Denos Gazis:

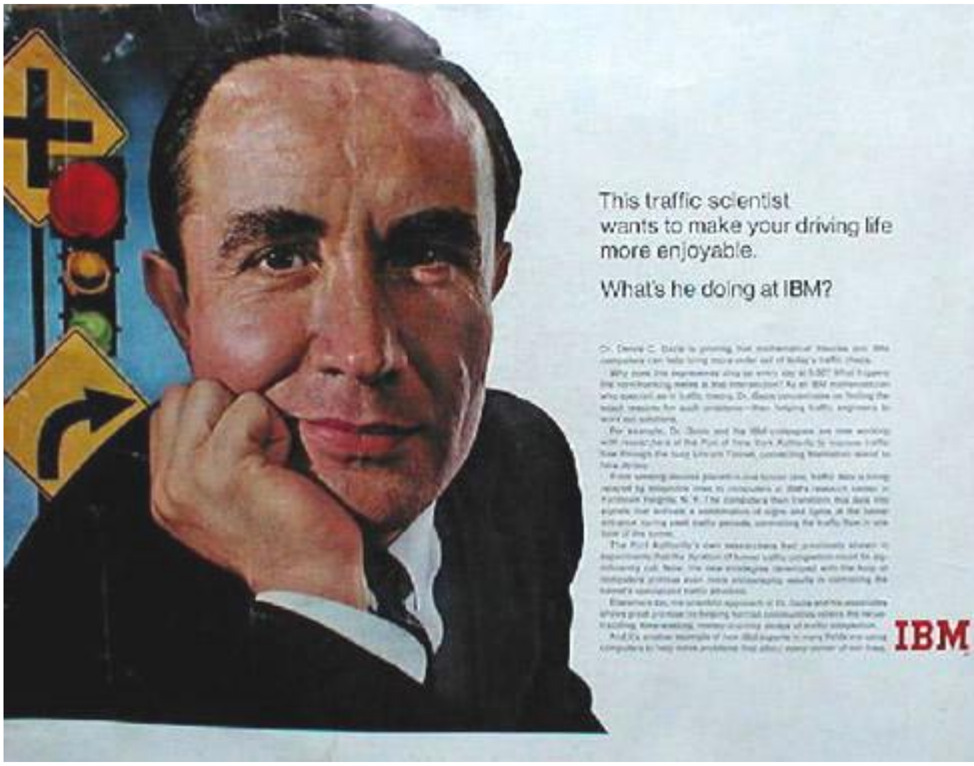
From Denos Gazis' website: http://www.pasha.net/ibm_workers_unite/gazisatibm.html

Career of Dr. Denos Gazis at IBM

Dr. Denos Gazis received a PhD in Engineering Science from Columbia University, in 1957. He worked at the General Motors Research Laboratories until November 1961, when he joined IBM Research. While at GM, he had been involved in early development of a nascent *Theory of Traffic Flow*, dealing with the mathematical modeling of automobile traffic. He was the co-recipient of the Lanchester Prize of Operations Research and The Johns Hopkins University for this seminal work.

At IBM Research, he joined the Mathematics Department in order to pursue research in solid state physics, which was a follow-up to his PhD thesis. However, he soon discovered a great deal of interest at IBM in using computers for traffic control. Taking advantage of the high degree of freedom of choice given then to researchers at IBM, he pursued the development of traffic control modeling. It led to the development of a pilot system for computerized traffic control in San Jose California, which was later duplicated on a large scale in New York City. Later, together with associates at the New York Port Authority, he conducted real-time control experiments at the Lincoln Tunnel connecting Manhattan and New Jersey, which consistently increased the throughput of the tunnel by 12%.

His work received international attention, with some of his review papers being translated into German and Dutch. He also received wide recognition within IBM. In 1967, IBM launched its first major advertising campaign featuring centerfold pictures of IBMers in seven leading magazines, advertising their contributions to the improvement of the lives of IBM customers. One of these advertisements, shown below, featured Dr. Gazis as the traffic scientist who was making people's driving life more enjoyable.



Two years later, IBM sponsored some CBS Reports programs which opened up with 3 minute advertisements of various IBM contributions. On of these advertisements, broadcast internationally, again featured Dr. Gazis explaining IBM's contributions to the modeling and optimization of traffic systems.

