



SEMINAR

Phase vortices ex Nihilo

Dr David Paganin

School of Physics, Monash University

Wednesday, 19 November
12.00 noon – 1.00pm
Science Lecture Theatre S11, Bldg 25

Abstract

The spontaneous creation of phase vortices plays an important role in four of the five collaborative wave-physics adventures discussed in this talk. We begin with Gary Ruben's work on "vortex snowflakes" that may be constructed using a Young-type interferometer which has three pinholes, rather than the usual two pinholes [1]. We continue with Gary Ruben's paper on quantum phase turbulence arising from the collision of three initially-separated pieces of Bose-Einstein condensate [2]. Attention is then turned to coherent X-ray optics, with Sergey Podorov's algorithm for deterministic coherent diffractive imaging [3], Sally Irvine's studies on three-dimensional blood-flow velocimetry [4], and Glenn Myers' work on X-ray phase-contrast tomography of few-material objects from few projections [5].

[1] G. Ruben and D.M. Paganin, *Phase vortices from a Young's three-pinhole interferometer*, Phys. Rev. E. **75**, 066613 (2007).

[2] G. Ruben, D.M. Paganin, and M.J. Morgan, *Vortex-lattice formation and melting in a nonrotating Bose-Einstein condensate*, Phys. Rev. A **78**, 013631 (2008).

[3] S.G. Podorov, K.M. Pavlov and D.M. Paganin, *A non-iterative reconstruction method for direct and unambiguous coherent diffractive imaging*, Optics Express **15**, 9954–9962 (2007).

[4] S.C. Irvine, D.M. Paganin, S. Dubsy, R.A. Lewis and A. Fouras, *Phase retrieval for improved three-dimensional velocimetry of dynamic X-ray blood speckle*, Appl. Phys. Lett. **93**, 153901 (2008).

[5] G.R. Myers, D.M. Paganin, T.E. Gureyev and S.C. Mayo, *Phase-contrast tomography of single-material objects from few projections*, Optics Express **16**, 908–919 (2008); G.R. Myers, T.E. Gureyev, D.M. Paganin, and S.C. Mayo, *The binary dissector: phase contrast tomography of two- and three-material objects from few projections*, Optics Express **16**, 16736–16749 (2008).

Convenor: Dr. Joanne Etheridge

Email: joanne.etheridge@mcem.monash.edu.au

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