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SIR EDMUND WHITTAKER MEMORIAL PRIZE

In October 1993 the Whittaker prize was awarded jointly to Dr. M. A. Berger and Dr. A. W. Reid

MITCHELL A. BERGER

In 1979, Mitchell A. Berger graduated B.A. Magna Cum Laude from Princeton University, majoring in Physics. By 1984 he had obtained an M.A. and Ph.D. in Astronomy from Harvard. After two years as a research fellow at the National Center for Atmospheric Research in Boulder, Colorado, he moved in 1986 to St. Andrews University, where he held a Postdoctoral Fellowship in the Department of Mathematical Sciences, working with Professor E. R. Priest in the Solar Theory research group. In 1989, he was appointed lecturer in the Department of Mathematics of University College London, where he was recently promoted to a readership.

Mitchell Berger's research encompasses astrophysics and space physics, fluid dynamics, probability theory and knot theory: indeed, he has touched every one of the areas, pure and applied mathematics, mathematical physics and statistics, for which the Whittaker Prize can be awarded! Most of his work has concerned topological fluid dynamics and magneto-fluid dynamics, with the aim of better understanding turbulent flows. This led him to discover new invariants for braids (i.e. entangled strings with fixed endpoints), applicable not only to tangled vortex or magnetic field lines in fluids but also to long polymer filaments. His work in Solar Physics has involved examination of experimental data from the Solar Maximum Mission satellite and development of theoretical models of aspects of solar flares and coronal heating. But he has not focussed narrowly on one area of application, and has collaborated fruitfully with pure mathematicians (including a Fields Medal winner) on the theory of knots and braids. He has himself written, with characteristic modesty, that "I attempt to master the rather distinct languages of astronomers, physicists, applied mathematicians and pure mathematicians, so that I may assist in encouraging communication between these groups". The award of the Whittaker Prize is recognition of his success.

ALAN W. REID

Alan Reid grew up in Buckie and was educated at Aberdeen University, obtaining his Ph.D. in 1988. He has held research positions at Ohio State University, Aberdeen, Berkeley's Mathematical Sciences Research Institute and the University of Texas at Austin. In 1993 he was awarded a Royal Society Research Fellowship which he is holding at Cambridge University.

His work is mainly concerned with the relationship between the topology of three dimensional manifolds and number theory. William Thurston's work has highlighted the interplay between topology and hyperbolic geometry in dimension three and as a

result much research is centred on the study of hyperbolic structures on three dimensional manifolds. A particularly interesting class of such manifolds consists of those obtained as quotients of hyperbolic space by the actions of certain arithmetically defined discrete groups. Alan Reid has made major contributions to the question of which manifolds arise in this way by inventing invariants depending on the arithmetic properties and using them to determine which examples amongst certain classes (for example, knot complements and punctured torus bundles) can admit arithmetic structures. His theorem that iso-spectrality implies commensurability for arithmetic two and three dimensional hyperbolic manifolds is one of the most remarkable in this area.

In joint work with Chinburg, he has found examples of closed hyperbolic manifolds in which every closed geodesic is simple. The proof is considered to be particularly striking because it is usually very difficult to prove the existence of even a single simple closed geodesic on a three dimensional manifold.

Alan Reid's clear and enthusiastic lecturing style results in his being in considerable demand as a lecturer at meetings worldwide. His work has influenced a number of researchers both in topology and number theory and he is the leading expert on the study of arithmetic three dimensional manifolds.