Dr. Gazis went on to attain executive management positions at IBM Research, covering wide areas of research, from software to hardware. He also continued a prolific output of publications, highly unusual for a person in a high management position, resulting in over 150 scientific papers, two books, and the leading chapters in two MIT Press books on the future of computer hardware and software. He also became one of the leading spokesmen of IBM on the future of computer technology and IBM's contribution to this area, giving more talks at IBM and customer functions than most IBM executives and receiving great acclaim for the style and content of his delivery. In the early 1990s, the new IBM administration started imposing pressure and budget cuts on all its divisions, which began to adversely affect the Research Division. Dr. Gazis tried to generate some new projects at Research, capitalizing on his reputation as a traffic scientist. He succeeded in winning two large government contracts for research on the emerging *Intelligent Trasportation Systems*. However, in spite of his successes, there was a rapid loss of mutual respect between Dr. Gazis and the Research management which ended up with his retirement in 1995. In his parting remarks to Dr. James McGroddy, Director of Research at the time, Dr. Gazis quoted Aristotle regarding values worth having:

There is a kind of life, which rises above the limits of human nature; men will live it not by nature of their humanity, but by virtue of something in them that is divine. We should not listen to those who exhort a man to live only according to rational reasoning, but we should live according to the highest thing that is in us, for small though it be, it is far more valuable than the rest.

After his retirement, Dr. Gazis received the *Lifetime Achievement Award* of the Trasportation Science Section of INFORMS (Institute For Operations Research and Management Science). He wrote yet anothe chapter for a third MIT book on "The Future of the Electronic Marketplace". Every year, during the five years of his retirement, he has been receiving checks from IBM Research for some of his recent inventions before retirement, which were in various stages of filing and approval, an unusual record for any IBMer, let alone one in a high management position. Finally, this year he was invited by INFORMS to contribute a chapter in a commemorative volume of the 50th anniversary of the Operations Research journal. He was one of 32 world leaders in Operations Research to be so invited, and one of two ex-IBMers. The other retired IBMer was Dr. Ralph Gomory who led and nurtured IBM Research as IBM Vice President and Director of Research during its golden years of the 1970s and 1980s, and has been President of the Sloan Foundation since his retirement in 1989. Dr. Gomory will contribute a chapter on Integer Programming, and Dr. Gazis one on the Origins of Traffic Theory.

After retirement, Dr. Gazis formed a company, PASHA Industries, Inc., aimed at developing highly inteligent software agents which can assist humans in carying out complex tasks. Examples are: providing traveler infromation services; providing assistance to elderly people; assisting in optimal allocation of energy to energy consuming units in a site; and assisting in portfolio management.

Robert Herman (1914 - 1997)

By American Astronomical Society

http://d7beta.aas.org/obituaries/robert-herman-1914-1997

Robert Herman died on Thursday the 13th of February 1997.

Robert Herman, L.P. Gilvin Centennial Professor in the Department of Civil Engineering and staff member of the Center for Statistical Mechanics at the University of Texas, Austin, died 13 February 1997.

Herman was born in New York City on 29 August 1914, and was educated in New York City public schools. He earned his undergraduate degree in physics from the City College of New York in 1935, while his PhD in physics was awarded by Princeton University in 1940. His dissertation advisor was originally E. U. Condon; after Condon's departure from Princeton, he worked with a committee headed by H. P. Robertson. His dissertation was on molecular structure and infrared spectroscopy.

Herman had a remarkable record, both as an undergraduate as well as throughout his career. He will be best known to readers of this note for his joint contributions with the author to the Big Bang cosmological model. I will therefore emphasize in this note his contributions in this area as well as his work in molecular structure and spectroscopy, which was of astrophysical interest. He was very productive scientifically, and switched quite freely between basic and applied science. As a graduate student at Princeton, he authored or coauthored fourteen papers, of which eight were on molecular spectra and structure, representing work done jointly with fellow graduate student Robert Hofstadter (later a Nobel Laureate).

His career count of papers was over 270, in many of which he was co-author, as well as several books of which he was co-author or co-editor. A scan of his publications shows research ranging from theory of high energy electron scattering as a tool to explore nuclear structure, to the application of statistical mechanics and operations analysis techniques generally to vehicular traffic flow, a field which he pioneered, to astrophysics, where he published on the spectra of astrophysically interesting molecules, and to cosmology, particularly physics in the Big Bang model.

