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SEMINAR

Center for Advanced Research in Photonics
&
Department of Electronic Engineering
The Chinese University of Hong Kong

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Rm 222 Ho Sin Hang Engineering Building,
The Chinese University of Hong Kong

Coupling dynamics in semiconductor lasers and applications to self-mixing interferometry and chaotic cryptography

Silvano Donati

Department of Electronics, Faculty of Engineering
University of Pavia, v. Ferrata 1, 27100 Pavia, Italy
phone +39 0382 985 204, fax +39 0382 422 583

silvano.donati@ieee.org
<http://www.unipv.it/donati>

Abstract

In this presentation, we start with a theoretical introduction to mutual- and self-coupling phenomena in laser oscillator, and then describe in details two applications.

The first is self-mixing interferometry for the measurement of dimensional quantities (displacement, distance, vibration, and angle) and physical quantities (coupling factors, line width, alfa-factor). In this case, the laser undergoes self-injection at *weak* level, leading to an amplitude and frequency modulation driven by external optical pathlength.

The second application is optical chaos, which is generated by the laser source at *strong* level of injection. We describe mutual and self-injection generation of chaos, and the first step of development to cryptography, that is, synchronization. Then, we will review several schemes of coding and decoding of information, i.e., chaotic masking and CSK (chaos shift keying) and how they can be implemented, along with theoretical and experimental results carried out recently.

About the Author : S. Donati is full Professor at University of Pavia since 1980. He authored 2 books (Photodetectors, Prentice Hall 1999 and Electrooptical Instrumentation, Prentice Hall 2004), about 250 papers in Journal and Conference Proceedings, and has been the Guest Editor of a dozen Special Issues (JSTQE, JoO-A, Opt.Engineer., JQE, etc.). His seminal papers on self-mixing interferometry and optical chaotic cryptography have totaled 430 citations. He is a Fellow of IEEE and of OSA. Has founded and has been the Chair of the LEOS Italian Chapter. Has been LEOS VP Region 8 membership and is presently BoG member of the LEOS and Vice Chair, IEEE Italy Section. For more detail and to download papers go to <http://www.unipv.it/donati>

*** All are welcome to attend ***

For further information contact Prof. Chester Shu at 2609 8258