

SÉMINAIRE DU DÉPARTEMENT DE GÉNIE PHYSIQUE

Jeudi 10 septembre 2020 – 10h30

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Meeting-ID: 995 3398 3816

password: 533038

Dr Arthur Dogariu

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Fast and Slow Light: Applications to Imaging Diagnostics

The talk will describe the basis for light propagation through dispersive media, with examples of negative and positive dispersion in atomic media. In particular, superluminal propagation, or fast light, is demonstrated in atomic media where Raman gain is used to achieve sharp resonances. Pulses of light can travel with group velocities much larger than c , and can even have negative velocities. In contrast, slow light can be obtained in media where significant positive dispersion is encountered. Using the strong positive dispersion found between neighboring hyperfine absorption resonances in an atomic vapor, a very narrowband spectral filter can be constructed, leading to a new method called Slow Light Imaging Spectroscopy (or SLIS). This approach eliminates spectrometers, has exceptionally high light collection efficiency, has exceptionally high spectral discrimination and provides an imaging capability for each individual spectral feature.



[1]-L. J. Wang, A. Kuzmich, and A. Dogariu, "Gain-assisted superluminal light propagation," *Nature* **406**, 277-9 (2000).

[2]-A. Dogariu, A. Kuzmich, and L. J. Wang, "Transparent Anomalous Dispersion and Superluminal Light Pulse Propagation at a Negative Group Velocity," *Phys. Rev. A (Atomic, Molecular and Optical Physics)*, **63** (5), 053806-12, (2001).

[3]-A. Kuzmich, A. Dogariu, L. J. Wang, P. W. Milonni, and R. Y. Chiao, "Signal velocity, causality, and quantum noise in superluminal light pulse propagation," *Phys. Rev. Lett.*, **86**, 3925 (2001).

[4]-A. Dogariu, A. Kuzmich, H. Cao, and L. J. Wang, "Superluminal light pulse propagation via rephasing in a transparent anomalously dispersive medium," *Optics Express* **8**, 344-350 (2001).

[5]-US patent US10578489 (2020) - Slow Light Imaging Spectroscopy.

Arthur Dogariu is a Research Scholar and Lecturer in the Mechanical and Aerospace Engineering Departments at Princeton University. He received his Ph.D. in Optical Physics from CREOL (School of Optics) at the University of Central Florida in 1997. Before joining Princeton, he was a research scientist at NEC Research Institute, and a researcher at the University of California, Santa Barbara. His research interests include experimental optical physics in the areas of nonlinear and ultrafast optics, biomedical optics, biosensors, remote detection techniques, hypersonics, plasma dynamics, photo-physics of organic materials and devices, ultrafast spectroscopy, nano-optics, quantum optics, wave propagation in dispersive media. Dr. Dogariu has authored over 90 publications in refereed journals, more than 150 conference papers, and 6 US and international patents. He is a member of the Optical Society of America, of the American Institute of Aeronautics and Astronautics, and an Honorary Member of the Academy of Romanian Scientists.

Vous êtes tous les bienvenus.

Responsable : Denis Seletskiy et Stephan Reuter

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