

PhLAM RESEARCH SEMINAR SERIES

Partnered by: OPTICA Student Chapter of University of Lille,
OPTICA Optical Metrology Technical Group

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Temporal Waveguiding in a Dispersive Time-Varying Medium

by

Prof. Govind P. Agrawal
University of Rochester (USA)

Wave propagation in a time-varying medium has attracted considerable attention recently. In this talk, I discuss how temporal changes in a medium's refractive index can be used for a variety of applications, such as for realizing time-domain equivalents of lenses, total internal reflection, optical waveguides, and Fabry-Perot interferometers. I first introduce the temporal version of a spatial interface and then focus on my group's work on the temporal analog of reflection and refraction of optical pulses inside a dispersive medium with a temporal boundary across which the refractive index changes. As an optical pulse approaches this boundary, it splits into two parts that propagate at different speeds because of their widely different spectra. An analog of total internal reflection also occurs when the refractive index change at the boundary is large enough. This phenomenon can be used to make a temporal waveguide that confines optical pulses to a time window. I also discuss how optical solitons can be used for making such waveguides by employing a pump-probe configuration.