1530–1600 hrs Peter Brooke  
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The Physics behind the Quantum Computer  
Utilising quantum states as a basis for information processing, storage, and transfer has shown that, in some cases, quantum information (QI) has significant advantages over its classical counterpart. However, it also has real disadvantages, namely, decoherence, gate implementation, and readout. Here, at Macquarie University, the physics research concentrates on the trying to overcome the disadvantages. Specifically, we are performing a comprehensive study (with Dr K-P Marzlin, University of Calgary, and R. Karasik, UC Berkeley) of decoherence-free subspaces, without any restrictive physical assumptions. This is a much needed examination of the limitations imposed by purely physical contraints on QI processing. The results also help quantify the difficulty of constructing a large QI processor, and, if a such a processor is to built, show a need for physicists, both in Australia and worldwide, to examine mathematical results from a physical perspective.

Welcome Reception  
Sunday 30 January  
1800–2000 hrs  
Melville Hall, ANU  

The Congress Welcome Reception is sponsored by Institute of Physics (UK) and will be held in the trade exhibition and poster venue in Melville Hall at the Australian National University. The cost of attending is included in the registration fees for full registrants and exhibitor aides. The cost for day-only registrants and delegates’ guests is $35.  

This is a great chance to catch up with colleagues and meet new contacts in your area—a terrific networking opportunity.

Sutherland Lecture  
Monday 31 January  
1300–1400 hrs  
Manning Clark 1 (MC1), ANU  

Presenting Author: R. W. Home  

R.W. Home was Professor of History and Philosophy of Science at the University of Melbourne, 1975–2003, and is now Professor Emeritus. He has written extensively on the history of physics, especially on eighteenth-century theories of electricity and magnetism and on the history of physics in Australia. He is a Fellow of the Australian Academy of the Humanities and a member of the International Academy of the History of Science. In 2004 the Australian Academy of Science awarded him its Academy Medal for his contribution to the Academy as editor since 1984 of the journal Historical Records of Australian Science.

Speculating about Atoms in Early 20th-century Melbourne: William Sutherland and the ‘Sutherland-Einstein’ Diffusion Relation  

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In his biography of Einstein, ‘Subtle is the Lord…’, Abraham Pais noted, while describing Einstein’s route to his well-known diffusion relation, that the same relation had been discovered ‘at practically the same time’ by the Melbourne physicist William Sutherland, following similar reasoning to Einstein’s, and had been submitted by him for publication shortly before Einstein completed the doctoral thesis in which he first announced the relation. Pais therefore proposed that the relation be called ‘the Sutherland-Einstein relation’.  

In this paper I discuss Sutherland’s research programme that led him to the diffusion relation, and comment on structural factors within the international physics community of the day that led to his work being over-shadowed by Einstein’s and soon forgotten.