

SINAM NANO SEMINAR

Center for Scalable and Integrated Nano
Manufacturing (SINAM) Presents:



Geometry, Light, and a wee bit of Magic

Professor Ulf Leonhardt

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Monday, November 30th, 2009

2:00 PM - 3:00 PM

3110 Etcheverry Hall

Abstract

Many mass-produced everyday products of modern technology would appear to be completely magical to our ancestors: mobile phones, television, computers, electric light, cars, etc. Some devices that are still perceived as magical or mysterious are about to appear in the laboratory and are not so mysterious after all. For example, the first prototype of an electromagnetic cloaking device has been made at Duke university in 2006. This device makes an object invisible to microwave radiation of a single frequency and polarization. At Harvard University, first vital steps towards levitating objects on the forces of the quantum vacuum have been made. At St Andrews, we observed first indications of artificial black holes in the laboratory, using extremely short light pulses in photonic-crystal fibres. Invisibility devices, quantum forces and optical black holes have two things in common: they represent applications of Einstein's general relativity in Maxwell's electromagnetism and their practical demonstrations are made possible by modern metamaterials. I will try to elucidate the scientific principles acting behind the scenes of such "pure and applied magic".

Biography

Ulf Leonhardt was born in Schlemka, in former East Germany, on October 9th 1965. He studied at Friedrich-Schiller University Jena, Germany, at Moscow State University, Russia, and at Humboldt University Berlin, Germany. He received the Diploma in Physics from Friedrich-Schiller University in 1990 and the PhD in Theoretical Physics from Humboldt University in 1993. Ulf Leonhardt was a research associate at the Max Planck Research Group Nonclassical Radiation in Berlin 1994-1995, a visiting scholar at the Oregon Center for Optics in Eugene, Oregon, 1995-1996, a Habilitation Fellow of the German Research Council at the University of Ulm, Germany, 1996-1998, and a Feodor-Lynen and Göran-Gustafsson Fellow at the Royal Institute of Technology in Stockholm, Sweden, 1998-2000. Since April 2000 he is the Chair in Theoretical Physics at the University of St Andrews, Scotland. In 2008 he was a Visiting Professor at the National University of Singapore. Ulf Leonhardt enjoys imaginative research that connects the practical aspects of physics with abstract ideas, thoughts and stories. He loves to find and use unusual and often unused connections across several areas of physics. In particular, he is interested in connections between quantum optics and general relativity. In addition to his theoretical work, he is also running an experiment where the tools of ultrafast photonics are used to make analogues of the event horizon in the laboratory. Ulf Leonhardt is the first from former East Germany to win the Otto Hahn Award of the Max Planck Society. For his PhD thesis he received the Tiburtius Prize of the Senate of Berlin. In 2006 Scientific American listed him among the top 50 policy business and research leaders for his work on invisibility devices. In 2008 he received a Royal Society Wolfson Research Merit Award and in 2009 a Theo Murphy Blue Skies Award of the Royal Society. He is a Fellow of the Institute of Physics and of the Royal Society of Edinburgh.

Refreshments Provided

Hosted By: Professor Xiang Zhang, 3112 Etcheverry Hall
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