

Room 101 -- (1F)**Room 105 -- (1F)****Room 106 -- (1F)****Room 107 -- (1F)****Room 110 -- (1F)**

14:00-15:30
 TU3I • Waveguide Devices (I)
 Y. J. Ray Chen, University of
 Maryland Baltimore County,
 USA, Presider

14:00-14:30 TU3I-(8)-1
 (Invited)
**Application of microring
 resonators in large scale
 photonics integrated circuits**
 S. Chu
 Little Optics, USA

14:00-15:30
 TU3H • Optical Information
 Processing and Switching
 Ken Hsu, National Chao Tung
 University, Taiwan, Presider

14:00-14:30 TU3H-(9)-1
 (Invited)
**Holography: origin,
 development and beyond**
 Francis Yu
 Pennsylvania State University,
 USA

14:00-15:30
 TU3E • Solid-State Lighting (I)
 J. -I. Chyi, National Central
 University, Taiwan, Presider

14:00-14:30 TU3E-(SS1)-1
 (Invited)
ZnSe-based white LED
 Toshihiko Takebe
 Sumitomo Electric Industries, Ltd.,
 Japan
 A phosphor-free ZnSe-based
 high-brightness white LED operating at
 very low voltages is demonstrated. The
 optical output power and operating
 voltage of a typical device at a forward
 current of 20mA is 6.8mW and 2.5V,
 respectively.....

14:00-15:30
 TU3G • Ultrashort Pulses,
 Solitons and Mode-locking
 I. T. Solokina, Technical
 University Wein, Austria,
 Presider

14:00-14:30 TU3G-(6)-1
 (Invited)
**Ultrafast optical pulses and
 solitons for advanced
 communications**
 Masataka Nakazawa
 Tohoku University, Japan
 Generation of ultrafast and short pulses
 from a regeneratively and harmonically
 mode-locked fiber laser and its
 compression and reshaping technique
 are summarized. The pulses are
 utilized for 80 Gbit/s channel soliton
 transmission over 10,000 km and
 OTDM transmission that exceeds 1
 Tbit/s.

December 16, Tuesday

Int'l Reception Hall -- (1F)

14:00-15:30
TU3F • Quasi Phase Matching Devices and Application (I)
S. C. Wang, National Chiao Tung University, Taiwan, Presider

14:00-14:30 TU3F-(5)-1 (Invited)
All-Optical Signal Processing in Periodically Poled Ti:LiNbO₃ Channel Guides
W. Grundkötter, J. H. Lee, Y. L. Lee, Y. H. Min, V. Quiring, R. Ricken, H. Suche, and Wolfgang Sohler
University of Paderborn, Germany
Quasi phasematched second order nonlinear optical interactions in periodically poled LiNbO₃ waveguides are exploited to develop efficient integrated optical devices for all-optical wavelength conversion, parametric amplification, time division (de-)multiplexing, phase- and polarisation- switching.

Ever Green Room -- (10F)

14:00-15:30
TU3B • Inter-subband and Nano-structure Emitters
S. L. Lee, National Taiwan University of Science and Technology, Taiwan, Presider

14:00-14:30 TU3B-(2)-1 (Invited)
Mid-IR quantum cascade lasers and amplifiers: recent developments and applications
Mariano Troccoli, Federico Capasso
Harvard University, USA
This talk will give an overview of the most recent results on the realization of new quantum cascade laser devices and the perspective of their innovative applications in the mid-infrared range of the spectrum.

Spanish Room -- (10F)

14:00-15:30
TU3D • New Advances in Some Ultrafast Intense Laser Laboratories (I)
S. L. Chin, Laval University, Canada, Presider

14:00-14:30 TU3D-(SS3)-1 (Invited)
Recent advances in high-intensity laser-matter interaction at LOA (France)
Philip Balcou
ENSTA, France

Auditorium -- (10F)

14:00-15:30
TU3C • Fundamentals of Photonic Crystal and Photonic Crystal Fibers
S. Noda, Kyoto University, Japan, Presider

14:00-15:00 TU3C-(16)-1 (Tutorial)
Photonic crystals - new materials for 21st century
Eli Yablonovitch
UCLA, USA

Sky Lounge -- (12F)

14:00-15:30
TU3A • Advanced Transmission Systems
Gee-Kung Chang, Georgia Tech. U., Presider

14:00-14:15 TU3A-(13)-1
Characteristic of the reflective type Raman amplification in a dispersion compensating fiber
Jeng-Cherng Dung and Sien Chi
National Chiao Tung University, Taiwan

With the same dispersion compensation, the gain of the reflective type dispersion compensating Raman amplifier (DCRA) is higher than that of the conventional single-pass type. Moreover, the forward pumping is better than the backward pumping in the reflective type DCRA.

