ROY CHISHOLM

Professor Roy Chisholm died on 10 August 2015, aged 88.

Ruth Farwell writes

Roy was the founding Professor of Applied Mathematics at the University of Kent. He was extremely influential in shaping the nature of applied mathematics at Kent during his career which lasted nearly 30 years. He was a highly regarded mathematical physicist, he is remembered with much affection and respect by those who had the good fortune to work and collaborate with him.

Roy was brought up in North London and studied mathematics at Christ's College, Cambridge. He was a Wrangler in part 2 and achieved a distinction in part 3 of the tripos. In 1952 he obtained a Doctor of Philosophy from Cambridge, with research into quantum field theory of elementary particles developing what was 'new' at the time, Feynman graphs, and breaking new ground with his derivation of the 'symmetric integration' formula.

After Cambridge, he moved to Glasgow University and from there to University College, Cardiff, where he had his first lectureship in Applied Mathematics. While at both universities his work using Feynman graphs continued, investigating field theories of various different interactions and their equivalencies. At Glasgow he also found time to publish on the fundamentals of statistical mechanics, and in Cardiff he authored, with Rosa Morris, a seminal text book on mathematical methods for scientists and engineers.

The list of institutions which welcomed Roy as a visiting academic over the years is too long to include all, but, to give a flavour, they included Texas A&M, Los Alamos, Stanford, Adelaide, plus regular short trips to CERN. At CERN in the early sixties, Roy developed the full set of algorithms for scalar products of the Dirac gamma algebra, to which his name is attached – the Chisholm-Caianiello-Fubini Identities. This led to a paper a few years later on the linked Pauli algebra.

Roy returned from CERN in 1963 to his first chair at Trinity College, Dublin. He remained there for ~~only~~ two years, then spent a year in the USA prior to returning to England in 1966 to take up the Chair at Kent. He built up the core of the applied mathematics staff, whose specialisms were numerical analysis and numerical computations applied to Physics. This included using Padé approximants to accelerate sequences of numerical approximations to single integrals and then more generally to numerical integration. The culmination of the group's Padé work was a successful Summer School and Colloquium in 1972, bringing together mathematicians and physicists and leading to a resurgence of interest. Roy was stimulated to develop multivariate Padé approximants with which the name of the applied group at Kent then became associated.

In the mid 1970's Roy's research took a new direction. The Dirac and Pauli algebras are examples in spaces of particular dimensions of algebras developed by the Victorian mathematician, William Kingdon Clifford. It was these Clifford algebras on which Roy's and my 'spin gauge theories' are based. They are Lagrangian field theories unifying the interactions of the fundamental particles

based on Clifford algebras of higher dimensions, with the interactions generated by gauge symmetry transformations in the higher dimensional space. The most notable achievement was the prediction of the mass of the top quark which was very close to the experimental measurement.

Roy became aware of a significant number of small research groups around the world who were also working on the applications of Clifford algebras. His positive experience of the earlier Padé conference led him to organise successfully an international conference at the University of Kent to bring together these different groups. It triggered a series of conferences around the world which continue to this day; Roy is recognised internationally as one of the founding fathers of mathematical applications of Clifford algebras.

For Roy, the work on Clifford algebras opened new and unexpected avenues. William Clifford, with his wife, Lucy, were at the centre of scientific and literary culture in London in the late nineteenth century. With his wife, Monty, Roy found himself moving into new aspects of research: history and philosophy inspired by the lives of William and Lucy.

Although Roy's health was deteriorating in recent years, he remained active with an enquiring mind, even publishing his first novel, Changing Stations, in 2014. He is survived by his wonderful wife, by his three beloved children and his granddaughters, of whom he was immensely proud. I and many others feel privileged to have been able to have him as part of our professional lives.

Professor Ruth Farwell CBE DL recently retired as Vice Chancellor of Buckinghamshire New University. She was an undergraduate student in mathematics in the early days of the University of Kent, and Roy Chisholm was the supervisor of her PhD. This PhD research was the start of a long collaboration over several decades during which they developed and further refined 'spin gauge theories'. More details of Roy's career and his work can found in his memories on http://www.roychisholm.com/