Herman spent his first year after the PhD at the Moore School of Electrical Engineering, University of Pennsylvania, working on early digital computers. With the advent of World War II, he was invited to join Section T, OSRD, then getting underway at the Department of Terrestrial Magnetism, Carnegie Institution of Washington (which later became The Applied Physics Laboratory, of Johns Hopkins

University), where his work included among other things operations analysis of the efficacy of variable time fuzes (proximity fuzes) for rotating projectiles. After the war and until 1955, he continued as head of a molecular spectroscopy group, largely concerned with combustion reactions, and served for several years as Associate Director of the Laboratory. During this period, he authored or co-authored a number of papers in *Astrophysical Journal* and elsewhere concerning spectra of astrophysically interesting molecules. In 1955 he became a Visiting Professor of Physics at the University of Maryland, and then, in 1956, moved to the Research Laboratory of General Motors, where he headed both the Theoretical Physics and Traffic Science Departments. He retired from General Motors in 1979 and joined the faculty of the University of Texas.

Although what follows is not related to astrophysics and cosmology, I would feel remiss were I not to mention two major contributions emerging from his career at General Motors. For one, he, along with several colleagues from Ohio State and Stanford, collaborated with former fellow graduate student Robert Hofstadter at Stanford, in the latter's studies of nuclear form factors, work which led to a Nobel Prize. Hofstadter's research involved using high energy electron scattering as a probe. Because Herman contributed to this work in a major way, he was invited to the Swedish ceremony when the Nobel Prize was given to Hofstadter. In a completely different field, Herman led the development of vehicular traffic science as an operations research discipline, involving such people as Ilya Prigogine (later a Nobel Laureate) and the late Elliot Montroll, and many others. Herman became quite well known for this work; he established a Transportation Science section of the Operations Research Society, as well as serving as founding editor of a journal on Transportation Science. He received many awards for his transportation science research, including the presidency of the Operations Society of America, and was elected to the National Academy of Engineering in recognition of his pioneering work. It was always startling to me to receive a preprint from Herman in which the solution to some problem in traffic science started with the Boltzmann equation. This was really applied physics in the best sense.

What was for me the most important element of Herman' s career began in 1947 and continued at various intensity levels until his death in February. Herman collaborated with me and with the late George Gamow in the development of the physics of the Big Bang model of the universe. The essence of this research and of the many consequent publications was the importance of physical phenomena in cosmological modeling. We showed that the cosmic abundances of the lighter chemical elements were surely established by thermonuclear reactions in the early stages of a relativistic, radiation-dominated universe. Moreover Herman and I proposed and calculated in 1948 that there should now exist a cosmic blackbody background radiation at a temperature of several kelvin, reflecting conditions in the expansion after matter and radiation decoupled. The existence of this now-famous 3K residual radiation was established in 1965 by Arno Penzias and Robert Wilson, work for which they received the Nobel Prize. Its existence, together with the agreement of theory and observation on element abundances, are strong pillars of the Big Bang model. I should mention that Herman, James Follin, Jr., and I published a paper establishing a methodology, still used, for dealing with physical conditions in the early universe prior to nucleosynthesis.

Herman left a truly remarkable record, that of a polymath, who at the time of his death had four papers in press, on traffic problems, and on the serviceability of pavements. During his career, he contributed to the theory of the English flute (one he made is on exhibit in a museum), to the problem of the measurement of pupillary diameters, had a one-man show of his sculptures in wood at the Washington headquarters of the National Academy of Sciences, and was a published cartoonist in *Physics Today*. His influence must be considered impressive, particularly if one looks at the list of many more than one hundred scientists with whom he coauthored papers in basic and applied science. He will be sorely missed, particularly as I must now finish alone a book on our journey through cosmology which we were writing when he died.

An extensive oral history interview with Alpher and Herman, conducted by Martin Harwit, is on file at the AIP Center for the History of Physics, and it is intended that our joint papers in cosmology be archived at Union College.

Photo (available in PDF version) courtesy Marsha Miller, University of Texas at Austin.

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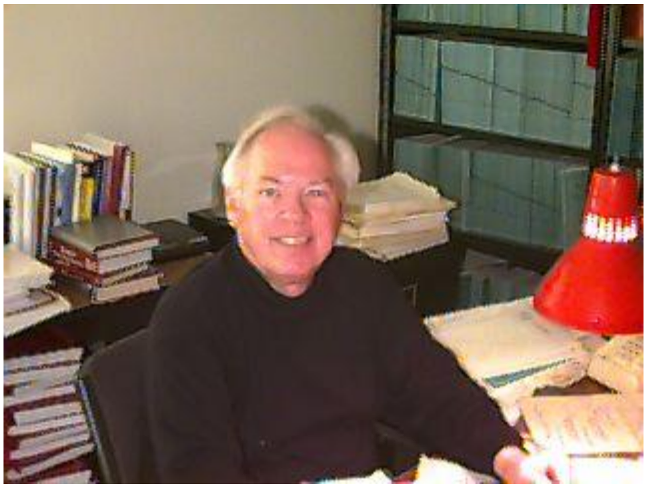

Alexei A. Maradudin

From the University of California, Irvine's website: http://www.ps.uci.edu/physics/maradudin.html

Professor

Condensed Matter Theory

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Professor Maradudin earned his B.S. degree from Stanford University in 1953 and his Ph.D. from the University of Bristol (England) in 1957. After four years at the University of Maryland, College Park, as a postdoctoral fellow and assistant research professor, and five years at the Westinghouse Research Laboratories, he joined the UCI Physics Department in 1965.

