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Douglas Leon Mills

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### Authors

Chernyshev, Aleksandr L  
Maradudin, Alexei A  
White, Steven R  
et al.

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## Douglas Leon Mills

With the death of Douglas Leon Mills in Duarte, California, on 29 March 2012, the world of condensed-matter physics and the University of California, Irvine, lost a major figure and a dear colleague. He died after a long battle with leukemia.

Born in Berkeley, California, on 2 April 1940, Doug was the first member of his family to go to college. He received a BS in engineering physics in 1961 and a PhD in physics in 1965, both from UC Berkeley. His thesis adviser was Charles Kittel, and his thesis subject was the properties of ultrasonic waves in insulating crystals.

After receiving his PhD, Doug spent a year as an NSF postdoctoral fellow at the Université Paris-Sud, where he worked in the group of Jacques Friedel. There he carried out his first investigations into magnetic properties of solids, a subject that occupied him throughout his professional career.

On returning to the US in 1966, Doug became one of the earliest faculty members in UC Irvine's physics department. It would be his academic home for the rest of his life.

Doug made seminal contributions to several areas of condensed-matter physics; most of that work was done in the context of surface physics. He was an early contributor to the modern theory of surface electromagnetic waves, which began to be developed in the late 1960s and laid the theoretical foundations for plasmonics. Particularly significant were his papers devoted to surface waves on ferromagnets, antiferromagnets, and magnetoelastic media. He produced the first theories of the Raman scattering of light from surface phonon polaritons on semiconductors, from metal surfaces, and from surface spin waves on opaque ferromagnets. He also developed the first theories of IR absorption by binary metallic alloys and multiphonon processes in alkali-halide crystals.

Doug's theoretical work on the use of low-energy electron diffraction from solid surfaces helped make that technique a valuable tool for the experimental study of surface phonons. He proceeded with Harald Ibach to write *Electron Energy Loss Spectroscopy and Surface Vibrations* (Academic Press, 1982), a standard reference on the subject. With Wei Chen and Steven Trullinger, Doug discovered gap solitons in superlattices. His papers on the scattering of spin-polarized electrons from magnetic surfaces predicted and explained data



Douglas Leon Mills

obtained in such experiments. Those papers remain the benchmarks for such calculations.

Much of Doug's work over the past decade dealt with the magnetic properties of multilayer structures and ultrathin magnetic films, subjects that he began to study before practical uses for them had been found. It was a characteristic of his work: His interest in the basic properties of the systems he studied frequently led him to make significant predictions years before the development of experimental techniques that verified them.

Among his academic honors, Doug was a Yamada Science Foundation Lecturer in Japan in 1984 and a recipient of a senior US scientist award from the Alexander von Humboldt Foundation of Germany in 1990.

Many of the approximately 25 PhD students that Doug supervised went on to become senior figures in the condensed-matter theory community. He mentored a like number of postdoctoral students, many of them now well-known scholars.

An able administrator, Doug was chair of UC Irvine's department of physics and astronomy from 1983 to 1986. He helped recruit and mentor many of the department's current faculty members. His service to the university extended beyond his department. For example, he was the director of the multidisciplinary Institute for Surface and Interface Science from 1996 to 2001. He served on, and sometimes chaired, many academic senate committees and was a staunch defender of high academic standards.

Doug was an excellent classroom

teacher at both the undergraduate and graduate levels, and he received several teaching awards. As a consequence of teaching a nonlinear optics graduate course, he wrote *Nonlinear Optics: Basic Concepts* (2nd edition, Springer, 1998).

The passion Doug had for teaching and inspiring students was not confined to UC Irvine. His principal nonacademic diversion was sailing. He competed many times in the annual Newport Beach to Ensenada yacht race and was commodore of the Bahia Corinthian Yacht Club in Newport Beach. He supported the next generation of amateur sailors by founding the Bahia Sail Racing Association.

Doug served on the organizing committees of several magnetism conferences. He was a member of the editorial board of *Physics Reports*, an editor of *Comments on Condensed Matter Physics*, and an editor of the book series *Contemporary Concepts of Condensed Matter Science*.

Doug was enthusiastic and always ready to share an opinion on any subject, be it South American music, a *New York Times* article, or the latest work on the skyrmion lattices on a magnet surface. Especially to younger colleagues, he was generous with his time, ideas, and encouragement. He fought his illness with amazing courage and approached it as a problem than needed an intricate solution. He was a great optimist until the end.

A most congenial colleague, great storyteller, and warm human being, Doug is mourned by the condensed-matter community and will be greatly missed by those who knew him.

Aleksandr L. Chernyshev  
Alexei A. Maradudin  
Steven R. White  
Clare Yu  
University of California, Irvine ■

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