

Abstract Submitted  
for the DAMOP13 Meeting of  
The American Physical Society

**Optical impulse response of silica microspheres: complementary approach to whispering-gallery-mode analysis** JEAN-RAPHAËL CARRIER, HUGO BERGERON, JULIEN ROY, SIMON POTVIN, VINCENT MICHAUD-BELLEAU, JÉRÔME GENEST, CLAUDINE NÌ ALLEN, Centre d'optique, photonique et laser (COPL), Université Laval — Due to their high sensitivity, microspheres are often seen as suitable sensors for applications in biochemistry and quantum electrodynamics. Sensing may be achieved by monitoring the spectral shift of one whispering-gallery mode. However, the information obtainable with this technique is limited since only one mode is tracked. We analyze the optical impulse responses and wide band complex transmission spectra of silica microspheres, as they together provide complementary perspectives to investigate the behaviour of the resonator and its interaction with the surrounding medium. This paper describes how time- and frequency-domain data can be obtained simultaneously with an interferometric setup and how both approaches can be used to better understand the optical dynamics of dielectric microspheres. The impulse response provides confirmation that small asphericities give rise to a precession of the orbit of the pulse propagating around the inner surface of the cavity. This effect also strongly depends on coupling conditions. Moreover, we noticed the presence of secondary pulses associated with modes of higher radial quantum number. All these features bring valuable information on the optical behaviour of the microspheres, which could eventually help increasing sensing possibilities.

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Date submitted: 23 Jan 2013

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