

Professor Dan Quillen

Oxford mathematician whose penetrating work on the higher algebraic K-theory received the highest praise

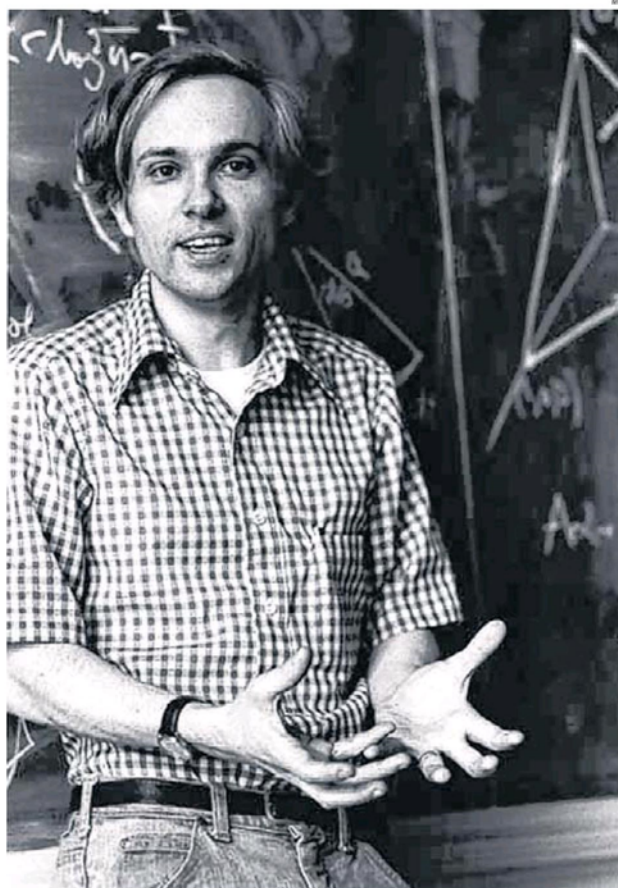
Dan Quillen was the Waynflete Professor of Pure Mathematics for more than 20 years until he retired from the Oxford post earlier than planned five years ago because he was given a diagnosis of Alzheimer's disease. The loss of the ability to do mathematics and logical thinking was particularly hard on him.

Daniel Gray Quillen was born in Orange, New Jersey in 1940. His father was a physics teacher. Quillen went to school at Newark Academy and then entered Harvard University, receiving his BA in 1961. He proceeded to research at Harvard, under the supervision of the great topologist Raoul Bott. He obtained his PhD in 1964 for a thesis on partial differential equations. By this time he was married; he and his wife Jean already had two children and went on to have four more.

Also in 1964, Quillen began his academic career at Massachusetts Institute of Technology (MIT). He spent the year 1968-69 on leave from MIT on a Sloan Fellowship in Paris, where he was much influenced by Alexander Grothendieck, an eccentric French mathematical genius who in the 1960s revolutionised algebraic geometry, but gave up mathematics in 1970 and now lives as a recluse. This good fortune continued. Quillen spent the following year as a visiting member of the Institute of Advanced Study in Princeton, where he was greatly influenced by the British mathematician M. F. (now Sir Michael) Atiyah of Oxford.

Quillen's early work was on the Adams conjecture (due to the British topologist J. Frank Adams), giving two approaches, one via algebraic geometry, the other using modular representation theory of groups. This second approach led Quillen to the work for which he is best known. Grothendieck's ideas had led to two new areas of mathematics, both known as K-theory.

Topological K-theory was developed by Atiyah and Friedrich Hirzebruch, but it was in algebraic K-theory that Quillen made his breakthrough. Two



Quillen: he greatly influenced the thinking of topologists and algebraists

algebraic objects (called the K-groups of orders 0 and 1) had been developed and exploited by Hyman Bass and others, and various attempts had been made to extend this work to K-groups

of higher order. Quillen's successful work in this area led to his giving an address at the International Congress of Mathematicians (ICM) in Vancouver in 1974, on higher algebraic K-theory.

It led also to his receiving the Fields Medal at the next ICM in 1978 (the Fields Medal, often referred to as the equivalent in mathematics of the Nobel prize, which is not awarded to mathematicians, is restricted to those under 40). The citation for this prize (by I. M. James, later his colleague at Oxford) includes "D. G. Quillen's contributions to algebra are outstanding in their inventiveness, conceptual richness and technical virtuosity."

"He is the prime architect of the higher algebraic K-theory, and this is perhaps his finest achievement.... Quillen's work has had a great influence on the thinking and perceptions of the present generation of topologists and algebraists. His papers are not merely informative, but edifying and exciting to read. They bring into clear view a mathematical landscape of great richness and beauty that many others have vainly striven to approach."

Perhaps Quillen's best-known other work concerns his proof of the Serre conjecture in algebra. This dates back to the work of the French mathematician Jean-Pierre Serre in 1955-57; it was resolved independently by Quillen and the Russian mathematician A. A. Suslin in 1977, and is now known as the Quillen-Suslin theorem.

In 1984 Quillen became Waynflete Professor of Pure Mathematics at Magdalen College, Oxford. Here he was able to rejoin Atiyah, then a Royal Society research professor in Oxford, until Atiyah left for Cambridge in 1990. Quillen spent the rest of his career in Oxford, retiring in 2006.

His influence on mathematics has been profound. His output, however, was modest for a mathematician of his importance and calibre: one book and 50 papers. His personality too was modest, and he was a somewhat retiring man. He is survived by his wife Jean and their six children.

Professor Dan Quillen, mathematician, was born on June 27, 1940. He died of complications of Alzheimer's disease on April 30, 2011, aged 70