

- Masterclass - Quantum Dots: Tinkering with Artificial Atoms for Future Semiconductor Devices

Professor Axel Lorke
Chair, Faculty of Physics and CENIDE
University of Duisburg-Essen, Germany

Friday, 7 August 2015 @ 10.00 AM – 1 PM

Cost: Free, but RSVP is essential by 31 July. Places are limited.

Book by completing this online form: www.ias.uwa.edu.au/masterclass/lorke

Venue: Institute of Advanced Studies, University of Western Australia, Crawley

<http://www.uwa.edu.au/contact/map?id=1898>

About Masterclasses

The IAS Masterclass provides an opportunity for postgraduate students and early career researchers to meet and discuss their research with a distinguished visiting scholar. Participants will present short papers on their current research, which will then be opened for discussion by the group. Places are available for those who wish to participate in the discussion, but do not wish to give a paper. Interested postgraduate students and early career researchers from all relevant disciplines at all Perth universities are invited to attend.

Abstract:

With rapidly improving technologies in nano-patterning and crystal growth, it is now possible to realize solid-state structures, which confine electrons in all 3 spatial dimensions, down to quantum mechanical length scales. These so-called quantum dots exhibit many phenomena known from atomic physics, such as charge and energy quantization, Zeeman splitting, Stark shift and shell filling effects. Contrary to real atoms, however, quantum dots can be tailored in size and shape, and their charging state can easily be controlled electrically. Furthermore, the confining potential can often be well approximated by a harmonic oscillator, which greatly facilitates the understanding of these fascinating, interacting many-particle systems.

In this Masterclass, we will discuss the physics and technology of quantum dots, in particular self-assembled quantum dots, which have great application potential for novel laser structures and memory devices. Using basic, textbook-style treatments from solid-state physics, electrical engineering and quantum mechanics, we will unravel their electronic and optical properties and introduce experimental techniques that can be used to detect and even manipulate their quantum states.

Biography:

Professor Axel Lorke is the Chair of the Faculty of Physics and CENIDE, University of Duisburg-Essen, Germany. In 2000 he was appointed Full Professor (C4) of Experimental Physics at the University of Duisburg-Essen. His work focuses on the electronic and optical properties nano-structures and low-dimensional semiconductors. From 2004–2012 he was coordinator of the Collaborative Research Centre ‘Nanoparticles from the Gas Phase’, funded by the German Research Foundation. He was the founding Director of the ‘Center for NanoIntegration Duisburg-Essen’ (CENIDE), which represents about 60 research groups working in the nanosciences with a total of about 300 scientists. He presently serves as scientific director of the Interdisciplinary Center for Analytics on the Nanoscale and board member of the Nanoenergy Technology Center. Professor Lorke is a 2015 UWA Gledden Visiting Fellow.