14:15-14:30 TU3A-(13)-2
Four-wave mixing induced gain suppression and signal degradation in a co-pumped distributed Raman amplifier
Tsu-Te Kung, Jeng-Cherng Dung, and Sien Chi
National Chiao-Tung University; National Lien-Ho Institute of Technology, Taiwan
We observed experimentally Raman gain suppression and signal degradation in a co-pumped distributed Raman amplifier and explained these are due to the pump-signal four-wave mixing over a 50 km of non-zero dispersion shifted fiber.

December 16, Tuesday

Room 101 -- (1F)

TU3I • Waveguide Devices (I)
--- continued

14:30-14:45 TU3I-(8)-2
Vertically coupled microring resonator filter with multilevel crossing busline waveguide
Yutaka Hatakeyama, Takamitsu Hanai, Shuichi Suzuki, and Yasuo Kokubun
Yokohama National University, Japan

To eliminate the scattering loss at the crossing points of busline waveguides in the vertically coupled microring resonator, a multilevel crossing of busline was introduced. Clear filter responses were observed for single and double ring resonators.

14:45-15:00 TU3I-(8)-3
Wavelength trimming of integrated-optic microring filters by plasma treatment
Tzyy-Jiann Wang, Yen-Hao Huang, and Hsuen-Li Chen
National Taipei University of Technology, Taiwan

The resonant-wavelength trimming of integrated-optic microring filters using oxygen plasma treatment is demonstrated. By adjusting treatment parameters, the resonant wavelength can be effectively tuned in the range of 8.9nm.

Room 105 -- (1F)**Room 106 -- (1F)**

TU3H • Optical Information Processing and Switching
--- continued

14:30-14:45 TU3H-(9)-2
An all-optical switching device by using the nonlinear control waveguide
Yaw-Dong Wu and Yow-Chyuan Jang
Electronic Engineering of National Kaohsiung University of Applied Sciences, Taiwan

We propose an all-optical switching device that is composed of a Y-junction signal waveguide and a parabolic nonlinear control waveguide. By fixing the input power and changing the control power, the numerical results show that this device could function as an all-optical switch.

14:45-15:00 TU3H-(9)-3
Characteristics of a polyimide-hinged MEMS beam scanner for location-based information services
Hideo Itoh, Akio Uchiyama, Yoshiyuki Nakamura, Yoshinobu Yamamoto, Takuichi Nishimura, Toshio Nemoto, Hideyuki Nakashima, and Nobuyoshi Iwasaki
Meiji Univ.; Olympus Optical Co. Ltd. Japan

Characteristics of a polyimide-hinged MEMS mirror is reported for vector scanning of eye-safe laser beam with larger angle. This MEMS mirror is used as a beam steering element of indoor laser radar communication system.

Room 107 -- (1F)

TU3E • Solid-State Lighting (I)
--- continued

14:30-14:45 TU3E-(SS1)-2
Infrared reflectance studies of GaN grown on sapphire by metalorganic chemical vapour deposition
Z. C. Feng, I. Ferguson, Y. T. Hou, and T. R. Yang
Georgia Institute of Technology, USA; National Taiwan University, Taiwan; National University of Singapore, Singapore; National Taiwan Normal University, Taiwan
Infrared reflectance of GaN grown on sapphire by metalorganic vapour deposition has been studied theoretically/experimentally. Comprehensive theoretical calculations have been made and compared with experimental data, evidencing a good technique for characterising GaN epilayers.

14:45-15:00 TU3E-(SS1)-3
Effects of thermal annealing on InGaN/GaN quantum well structures with silicon doping
Yung-Chen Cheng, En-Chiang Lin, Shih-Wei Feng, Hsiang-Chen Wang, C. C. Yang, Kung-Jen Ma, Shih-Chen Shi, L. C. Chen, Chang-Chi Pan, and Jen-Inn Chyi
National Taiwan University; Chung Hua University; National Central University, Taiwan
The effects of thermal annealing on the optical properties and material structures of InGaN/GaN quantum wells with silicon doping were studied to find that the material microstructures alteration was the major reason for the changes.

