technologies for later performance breakthroughs. These trailblazing concepts, as well as his presentation of theories and their experimental verification, further opened the way for major developments in the 1980s in integrated optics, which became merged with quantum electronics, a technology that had been developing on its own at the time. This led to the establishment of leading-edge photonics that required the more advanced scientific knowledge and broadly comprehensive technology. He put the name of "Photonics" in his laboratory.

Dr. Kogelnik has received numerous honors and awards, including selection as a member of National Academy of Science (USA) and National Academy of Engineering (USA), and so on. He was also awarded the "Medal of Honor" by the IEEE, the highest honor given to the member of IEEE.

In honor of his research work and achievements as director of research laboratory, leader of academic society, guest professor, which extends from the time when optical fiber communications was in its infancy through its growth period to its current heyday of wide-band WDM optical fiber communications, Dr. Herwig Kogelnik is hereby awarded the Okawa Prize.

Dr. and Mrs. Kogelnik have three sons and are enjoying playing tennis and skiing.