Room G (201)

Session Title 25G2 / [T08] Quantum Information I
Date & Time Tuesday, 25 August, 13:45 ~ 15:15
Session Chair Hyunseok Jeong (Seoul National University, Korea)

[25G2-1] 13:45~14:15 Invited Talk

New Directions in Optical Quantum Computing

Tim C. Ralph

University of Queensland, Australia

We will discuss new sampling algorithms that are hard for classical computers but can be solved with linear optical quantum processors and techniques for implementing universal quantum gates using strong optical non-linearities and Gaussian optics.

[25G2-2] 14:15~14:30

Experimental Implementation of Delayed-Choice Decoherence Suppression

Jong-Chan Lee[1], Hyang-Tag Lim[1], Kang-Hee Hong[1], Youn-Chang Jeong[1], M. S. Kim[2], and Yoon-Ho Kim[1]

[1]POSTECH, Korea, [2]Imperial College London, UK

We propose and experimentally implement the delayedchoice decoherence suppression protocol. Using photonic entanglement, we successfully demonstrated that the choice to suppress decoherence can be delayed after decoherence and even after the detection of a qubit.

[25G2-3] 14:30~14:45

Correlation between Initial and Final Result in a Sequential Quantum Measurement

Masataka Iinuma[1], Yutaro Suzuki[1], Taiki Nii[1], Ryuji Kinoshita[1], and Holger Hofmann[1,2]

[1]Hiroshima university, Japan, [2]JST, Japan

Measurement error can be evaluated using the concepts introduced by Ozawa in 2003. Importantly, this evaluation takes into account the non-classical effects of quantum correlations. We investigate this effect by using a sequence of non-commuting measurements of photon polarization with a variable measurement resolution for the intermediate measurement. It is shown that quantum correlations between the initial and the final measurement outcomes result in a significant reduction of the measurement errors for the target observable, even though the final measurement is not sensitive to the polarization component of interest.

[25G2-4] 14:45~15:00

Generation and Characterization of a Frequency Anti-correlated Entangled Biphoton Source at 1560nm

Feiyan Hou, Ruifang Dong, Xiao Xiang, Runai Quan, Mengmeng Wang, Yiwei Zhai, Shaofeng Wang, Tao Liu, and Shougang Zhang

Chinese Academy of Sciences, China

We report the generation and characterization of a frequency anti-correlated entangled biphoton source at the wavelength of 1560nm via a continuous-wave laser pumped spontaneous parametric down-conversion process. The spectra of the signal and idlerphotons are measured to have their center wavelength being 1559.7nm and 1559.8nm while their 3-dB bandwidths being 3.2nm and 3.15nm respectively. The joint spectrum of the photon pair is observed to be frequency anti-correlated and have a spectral bandwidth of 0.5nm. According to the ratio of the single-photon spectral bandwidth to the joint spectral bandwidth of the photon pairs, the degree of frequency entanglement is quantified to be 6.4. By investigating the relative overlap between the achieved two-photon spectral intensity function and its transpose, the spectral indisinguishablity of the photon pairs is expected to be 90%. Based on a HOM interferometric coincidence measurement setup, a visibility of 89.8% is demonstrated, which shows a good agreement with the expectation.

[25G2-5] 15:00~15:15

Near-Deterministic Bell Measurement for Multiphoton Quantum Information Processing

Seung-Woo Lee[1], Kimin Park[1,2], Timothy C. Ralph[3], and Hyunseok Jeong[1]

[1]Seoul National University, Korea, [2]Palacký University, Czech, [3]The University of Queensland, Australia

We propose a Bell measurement scheme for discriminating logical Bell states with many photons. The logical qubit is in Greenberger-Horne-Zeilinger entanglement with an arbitrary number of photons. Remarkably, its success probability can be made arbitrarily high using only linear optics and photon on-off measurements as the number of photons increases. It is shown that our scheme outperforms all the previously known schemes using single-photon qubits with respect to both the efficiency and feasibility. Our proposal provides an alternative candidate for all-optical quantum information processing.

Room H (202)

Session Title 25H2 / [T09] Material and Device Characterizations
Date & Time Tuesday, 25 August, 13:45 ~ 15:15
Session Chairs Lai Wang (Tsinghua University, China)
Julien Brault (CRHEA-CNRS, France)

[25H2-1] 13:45~14:15 Invited Talk

Two-dimensional Mapping of Strain and Piezoelectric Polarization in InGaN/GaN MQWs by Electron Dark-field Holography

Kyung Song and Sang Ho Oh

POSTECH, Korea

Applying the state-of-the-art inline electron holography to a light emitting diode containing strained InGaN/GaN multiquantum wells, we show fully quantitative maps of 2-D strain and charge density can be obtained and correlated with sub-nanometer resolution.

[25H2-2] 14:15~14:45 Invited Talk

Study of Percolation Transport in the InGaN/AlGaN LEDs with Random Alloy Fluctuation

Yuh-Renn Wu[1], Chen-Kuo Wu[1], Chi-Kang Li[1], David A. Browne[2], and James S. Speck[2]

[1]National Taiwan University, Taiwan [2]University of California, Santa Barbara, USA

3D Numerical modeling for carrier transport in the EBL and InGaN quantum well by considering the random alloy fluctuation have been done. The result shows that percolative transport should be the dominant transport mechanism in the light emitting diode and affects the efficiency droop.

[25H2-3] 14:45~15:00

Strain Relaxation and Quantum Size Effect Studied by Two-Photon Laser Scanning Photoluminescence Microscopy

Hyeong-Yong Hwang[1], Hoonil Jeong[1], Hyun-Jun Baek[2], Gyu-Chul Yi[2], Hyoung-Chan Kim[3], and Young-Dahl Jho[1]

[1]GIST, Korea, [2]Seoul National University, Korea, [3]National Fusion Research Institute, Korea

Nanoscale excitation by the simultaneous absorption of two photons was employed to investigate the spatially resolved role of strain relaxation and quantum size effect (QSE) in affecting luminescence from ZnO nanorods (NRs).

[25H2-4] 15:00~15:15

Radiative and Non-radiative Carrier Lifetime in InGaN-Based Light-Emitting Diodes Investigated by Impedance Analysis

Young Jin Kim, Dong Pyo Han, Gyeong Won Lee, Dong Soo Shin, and Jong In Shim

Hanyang University, Korea

To investigate the efficiency droop in InGaN-based lightemitting diodes, we have measured the differential carrier lifetimes using the electrical method. After separating the radiative and non-radiative carrier lifetimes using the internal quantum efficiency, we discuss their implications.