Room 110 -- (1F)

TU3G • Ultrashort Pulses, Solitons and Mode-locking
--- continued

14:30-14:45 TU3G-(6)-2
The linewidth and noise control of Fabry-Perot diode laser mutually injection-locked with a regenerative traveling-wave semiconductor optical amplifier
Gong-Ru Lin and Pai-Shen Hsueh
National Chiao Tung University; National Taipei University of Technology, Taiwan
Mutual injection locking of a traveling-wave semiconductor optical amplifier (TWSOA) and a fiber-pigtailed Fabry-Perot laser diode (FPLD) link with reduced linewidth of 0.019 nm and improved side-mode-suppression ratio of 30.3 dB is demonstrated.

14:45-15:00 TU3G-(6)-3
A femtosecond hybrid mode-locked Er-fiber soliton laser by asynchronous phase modulation
Ming-feng Tien, Wei Wei Hsiang, and Yinchieh Lai
National Chiao-Tung University, Taiwan
An asynchronous mode-locked Er-fiber soliton laser at 2GHz repetition rate is demonstrated experimentally. The pulsewidth is 700fs and the SMSR is more than 70dB. We also observe quite different characteristics between asynchronous and synchronous modelocking.

Int'l Reception Hall -- (1F)

TU3F • Quasi Phase Matching Devices and Application (I) --- continued

**14:30-14:45 TU3F-(5)-2
Enhancement and control of
switched phase-conjugate
reflectivity in a BaTiO₃ crystal**

*Sharafuddin Md. Sharif and
Kazuhiko Ogusu*

Shizuoka University, Japan

A suitable pulsed backward pump beam, in a four-wave mixing, can increase the switched phase-conjugate reflectivity over the initial value under a suitable condition which can be explained by the proposed charge transport model.

**14:45-15:00 TU3F-(5)-3
Temperature and wavelength
tuning of optical parametric
generation in a
quasi-periodically optical
superlattice**

S. N. Zhu , P. Xu , Y. Du , Y. Y. Zhu , N. B. Ming , L. Luo , K. F. Li , K. W. Cheah

Nanjing University, China ; Hong Kong Baptist University, Hong Kong

Temperature and wavelength tuning of optical parametric generation in a quasi-periodically optical superlattice were studied in theory and experiment. We also observed and characterized tunable blue generation by up-conversion process in the same crystal.

Ever Green Room -- (10F)

TU3B • Inter-subband and Nano-structure Emitters --- continued

**14:30-14:45 TU3B-(2)-2
Experimental and theoretical
investigation of detection
wavelength tuning in quantum
well infrared-photodetectors by
quantum well intermixing
technique**

S. H. Hwang, J. C. Shin, W. J. Choi, I. K. Han, J. I. Lee, J. W. Choi, H. Han

Korea Institute of Science and Technology; Kyung Hee University; Pohang University of Science and Technology (POSTECH), Korea

Detection wavelength tuning of quantum well infrared photodetector (QWIP) has been carried out by using dielectric cap quantum well intermixing technique with SiO₂ capping layer. The detection wavelength of QWIP was changed from 8.2 μm to 10 μm

**14:45-15:00 TU3B-(2)-3
Feasibility study on
simultaneous wavelength
conversion in GaN/AlN
intersubband optical amplifiers**

Nobuo Suzuki

Toshiba Corp., Japan

Simultaneous wavelength conversion in GaN/AlN intersubband optical amplifiers has been theoretically investigated. The conversion efficiencies at a pump power of +7-+10 dBm were predicted to be -10-+7 dB depending on the frequency detuning (0.3-10.9 THz).

Spanish Room -- (10F)

TU3D • New Advances in Some Ultrafast Intense Laser Laboratories (I) --- continued

**14:30-15:00 TU3D-(SS3)-2
(Invited)
Development of multi-terawatt
laser technology and
applications in Taiwan**

J. Wang

Institute of Atomic & Molecular Physics, Academia Sinica, Taiwan

Auditorium -- (10F)

TU3C • Fundamentals of Photonic Crystal and Photonic Crystal Fibers --- continued

Sky Lounge -- (12F)

TU3A • Advanced Transmission Systems --- continued

**14:30-14:45 TU3A-(13)-3
Reduction of semiconductor
optical amplifier induced
distortion and crosstalk in WDM
transport systems**

*Hai-Han Lu, Wen-Jen Wang,
Heng-Sheng Su and Chien-Tang Wang*

National Taipei University of Technology, Taiwan

A 4-wavelength 256-QAM WDM SOA amplified transport system using light injection technique over an 80-km SMF link is proposed and demonstrated. SOA-induced distortion and crosstalk can be reduced employing light injection technique, and thus systems' performance can be further improved.

