



Workshop on OptoMechanics and Brillouin scattering:
fundamentals, Applications and Technologies

WOMBAT PROGRAM

INVITED PRESENTATIONS

KEYNOTE ADDRESS

TUTORIALS

INDUSTRY ENGAGEMENT

NETWORKING OPPORTUNITIES

The University of Sydney
Camperdown, Sydney, Australia
20 July 2015

Waterfront
The Rocks, Sydney, Australia
21-22 July 2015

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DAILY SCHEDULE

MONDAY - 20 JULY	TUESDAY - 21 JULY	WEDNESDAY - 22 JULY
Registration 8:30 to 10:00	Registration 08:30 to 09:00	Registration 08:30 to 09:00
Welcome Address 10:00 to 10:15	Welcome Address 09:00 to 09:10	Invited Talk Peter Rakich 09:00 to 09:30
Tutorial 1 Christopher Poulton Overview and Fundamentals 10:15 to 11:15	Invited Talk Raphael van Laer 09:10 to 09:40	Session E Nonlinear Wave Propagation 09:30 to 10:15
Tutorial 2 Christian Wolff Waves and forces in optics and mechanics 11:35 to 12:35	Session A Unconventional Material Systems 09:40 to 10:25	Invited Talk Johannes Koehler 11:00 to 11:30
Tutorial 3 Peter Rakich SBS: Theory and phenomenology 13:15 to 14:15	Invited Talk Jean-Charles Beugnot 11:00 to 11:30	Session F Pulse Formation 11:30 to 12:15
Tutorial 4 Gaurav Bahl Cavity optomechanics: Theory and phenomenology 14:25 to 15:25	Session B SBS/Optomechanics in Resonators 11:30 to 12:30	Keynote Talk Kerry Vahala 14:00 to 14:45
Tutorial 5 David Marpaung Selected applications of SBS and Optomechanics 15:50 to 16:50	Keynote Talk Gaurav Bahl 14:00 to 14:45	Session G Quantum Dynamics 14:45 to 15:30
Public Lecture Kerry Vahala Integrated optical clocks to phonon lasers -hosted by Sydney University OSA/ SPIE Student Chapter at the Slade Lecture Theatre, School of Physics- 17:15 - 18:15	Session C Periodic Systems 14:45 to 15:45	Session H Metamaterials 16:15 to 17:15
	Session D SBS in Microwave Photonics 16:15 to 17:30	Farewell Address 17:15 - 17:30
	Keysight Workshop Reception and Opening Address Mary O'Kane, NSW Chief Scientist & Engineer 17:30 to 20:00	
		

TIME	SESSION
08:30	Registration
10:00	WELCOME ADDRESS Benjamin Eggleton , The University of Sydney
10:15	TUTORIAL I - Overview and Fundamentals Christopher Poulton , University of Technology, Sydney
11:15	Morning Tea
11:35	TUTORIAL II - Waves and forces in optics and mechanics Christian Wolff , University of Technology, Sydney
12:35	Lunch
13:15	TUTORIAL III - SBS: Theory and phenomenology Peter Rakich , Yale University, USA
14:15	Short break
14:25	TUTORIAL IV - Cavity optomechanics: Theory and phenomenology Gaurav Bahl , University of Illinois at Urbana-Champaign, USA
15:25	Afternoon Tea
15:50	TUTORIAL V - Selected applications of SBS and Optomechanics David Marpaung , The University of Sydney
16:50	Short break
17:15 - 18:15	PUBLIC LECTURE - Integrated optical clocks to phonon lasers: optical micro-resonator technology & science Kerry Vahala , Caltech, USA Hosted by Sydney University OSA/SPIE Student Chapter at the Slade Lecture Theatre, School of Physics



Abstract

Like a tuning fork for light, optical resonators have a characteristic set of frequencies at which it is possible to confine light waves. At these frequencies, optical energy can be efficiently stored for lengths of time characterized by the resonator Q factor, roughly the storage time in cycles of oscillation. In the last ten years there has been remarkable progress in boosting this storage time in micro and millimeter-scale optical resonators. Chip-based devices have attained Q factors of nearly 1 billion and micro-machined crystalline devices have provided Qs exceeding 100 billion. The resulting long, energy-storage times combined with small form factors have made it possible to access a wide range of nonlinear phenomena and to create laser devices

that operate with remarkably low turn-on powers. Also, new science has resulted from radiation-pressure coupling of optical and mechanical degrees-of-freedom in the resonators themselves. I will review some of these results including the effort to miniaturize time standards and stable frequency sources using frequency micro combs as well as the physics of cavity-optomechanics including phonon lasers and mechanical ground-state cooling.

