CONSIGLIO NAZIONALE DELLE RICERCHE
ISTITUTO NAZIONALE DI OTTICA

AVVISO DI SEMINARIO

Giovedi 13 febbraio 2014 alle ore 11,00

l'Area della Ricerca CNR di Pisa, Aula 44, primo piano, Edificio "A"

il Dr. ***Fernando Brandi***

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terrà un seminario sul tema:

Recent developments in second-harmonic dispersion interferometry for diagnostic applications

Abstract

Chromatic dispersion is a fundamental property of materials resulting in the variation of the refractive index with the light wavelength. The chromatic dispersion of a sample induces a wavelength dependent phase-shift on the transmitted light which can be measured and used to characterize the physical system, as for example electron density in plasma, molecular density in gas, thin-film thickness, as well as to perform quantitative phase imaging of biological systems. A very efficient interferometric method to exploit chromatic dispersion for diagnostic applications is the so-called second-harmonic interferometer (SHI), a special fully common-path two-color interferometer that measures the phase-shift difference between the fundamental laser beam and its second-harmonic. Being common-path the SHI is intrinsically insensitive to vibrations resulting in a high sensitivity. The use of a single laser source greatly simplifies the set-up as well as the optical design compared to typical two-color interferometers, offering great versatility and the possibility of a robust implementation, as for example in industrial environments, large scale machines, as well as in microscopy set-up.
In this seminar, the second-harmonic dispersion interferometry method and the development of a fully fiber-coupled remotely controlled CW laser based SHI are presented. Specific applications of such system, like the measurement of electron density in plasma and molecular density in gas jet with microsecond time resolution are discussed. The first demonstration of harmonic dispersion interferometry using the third-harmonic beam and pulsed picosecond laser source is also given.
Finally, recent developments towards high-spatial resolution second-harmonic dispersion interferometry are discussed.