



(Image by Anthony Gregory, Staffordshire University)

Modern Quantum Technologies : The offspring of Schrödinger's famous cat

2016 'Women in Physics' Lecture
Dr Catalina Curceanu



The Western Australian branch of the Australian Institute of Physics invites Year 10-12 science classes and the interested public to attend this year's 'Women in Physics' lecture to be held on

Friday 19 August 2016 from 11am - 12noon
Murdoch University Kim Beazley Lecture Theatre

followed by light refreshments.

Places are limited. To book your place, please RSVP to outreach@murdoch.edu.au

About the Speaker Dr Catalina Curceanu is the head of a research team at Italy's prestigious National Institute of Nuclear Physics, Laboratori Nazionali di Frascati. Born close to Dracula's castle in Romania's Transilvania region, her urge to become a scientist took Catalina to a physics degree at the University of Bucharest, and to a doctoral degree in an experiment at Geneva's famous particle laboratory CERN. Throughout her career, Catalina has been decorated with prestigious international awards and is the author of more than 200 scientific articles. Her book "From Black Holes to hadrontherapy. A journey into Modern Physics" reflects her passion to explain the beauty and importance of science – particularly to enthusiastic high school audiences.

Catalina will be touring Australian Universities and Schools as part of the 2016 Women in Physics lectureship, awarded to her by the Australian Institute of Physics.

About the Lecture About 100 years ago, it became clear that a new theory was needed to explain the very foundation of all matter, us included. This new theory, *Quantum Mechanics*, departed sharply from older theories in that probabilities and chance events, and lack of microscopic predictability, were its essential elements. Despite being famously opposed by Einstein's quote "God does not play dice", Quantum mechanics has matured into the best theory we have ever had. The structure of molecules, the forces that shape proteins and molecules, the semi-conductor physics that underlies all computing, and many other fields cannot be understood without quantum mechanics. In spite of its tantalizing success, quantum mechanics still spurs a lively debate about its interpretation: the early quantum physicist Erwin Schrödinger created the now famous paradox known as *Schrödinger's cat* – which is simultaneously dead and alive until we look at it. In this talk, we shall explore

$$\frac{1}{\sqrt{2}}|\text{dead}\rangle + \frac{1}{\sqrt{2}}|\text{alive}\rangle$$

some modern perspectives on this paradox: the *collapse models*, the *many worlds* scenario and *Bohmian mechanics*. We shall also look at some of today's experiments conducted to test the most peculiar features of quantum mechanics, such as the apparent infinitely-fast infinitely-distant information exchange known as *entanglement*. Far more than a mere challenge for our philosophical interpretation of the world, quantum mechanics is the basis for future quantum-driven technologies, from quantum computing and cryptography to teleportation. Today's dreams might become tomorrow's realities.

Transport Funding and More Information The lecture is aimed at year 10-12 high school science students. Murdoch University has funding available for bus transfers from high-school locations to the lecture venue. Teachers or students interested in organising transport for high-school classes should contact Michelle Austin (M.Austin@murdoch.edu.au) for help and assistance. For questions related to any other aspect of the event please contact Dr Gerd Schröder-Turk (G.Schroeder-Turk@murdoch.edu.au).