A large part of the research activity in my group is devoted to the theoretical study of surface phenomena.

A primary area of interest is the scattering of electromagnetic waves from randomly rough surfaces. One of the objects of study in this field is the phenomenon of enhanced backscattering, which is the presence of a well-defined peak in the retroreflection direction in the angular dependence of the intensity of the diffuse component of the scattered light. It is caused by the coherent interference between each multiply- scattered optical path and its time-reversed partner. Most of the existing calculations of this effect by computer simulations have been carried out for one-dimensional random surfaces. A major effort is currently underway to extend these calculations to two-dimensional surfaces.

Anharmonic properties of a surface phonon, such as the shift in its frequency with increasing temperature and the temperature dependence of its lifetime, due to phonon-phonon interactions, are being studied in the classical regime of high temperature by molecular dynamics simulations. In the low temperature regime, where quantum effects are important, path integral quantum

Monte Carlo methods are being used to calculate static (thermodynamic) and dynamic properties of anharmonic crystals. In addition to providing nonperturbative results for fundamental vibrational properties of crystals, such calculations provide benchmarks against which the results of perturbative and other approximate calculations can be compared.

We have recently been carrying out calculations of the dispersion curves of electromagnetic waves propagating through two and three dimensional, periodic, dielectric structures. They possess gaps in certain frequency ranges. Electromagnetic waves with frequencies in these ranges cannot exist. This has the consequence that spontaneous emission is forbidden in cases in which the band gap overlaps the electronic band edge, which can improve the performance of many optical and electronic devices. The absence of electromagnetic modes in a certain frequency range can also modify the basic properties of many atomic, molecular, and excitonic systems.

General theories of wave propagation through a disordered medium predict their confinement to a limited region of the medium caused by the strong, multiple scattering of the waves by the random spatial fluctuations of the material properties of the medium. This effect has yet to be observed experimentally, and we are trying to elucidate conditions particularly favorable for its observation. We have shown recently that electromagnetic waves are confined to a smaller region of a random two-dimensional dielectric medium that is periodic on average when their frequency lies in a gap in the dispersion curves of the average periodic medium than when their frequency is outside it.

As a teacher, I believe that my role is not only to transmit information to my students but also to teach them how to think, to reason. The latter is more difficult, both for the teacher and for the student, than the former, but ultimately more rewarding, since the knowledge a student receives will change with time, particularly in a rapidly evolving field such as physics, but the ability to reason transcends such changes.

Representative Publications

1. A. A. Maradudin, I. V. Novikov, and A. V. Shchegrov, "Scattering of Surface Plasmon Polaritons by a Circularly Symmetric Surface Defect," Phys. Rev. Lett 78, 4269-4272 (1997).
2. I. P. Ipatova, V. G. Malyshkin, V. A. Shchukin, A. A. Maradudin, and R. F. Wallis, "Kinetic Instability of the Semiconductor Alloy Growth," Phys. Rev. B57, 12968-12993 (1998).
3. J. A. Sanchez-Gil, V. Freilikher, I. Yurkevich, and A. A. Maradudin, "Coexistence of Ballistic Transport, Diffusion and Localization in Surface Disordered Waveguides," Phys. Rev. Lett 80, 948-951 (1998).
4. T. A. Leskova, A. A. Maradudin, I. V. Novikov, A. V. Shchegrov, and E. R. Mendez, "Design of One-Dimensional Band-Limited Uniform Diffusers of Light," Appl. Phys. Lett 73, 1943-1945 (1998).
5. A. V. Shchegrov and A. A. Maradudin, "Signatures of Electromagnetic Surface Shape Resonances in Scattering of Pulsed Beams from Surface Defects," Optics Lett 23, 1642-1644 (1998).
6. M. Leyva-Lucero, E. R. Mendez, T. A. Leskova, and A. A. Maradudin, "Destructive Interference Effects in the Second Harmonic Light Generated at Randomly Rough Metal Surfaces," Opt. Commun. 161, 79-94 (1999).