**14:45-15:00 TU3A-(13)-4
Optimal configuration of
discrete-value dispersion
compensator modules for a
given dispersion map in a fiber
optic communication link**

Malin Premaratne and Prashan Premaratne

Monash University, Australia

Given a dispersion map, selecting an appropriate combination of discrete-value dispersion compensation modules (DV-DCMs) with minimum cost from an available set of DV-DCMs is a NP-hard problem. We formulate this problem and derive a novel dynamic programming algorithm with pseudo-polynomial time bound.

December 16, Tuesday

Room 101 -- (1F)

TU3I • Waveguide Devices (I)
--- continued

**15:00-15:15 TU3I-(8)-4
Wavelength-scale functional
waveguide mode conversion**

*Ming-Chuan Yang, Jia-Han Li,
Hua-Tsai Chen, and Kevin J.
Webb*

Purdue University, U.S.A.

A new type of field transformation mechanism is introduced that employs compact synthesized irregular waveguide structures. Results from a microwave experiment are given. Fabrication for optical applications using a lift-off process is proposed.

**15:15-15:30 TU3I-(8)-5
Control of SOI waveguide
polarization properties for
microphotonic applications**

*D. -X. Xu, P. Cheben, S. Janz, and
D. Dalacu*

*Institute for Microstructural
Sciences, National Research
Council Canada, Canada*

Top oxide cladding induced significant photoelastic birefringence on SOI waveguides. We demonstrated the use of this property for birefringence tuning, which we believe opens a new avenue of birefringence control for microphotonic applications.

Room 105 -- (1F)**Room 106 -- (1F)**

TU3H • Optical Information
Processing and Switching
--- continued

**15:00-15:15 TU3H-(9)-4
Depth detection and 3-D pattern
recognition using holographic
information**

Taegeun Kim

Sejong University, Korea

We propose a technique that detects the depth location of an object whose depth range is longer than the Rayleigh range of the hologram. We recover the hologram of the object at the detected depth location.

**15:15-15:30 TU3H-(9)-5
Optical spectrum analyzer for
optical short pulses using
arrayed waveguide grating**

*Yoshimasa Itoh, Koichi Aizawa,
Yosuke Tanaka, Hiroyuki Tsuda,
and Takashi Kurokawa*

*Tokyo University of Agriculture and
Technology; Keio University,
Japan*

We propose a novel method for measuring short-optical-pulse spectra based on a time-space conversion using an arrayed waveguide grating. 8ps and 670fs laser pulse spectra were successfully observed with a resolution of 15GHz.

Room 107 -- (1F)

TU3E • Solid-State Lighting (I)
--- continued

**15:00-15:15 TU3E-(SS1)-4
Enhancement of light extraction
of GaN-based LED with
introducing micro-structure
array**

*Chao-Ying Lin, Tsung-Xian Lee,
Shi-Xin Ma, and Ching-Cherng Sun
National Central University, Taiwan*

Optical models for simulating light extraction efficiency of an GaN-based LED chip is presented. We propose to introduce a periodic sharpening structure on the interface between the sapphire and the n-GaN of a GaN-based LED to obtain as high as 73% in light extraction efficiency.

**15:15-15:30 TU3E-(SS1)-5
Metallic wafer and chip bonding
for led packaging**

*C. C. Hsu, S. J. Wang and C. Y. Liu
National Central University, Taiwan*

Metallic bonding is a most effective way to simultaneously provide good thermal dissipation and ohmic contact for LED chip assembly. For the two current LED chip assemblies, i.e., wiring and flip-chip bonding, metallic bonding is seriously involved to improve the efficiency of LED.

Room 110 -- (1F)

TU3G • Ultrashort Pulses,
Solitons and Mode-locking
--- continued

**Observation of pulse repetition
rate multiplication in a
stretched-pulse additive-pulse-
modelocking Er-fiber laser**

*Wei Wei Hsiang, Cheng-Chin
Chung, and Yinchieh Lai
National Chiao-Tung University,
Taiwan*

Spontaneous pulse repetition rate multiplication phenomena are observed in a stretched-pulse APM Er-fiber laser. With suitable adjustment of the polarization controllers, the laser can switch between operating at the fundamental repetition rate as a stretched-pulse APM laser.....

