

# Optical Society of America Ann Arbor Local Section

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**Tuesday, 25 February 2014, 7:00-9:00 pm**  
**Location: U-M EECS, H. H. Dow Bldg., Room 1017**  
North Campus, University of Michigan

## **Coherent synthesis of ultrafast waveforms and energies using fiber laser arrays**

Prof. Almantas Galvanauskas  
EECS Dept., University of Michigan

**Abstract:** During last ten years coherently combined continuous-wave fiber lasers have gradually emerged as a promising technology for power scaling by adding up powers from multiple parallel lasers or amplifiers. Recently this approach has been extended to pulse fiber laser arrays for simultaneously increasing average powers and pulse energies to beyond what a single fiber laser can provide. Unexpectedly, this initial work quickly had led to a realization that coherent combining of ultrashort pulse lasers can provide us with much more than a simple addition of energies and powers.

In this talk I will describe our work on coherent combining of ultrashort pulses and the new possibilities that it enables. Conventionally, it is accepted that a laser performance is completely determined by the properties of its gain medium, for example its spectral characteristics or energy saturation. Coherent combining allows synthesizing output waveforms with characteristics that are well beyond the limitations of a particular gain medium. For example, coherent spectral combining enables output pulses with a much broader spectrum and, consequently, with a much shorter pulse duration. Furthermore, signal-synthesis using temporal interference can enable pulse energies significantly exceeding linear energy addition from multiple parallel amplification channels. Such coherent waveform synthesis, when considered in conjunction with fiber laser technology that is inherently compatible with monolithic integration into complex systems, can lead to a paradigm shift in lasers when desired optical waveform shape, power and energy can be synthesized by a complex but compact and robust optical circuitry.

**Bio-sketch:** Almantas Galvanauskas is a professor at the U-M EECS Dept. He has been working in the field of fiber lasers for more than 20 years, and has more than 200 publications, including approximately 30 patents and patent applications. He had pioneered ultrashort-pulse fiber CPA and his work had resulted in demonstrating several record-breaking achievements in performance of fiber lasers. Prior to joining University of Michigan he spent 8 years in industrial R&D. His current work spans areas from novel fiber designs to advanced fiber laser systems, including beam combining of pulsed and ultrashort pulse lasers, and new fiber laser applications such as high-intensity laser plasma produced EUV and X-ray generation. He is also a co-founder of Arbor Photonics, Inc., which was acquired by nLight Inc. in 2012.

**Map to seminar site:** Public parking is shown on the U-Mich campus map [www.umich.edu/~newsinfo/umnc.html](http://www.umich.edu/~newsinfo/umnc.html) (or see AA OSA website). This year, we will NOT be meeting at Paesano's Restaurant prior to the seminar for regular talks.

**Next AA OSA Meeting: TBD**

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