

Colloquium Notice

Andrey Chabanov

University of Texas at San Antonio

Harnessing light-matter interactions with multilayer photonic structures

It is widely believed that the ability to predict, manage, and exploit light-matter interactions could produce a major conceptual and practical impact on various applications utilizing electromagnetic waves. In this respect our understanding of resonant cavity-enhanced phenomena has resulted in fundamentally new predictive models for light-matter interactions. Simply put, light-matter interactions depend on the strength of the electric or magnetic field components of the electromagnetic wave, which can be very non-uniform in complex media. Our approach is thus the following: we first engineer complex media with useful spatial distributions of electric and magnetic fields, and then introduce optically active components (magnetic, nonlinear, phase-change, etc.) at specific locations in the medium, to enhance desired responses and suppress unwanted ones. Multilayer photonic structures (a.k.a. 1-D photonic crystals) are especially suitable for controlling light-matter interactions. They are simpler to design, easier to fabricate and optimize. Here we illustrate our approach to the design of multilayer structures by the example of wide-aperture omnidirectional isolator and reflective optical limiter. The former is a nonreciprocal device that transmits light in only one direction, thereby eliminating adverse effects of back reflection in optical systems [1]. The latter is a photosensitive device protecting optical systems and components from damage caused by intense optical radiation [2].

[1] R. Kononchuk, C. Pfeiffer, I. Anisimov, N. Limberopoulos, I. Vitebskiy, and A.A. Chabanov, Wide-aperture layered-sheet isolator, Phys. Rev. Applied 12, 054046 (2019).

[2] R. Kononchuk, S. Suwunnarat, M.S. Hilario, A.E. Baros, B.W. Hoff, V. Vasilyev, I. Vitebskiy, T. Kottos, A.A. Chabanov, A reflective mm-wave photonic limiter, Sci. Adv. 8, abh1827 (2022).

Monday

April 11, 2022

Starts at **12:15 pm**

If not mentioned otherwise, all [online Zoom.us events are accessible via this link](#)
or use **meeting ID 829 2687 2594** and **passcode 866995**.