

# Maths scholar solves puzzle, wins world acclaim

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Finding a solution to a mathematical puzzle unsolved for over 15 years has won an ANU mathematical physicist two prestigious awards this month, with long-term practical implications for the physical sciences.

Professor Rodney Baxter, from the Mathematical Sciences Institute at ANU, received both the 2006 Onsager Prize of the American Physical Society (APS) and the separate Onsager Lectureship and Medal for 2006 from the Norwegian University of Science and Technology.

Both prizes are named for widely respected theoretical physicist and Nobel Laureate Lars Onsager, who exactly calculated the order parameter of the Ising model in 1949. This was the first such calculation for a statistical mechanical model of magnetism. He received the 1968 Nobel Prize in Chemistry for his earlier work on irreversible thermodynamics.

“These awards are particularly pleasing for me as it is recognition of work on the order parameters of the chiral Potts model, which is research in the Lars Onsager tradition,” Professor Baxter said.

In his research, Professor Baxter showed by careful mathematical analysis that numerical predictions about the order parameters of the chiral Potts model were exactly right, something which had been elusive for mathematicians in the 15 years before his proof.

Simply, the complicated chiral Potts model is a prototype of theoretical

descriptions of the interaction and behaviour of materials at the molecular level. It includes the Ising model as a special case.

The “exact solution” of the chiral Potts model achieved by Professor Baxter has important implications in the physical sciences. It greatly increases confidence in theoretical models, particularly in materials science, where physicists around the world, and at ANU, are building next generation electronic devices using two-dimensional layers in ‘chips’. These specialised ‘chips’ may eventually be used in computing, audiovisual technologies and advanced telecommunications.

The Dean of the Mathematical Sciences Institute, Professor Alan Carey, said Professor Baxter’s breakthrough saw him join a long list of highly-regarded scholars around the world who had received the prizes in previous years.

“To win both the APS Onsager Medal and the Onsager Lectureship and Medal at the same time is a tremendous achievement and underscores the importance of this particular finding,” Professor Carey said. “It also goes some way to confirm our Centre as a world leader. In the independent review of ANU in 2004, external assessors rated the quality of much of the mathematical research at ANU in the top 5 per cent internationally.”

The American Physical Society prize is awarded to recognise outstanding research in theoretical statistical physics including quantum fluids and includes prize money of \$15,000.

It awarded Professor Baxter the Prize for “his original and groundbreaking contributions to the field of exactly solved models in statistical mechanics, which continue to inspire profound developments in statistical physics and related fields”.

Source: Australian National University

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