



Mastering the Madness: Controlling our quantum world

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Wednesday, 3 October 2012, 8:00 PM
Physics Lecture Theatre 1, Sandy Bay Campus, University of Tasmania

ABSTRACT:

The theory of quantum mechanics is, by any reasonable standard, completely crazy. It challenges our deepest understanding of the nature of reality. It was rejected outright by many of the brightest minds of the twentieth century, and is still the easiest way to start an argument between professional physicists. It is also easily the most successful physical theory ever devised by humans. No wonder then that even though it is almost a century after the theory was originally devised, our society has still not come to grips with the quantum worldview. Nevertheless, we are reaching a point in our technology where we are gaining the ability to control quantum systems to an unprecedented extent. The craziest behaviour of quantum mechanics is now enabling our most sensitive measurements, our most secure communication, and perhaps our most powerful computation. This lecture will review the ideas of quantum mechanics for a general audience, and explain exactly how they change our understanding of reality. It will then explore some of the new technologies that are allowing us to control the quantum state of systems, focussing particularly on atomic and optical systems such as Bose-Einstein condensates and lasers.

SPEAKER PROFILE:

Joe Hope grew up in Southern Tasmania, where he demonstrated a keen interest in science from an early age. He went to the Hutchins school in Hobart from 1984-1989, and then headed to Canberra, where he eventually obtained his PhD in theoretical physics from the Australian National University in 1997.

He held postdoctoral positions at the University of Queensland and at the University of Auckland before returning to the ANU in Canberra.

A/Prof. Joseph Hope has worked in many areas of quantum and atom optics, and has been researching methods of detecting atoms nondestructively, controlling the quantum state of atomic samples, and producing a high quality atom laser.

He was a founding member and project leader of the ARC Centre of Excellence in Quantum-Atom Optics located at the ANU from 2003-2010. This year A/Prof. Hope was awarded an ARC Future Fellowship to study controlling ultracold atomic gases.

Joe Hope has won awards for teaching and science writing including the ANU Vice-Chancellor's Award for Excellence in Education in 2010 and the Dialogica Award from the Academy of Science in 2003. He participates in the Scientists in Schools program to have an opportunity to talk about his work with local high school students.