

## Room G (201)

**Session Title** 27G2 / [T08] Quantum Information III  
**Date & Time** Thursday, 27 August, 15:45 ~ 17:45  
**Session Chair** Yong-Su Kim (KIST, Korea)

### [27G2-1] 15:45~16:15 Invited Talk

#### Quantum State Estimation and Discrimination

Shigeki Takeuchi  
 Kyoto University, Japan

Quantum state estimation and discrimination are important tasks not only for many quantum information protocols but also precise measurements. In this paper, we report our recent efforts on this issue. In the first part, we report adoptive quantum state estimation, which provides the most accurate estimation using an optimal measurement basis for each measurement. In the second part, we introduce quantum state data mining where the erroneous states (density matrices) are discriminated from the normal ones efficiently using machine learning method.

### [27G2-2] 16:15~16:45 Invited Talk

#### Advances in Photonic Remote Entanglement Sharing

Geoff J. Pryde  
 Griffith University, Australia

Remote entanglement sharing is a primitive for a range of quantum information science tasks and for fundamental studies of nonlocality. We experimentally demonstrate advances in performing secure, loss-tolerant entanglement sharing with photonic systems.

### [27G2-3] 16:45~17:00

#### Quantum Teleportation of Two Different Types of Optical Hybrid Qubits Over a Lossy Environment

Hoyong Kim, Seung-Woo Lee, and Hyunseok Jeong  
 Seoul National University, Korea

Hybrid of photon-polarized states with coherent states and hybrid of vacuum and single-photon states with coherent states are compared for teleportation. We have shown that the latter is better than the former under photon losses.

### [27G2-4] 17:00~17:15

#### Waveguide Logic Gates for Polarization Encoded Magneto-Optical Qubits

Shukhrat Egamov and Islom Abdunazarov  
 Samarkand State University, Uzbekistan

Results of magneto-optical waveguide logic gates properties investigation are presented. Simple logic operations can be realized using photon properties in modulated magnetic field. Changing the magnetic field amplitude and its orientation relating to light propagation direction, choosing polarizer and analyzer orientation and proper waveguide geometry, we can design logic gates avoiding small coherence time of regular optic qubits.

### [27G2-5] 17:15~17:30

#### Quantum Refractometer

Anna Paterova<sup>1</sup>, Dmitry Kalashnikov<sup>1</sup>, Sergei Kulik<sup>2</sup>, and Leonid Krivitsky<sup>1</sup>  
<sup>1</sup>Agency for Science Technology and Research, Singapore, <sup>2</sup>Lomonosov Moscow State University, Russia

We exploit interference of two Parametric Down Conversion (PDC) sources to observe infrared resonances of CO<sub>2</sub>. Frequency correlations of PDC enable determination of the refractive index at IR wavelengths with visible range optics and photodetectors.

### [27G2-6] 17:30~17:45

#### Non-Maximal Polarization-Entangled Photons with Spectrally-Varying Non-Maximality

Mao Tong Liu<sup>1</sup> and Han Chuen Lim<sup>1,2</sup>  
<sup>1</sup>Nanyang Technological University, Singapore, <sup>2</sup>DSO National Laboratories, Singapore

We pump two periodically-poled lithium niobate waveguides of different lengths in a Sagnac loop to produce photons with spectrally-varying non-maximal polarization entanglement for the first time. The desired non-maximality is selectable by optical wavelength filtering.

## Room H (202)

**Session Title** 27H2 / [T11] Innovative Methods in Biophotonics  
**Date & Time** Thursday, 27 August, 15:45 ~ 17:15  
**Session Chairs** Chris Xu (Cornell University, U.S.A.)  
 Yong Keun Park (KAIST, Korea)

### [27H2-1] 15:45~16:00

#### Polarimetric Characterization of Healthy and RF Ablated Myocardial Tissue

Ittikhar Ahmad<sup>1,2</sup>, Adam Grillble<sup>2</sup>, Alex Vitkin<sup>2</sup>, and Masroor Ikram<sup>1</sup>  
<sup>1</sup>Pakistan Institute of Engineering and Applied Sciences, Pakisatn, <sup>2</sup>University of Toronto, Canada

Polarization signatures of ex-vivo healthy and RF ablated porcine hearts in backscattered geometry were explored through Mueller matrix polarimetry. Significant differences in depolarization and linear retardance values were observed between the healthy, ablated and rim regions.

### [27H2-2] 16:00~16:15

#### Multiphoton 3D Structured Illumination Microscopy for Enhanced Axial Resolution in Deep Imaging

Qiyuan Song<sup>1,2</sup>, Keisuke Isobe<sup>1,4</sup>, Fumihiko Kannar<sup>2</sup>, Hiroyuki Kawano<sup>3</sup>, Akiko Kumagai<sup>3</sup>, Atsushi Miyawaki<sup>3</sup>, and Katsumi Midorikawa<sup>1</sup>  
<sup>1</sup>RIKEN, Japan, <sup>2</sup>Keio University, Japan, <sup>3</sup>JST, Japan

By combining 3D structured illumination microscopy with temporal focusing, the axial resolution is improved by a factor of 2.3 compared with that of 2D structured illumination microscopy.

### [27H2-3] 16:15~16:30

#### Experimental Investigation of Timing Jitter of a 1.06- $\mu$ m Gain-Switched Laser Diode for Stimulated Raman Scattering Microscopy

Kyoa Tokunaga<sup>1</sup>, Yi-Cheng Fang<sup>2</sup>, Yuta Kusama<sup>2</sup>, Hiroyuki Yokoyama<sup>2</sup>, and Yasuyuki Ozeki<sup>1</sup>  
<sup>1</sup>The University of Tokyo, Japan, <sup>2</sup>Tohoku University, Japan

The timing jitter of 13-ps gain-switched laser diode pulses at 1.06  $\mu$ m is measured to be 3.9 ps, which is further reduced by external injection. We successfully demonstrate stimulated Raman imaging using the pulses.

### [27H2-4] 16:30~16:45

#### Identification of Amyloid Plaques in Mouse Brain Tissue Slides Using Quantitative Phase Imaging

Moosung Lee, Jae Hwang Jung, Eeksung Lee, Yong Jeong, and Yong Keun Park  
 KAIST, Korea

We demonstrate that quantitative phase imaging (QPI) can detect amyloid plaques in the brain of Alzheimer's disease (AD). Comparing QPIs and fluorescence images from wild-type and AD mice brains, we suggest that digital microscopic holography can be utilized for diagnosing AD.

### [27H2-5] 16:45~17:00

#### Quantitative Characterisation of MPP+ Effects on Neurons Using 3-D Refractive Index Tomography

Su-A Yang, Jonghee Yoon, and Yong Keun Park  
 KAIST, Korea

Quantitative characterization of neurodegeneration in Parkinson's disease-like model via 3-D refractive index (RI) tomogram measurements is presented. 3-D RI information enables quantification of neurodegenerative sequences, which provides insight on pathogenesis of neurodegeneration in Parkinson's disease.

### [27H2-6] 17:00~17:15

#### Dark-field Imaging Tracking of BSA Stabilized Gold Nanorods in Macrophage

Rui Hu<sup>1</sup>, Ken-Tye Yong<sup>2</sup>, and Junle Qu<sup>1</sup>  
<sup>1</sup>Shenzhen University, China, <sup>2</sup>Nanyang Technological University, Singapore

Bovine serum albumin (BSA) stabilized gold nanorods were fed to macrophages and tracked through dark-field imaging. Intracellular aggregation of the nanorods was observed before they were excreted from cells.