TUESDAY

TIME	SESSION
08:30	Registration
09:00	WELCOME ADDRESS
09:10	UNCONVENTIONAL MATERIAL SYSTEMS
09:10	INVITED TALK: Towards silicon photonics - exploiting Brillouin scattering and cavity optomechanics in integrated circuits Raphaël van Laer, Ghent University, Belgium
09:40	Surface Phononic Crystals Based on Phonon Polariton Coupling with Metallic Defect Structures Didit Yudistira, RMIT University
09:55	Stimulated Brillouin Scattering in hybrid slot waveguides Sayed Mirnaziry, University of Technology, Sydney
10:10	Stimulated Brillouin Scattering in Diamond Robert Williams, Macquarie University
10:25	Morning Tea and Exhibition
11:00	SBS / OPTOMECHANICS IN RESONATORS
11:00	INVITED TALK: Light-Sound interactions in tiny optical microwires Jean-Charles Beugnot, FEMTO-ST Institute, France
11:30	Stimulated Brillouin scattering amplification and high-Q ring resonators in directly written chalcogenide glass waveguides Shahar Levy, Bar Ilan University, Israel
11:45	A microtoroid based integrated cavity opto-electromechanical system Christopher Baker, University of Queensland
12:00	Magnetic field sensor using optical microcavities Beibei Li, University of Queensland
12:15	Opto-Mechanical Interactions in Split Ball Nano-Plasmonic Resonators Sergey Suchkov, Australian National University
12:30	Lunch
14:00	PERIODIC SYSTEMS
14:00	KEYNOTE TALK: Brillouin Optomechanical Systems and Non-Reciprocity Gaurav Bahl, University of Illinois at Urbana-Champaign, USA
14:45	Enhancing and inhibiting stimulated Brillouin scattering on a chip Moritz Merklein, The University of Sydney
15:00	Opto-mechanical Interactions in Nanowire Array Photonic Crystal Yuerui Lu, Australian National University
15:15	Slow phonon vortices and defect modes in periodic nano-waveguides Andrey Sukhorukov, Australian National University
15:30	Stimulated Brillouin scattering in a long tapered photonic crystal fiber Thibaut Sylvestre, FEMTO-ST Institute, France
15:45	Afternoon Tea and Exhibition

TUESDAY

TIME	SESSION
16:15	SBS IN MICROWAVE PHOTONICS
16:15	Wideband tunable microwave photonic phase shifter using on-chip stimulated Brillouin scattering Mattia Pagani , The University of Sydney
16:30	Multiple Frequencies Measurement Using Stimulated Brillouin Scattering with Improved Performance Hengyun Jiang , The University of Sydney
16:45	Tunable microwave notch filter using forward stimulated Brillouin scattering on a silicon chip Alvaro Casas-Bedoya , The University of Sydney
17:00	Rectangular Microwave Photonic Filter based on Stimulated Brillouin Scattering Lilin Yi , Shanghai Jiao Tong University, China
17:15	Enhancement of the long term stability of a stimulated Brillouin scattering tunable RF notch filter Shayan Shahnia , The University of Sydney
17:30 - 20:00	KEYSIGHT WORKSHOP RECEPTION AND OPENING ADDRESS Professor Mary O’Kane , NSW Chief Scientist & Engineer

WEDNESDAY

TIME	SESSION
08:30	Registration
09:00	NONLINEAR WAVE PROPAGATION
09:00	INVITED TALK: Control of coherent information by mixing light and sound in nanophotonic circuits Peter Rakich , Yale University, USA
09:30	Acoustic bunching of a random temporal cavity soliton pattern Stéphane Coen , University of Auckland, New Zealand
09:45	Torsional modes in a tapered fibre trap for cold atoms Lars Madsen , University of Queensland
10:00	Acoustically-induced mode-locking in a Brillouin photonic crystal fiber laser Birgit Stiller , The University of Sydney
10:15	Morning Tea and Exhibition
11:00	PULSE FORMATION
11:00	INVITED TALK: Optomechanical nonlinear phenomena in the dual-nanoweb fiber Johannes Koehler , Max Planck Institute for the Science of Light, Germany
11:30	Nonlinear thermo-optic response in chalcogenide nano-beam cavities Yue Sun , Australian National University
11:45	Phase-locked, Chip-Based, Cascaded Stimulated Brillouin Scattering Thomas Buettner , The University of Sydney
12:00	Effect of acoustic waves on the spontaneous emergence of temporal cavity solitons in a passive Kerr cavity Stuart Murdoch , University of Auckland, New Zealand
12:15	Lunch
14:00	QUANTUM DYNAMICS
14:00	KEYNOTE TALK: New Applications of Brillouin Scattering in Microcavities Kerry Vahala , Caltech, USA
14:45	High-Q Electromechanics with Crystalline Sapphire and Quartz: Towards Ground State Cooling of Massive Systems Michael Tobar , University of Western Australia
15:00	A Pulsed Quantum Optomechanical Light–Matter Interface James Bennett , University of Queensland
15:15	Anomalous vibrational decoherence in a nano-optomechanical transducer Ignacio Wilson-Rae , University of York, UK
15:30	Afternoon Tea and Exhibition
16:15	METAMATERIALS
16:15	Plasmon-enhanced Brillouin light scattering from nonlinear acoustic waves Ivan Maksymov , RMIT University
16:30	Polarization controlled optomechanically induced chirality in metamaterials Mingkai Liu , Australian National University
16:45	Electrostriction enhancement in composite materials Mike Smith , The University of Sydney
17:00	Optomechanical coupling of torsional metamaterials Mingkai Liu , Australian National University
17:15 - 17:30	FAREWELL ADDRESS

The WOMBAT Committee gratefully acknowledges the following sponsors for their support of the Workshop on OptoMechanics and Brillouin scattering: fundamentals, Applications and Technologies (WOMBAT).

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