

Winners of the AustMS medal for 2009

Arun Ram*, **Tony Dooley**** and **Brendan McKay*****

The AustMS medal for 2009 is shared by Dr Stephen Lack and Dr Ian Wanless.



Nalini Joshi (AustMS President), Ian Wanless and Stephen Lack

Dr Stephen Lack

Dr Lack works in category theory and its applications. He is a leading figure in both general and applied category theory. His research on categories and 2-categories is fundamental, and increasingly important in a large number of subjects, ranging from computer science to topology to mathematical physics.

Steve Lack is recognised as one of the primary developers of the foundations of higher categories and of categorical homotopy theory. He is responsible for establishing the notions of distributive and adhesive categories. He has been described as the world's leading expert on 2-categorical structures where his papers on 2-monads and pseudomonads are considered primary references.

Steve Lack's research is a constant interplay between fundamentals and applications. Joint work with Cockett examines categories whose logic is pertinent to

*Department of Mathematics and Statistics, University of Melbourne, Parkville, VIC 3010.

E-mail: aram@unimelb.edu.au

**School of Mathematics and Statistics, University of New South Wales, Sydney, NSW 2052.

***Department of Computer Science, Australian National University, Canberra, ACT 0200.

computation. Their work lays the foundation of restrictive categories, an important construct for the study of syntax and semantics in languages and recursion theory.

Steve Lack's mathematics has been described as 'mathematics ahead of its time'. In particular, in homotopy theory, Lack's work on Quillen model structures provided a firm homotopical foundation for the theory of 2-categories. Other work gave definitive answers for when limits of lax morphisms can make sense, and recent work with Simona Paoli has paved the way for a better understanding of how internal category theory relates homotopically to enriched category theory.

Steve Lack is on the editorial board of three international journals and a regular speaker at international conferences.

Dr Ian Wanless

Dr Ian Wanless' research can roughly be divided into analytic and combinatorial, with some overlaps. He is recognised as one of the top researchers in asymptotic combinatorics, a difficult field which uses the tools of real and complex analysis to study en masse characteristics of classes of discrete structures. His initial contributions were in the study of sets of discordant permutations, which can also be described in terms of Latin rectangles and 0–1 matrices. In joint work with McKay and Wormald he gave a tour de force solution of the long-standing important problem of the asymptotic enumeration of graphs with bounded degree.

Dr Wanless is the undisputed leader in the combinatorics of Latin squares. He was the first to determine which orders admit Latin squares having no subsquares, a problem that had been around for more than a century. In subsequent work he has developed a theory of cycles in Latin squares that is playing an essential part in subsequent developments in the theory of Latin squares. In the field of combinatorial permanents Dr Wanless has completely solved several conjectures and established important subcases of several more outstanding conjectures.

Further notable examples of the creativity of Ian Wanless include his work on the Hall–Paige conjecture where he established (with Vaughan-Lee) the equivalence of two disparate conditions, and the problem of the existence of Latin squares without orthogonal mates which he solved with Webb. A recent seminal paper shows for the first time how the structure of a random Latin square can be investigated theoretically. He has made use of differential equations to enumerate a class of planar triangulations, and used probabilistic methods to prove the existence of regular graphs of large girth which have no homomorphism onto a cycle of a given length.

Dr Wanless is a Managing Editor of the *Electronic Journal of Combinatorics*, President of the Combinatorial Mathematics Society of Australasia since 2006, and winner of the 2008 Hall Medal, the 2008 Victorian Young Tall Poppy award, and the 2002 Kirkman Medal.