



University of
Salford
MANCHESTER

Broadband nonlinear optics: fractals, white light and multiplexing

McDonald, GS, Christian, JM, Huang, JG, Laughton, G, Chamorro-Posada, P and Sanchez-Curto, J

Title	Broadband nonlinear optics: fractals, white light and multiplexing
Authors	McDonald, GS, Christian, JM, Huang, JG, Laughton, G, Chamorro-Posada, P and Sanchez-Curto, J
Type	Conference or Workshop Item
URL	This version is available at: http://usir.salford.ac.uk/id/eprint/18416/
Published Date	2005

USIR is a digital collection of the research output of the University of Salford. Where copyright permits, full text material held in the repository is made freely available online and can be read, downloaded and copied for non-commercial private study or research purposes. Please check the manuscript for any further copyright restrictions.

For more information, including our policy and submission procedure, please contact the Repository Team at: usir@salford.ac.uk.

New Trends in Nonlinear Optics, Glasgow, UK, Feb 23, 2005.

“Broadband Nonlinear Optics: Fractals, White Light and Multiplexing”

Authors:

Graham S McDonald, James M Christian, Jungang Huang,
Gary Laughton, Pedro Chamorro-Posada, Julio Sanchez-Curto

Abstract:

We will present an overview of some recent works that collectively fall under the banner of “Broadband NonLinear Optics”. Firstly, a generic mechanism for the spontaneous formation of spatial optical fractals has been proposed. Willie’s classic single-feedback-mirror system will be used to demonstrate this principle; similar results are expected for other configurations. It is useful to describe convention pattern formation as “single-frequency” in this context, whereby the broadband “scale-less” case corresponds to fractal generation. Secondly, our investigations of broadband Raman effects have recently ventured into the cavity domain. In earlier (cavity-less) configurations, two input beams could generate an evolving white light spectrum. Switching over to the driven-damped world inside a cavity, we have discovered a remarkable self-synchronization effect in which this bandwidth not only doubles in size but also locks to a fixed steady pattern. Finally, the broad spatial bandwidth associated with obliquely multiplexed or interacting beams has proved to be a goldmine of analytical developments. A map of developments in this field will be presented. This will include the first analytical description of spatial Kerr solitons interacting at arbitrary angles, along with new families of further Helmholtz solitons, waves, and interface effects.