

## Nonlinear optical phononics: Harnessing sound and light in nonlinear nanoscale circuits

By

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Host: Asst. Prof. Cesare Soci



### **Abstract**

Stimulated Brillouin Scattering (SBS), whereby light interacts coherently with acoustic phonons, is a powerful and flexible mechanism for the control of light, having recently been used to achieve tunable slow-light as well as find application in a range of important technologies such as Brillouin lasers, sensors, opto-mechanical oscillator and tailoring optical forces. However, many of the demonstrations exploiting SBS use long length (~ km) silica fiber, which is incompatible with photonic integration. In this talk, I review our recent development of a unique on-chip SBS platform exploiting chalcogenide photonic circuits and highlight demonstrations of on-chip SBS slow-light, SBS based microwave signal processing, chip based Brillouin lasers and non-reciprocal devices.

1. Christopher G. Poulton et al., "Design for broadband on-chip isolator using stimulated Brillouin scattering in dispersion-engineered chalcogenide waveguides," Opt. Express 20, 21235-21246 (2012).
2. Adam Byrnes et al. "Photonic chip based tunable and reconfigurable narrowband microwave photonic filter using stimulated Brillouin scattering," Opt. Express 20, 18836-18845 (2012).
3. Ravi Pant et al., "Photonic-chip-based tunable slow and fast light via stimulated Brillouin scattering," Opt. Lett. 37, 969-971 (2012).
4. Ravi Pant et al., "On-chip stimulated Brillouin scattering," Opt. Express 19, 8285-8290 (2011)
5. B. J. Eggleton, B. Luther-Davies, and K. Richardson, "Chalcogenide photonics," Nature Photonics, 5(3): p. 141-148 (2011)

### **Short Biography**

Professor Benjamin Eggleton is an ARC Laureate Fellow and Professor of Physics at the University of Sydney and Director of the ARC Centre for Ultrahigh-Bandwidth Devices for Optical Systems (CUDOS). He obtained the Ph.D. degree in Physics from the University of Sydney, Australia, in 1996. He then joined Bell Laboratories, Lucent Technologies as a Postdoctoral Member of Staff, and was promoted to Research Director within the Specialty Fiber Business Division of Bell Laboratories, where he was engaged in forward-looking research supporting Lucent Technologies business in optical fiber devices. He has published more than 340 journal publications and over 100 invited presentations. Prof. Eggleton is a Fellow of the Optical Society of America, IEEE and the Australian Academy of Technological Sciences and Engineering (ATSE). He was the recipient of the 2011 Eureka Prize for Leadership in Science, the 2007 Pawsey Medal from the Australian Academy of Science, the 2004 Malcolm McIntosh Prize for Physical Scientist of the Year, the 2003 International Commission on Optics (ICO) Prize, the 1998 Adolph Lomb Medal from the Optical Society of America, the Distinguished Lecturer Award from the IEEE/Lasers and Electro-Optics Society, and the R&D100 Award. He was President of the Australian Optical Society and is currently Editor-in-Chief for Optics Communications.

***This seminar is jointly organized by CDPT and IEEE Photonics Society Singapore Chapter.***

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