**15:15-15:30 TU3G-(6)-5
Self-regulating simulated
annealing for pulse-retrieval in
frequency-resolved optical
gating**

*Carlo Amadeo C. Alonzo and
Marlon Rosendo H. Daza
University of the Philippines,
Philippines*

Self-regulating simulated annealing (SRSA) is presented as a simple approach to efficiently implement a simulated annealing algorithm for multivariate optimization problems. SRSA is demonstrated to recover the amplitude and phase information of optical pulses from numerically simulated frequency-resolved.....

**15:30 – 16:00
Coffee/Tea Break**

December 16, Tuesday

Int'l Reception Hall -- (1F)

TU3F • Quasi Phase Matching Devices and Application (I) --- continued

**15:00-15:15 TU3F-(5)-4
Double injection seeded
ppr-PPLN-OPG and its
application**

*Koji Suizu, Yuza Sasaki and Hiromasa Ito
RIKEN PDC, RIEC, Tohoku Univ., Japan*

Double injection seeding for ppr-PPLN-OPG with sub-nsec pumping was demonstrated. This device is a suitable light source for DFG. THz-wave radiation was successfully generated using ppr-PPLN-OPG as a DFG light source.

**15:15-15:30 TU3F-(5)-5
Sinusoidally chirped optical
superlattices for flat broadband
wavelength conversion**

*Shiming Gao, Changxi Yang, and Guofan Jin
Tsinghua University, China*

We report on the enhancement of the bandwidth and the response flatness of wavelength conversion through cascaded second-order nonlinear processes in sinusoidally chirped optical superlattice (SCOS) lithium niobate crystal.

Ever Green Room -- (10F)

TU3B • Inter-subband and Nano-structure Emitters --- continued

**15:00-15:15 TU3B-(2)-4
Rate-equation modeling of
spectrum and dynamic
properties of quantum-dot
lasers**

*H.-T. Chen, W.-H. Hsieh, M.-H. Mao
National Taiwan University,
Taiwan*

The influences of the material and structural parameters on the static and dynamic characteristics of quantum-dot lasers are analyzed using a rate equation model. The simulation results are also compared with those of quantum-well lasers.

**15:15-15:30 TU3B-(2)-5
Enhancing light-emission
efficiency from Si-MOS
tunneling diodes by KOH wet
etching**

*Wu-Ping Huang, Ching-Fuh Lin
National Taiwan University,
Taiwan*

We create surface roughness in the Anisotropic Dissolution of Si(100) in Aqueous KOH to enhance phonon-assisted radiative recombination in Si. Using proper solution and etching time, the external quantum efficiency reaches ~10-4.

Spanish Room -- (10F)

TU3D • New Advances in Some Ultrafast Intense Laser Laboratories (I) --- continued

**15:00-15:30 TU3D-(SS3)-3
(Invited)
High energy petawatt laser
development at the Lawrence
Livermore National Laboratory**

*C. P. J. Barty
Lawrence Livermore National
Laboratory, USA*

Auditorium -- (10F)

TU3C • Fundamentals of Photonic Crystal and Photonic Crystal Fibers --- continued

**15:00-15:15 TU3C-(16)-2
A novel periodic structures in
photonic crystal fibers**

*Jung-Sheng Chiang and Tzong-Lin Wu
National Sun Yat-Sen University,
Taiwan*

An octagon periodic structure of photonic crystal fibers, where the air holes lie on octagonal period, is investigated in this work base on a full-wave simulation. Under the same air filling fraction with the hexagonal structure.....

**15:15-15:30 TU3C-(16)-3
Design, fabrication, and
characterization of
microstructured polymer optical
fibers**

*C. -W. Huang, M. -C. Ho, H. H. Chien, K. J. Ma, Z. P. Zheng, C. P. Yu, H. C. Chang, and C. C. Yang
National Taiwan University;
Chung-Hua University, Taiwan*
Fabrication and characterization of microstructured polymer optical fibers (MPOFs) are presented. The effects of drawing temperature and heating time during the fabrication processes are studied. The fibers exhibit single-mode characteristics as predicted by numerical simulation.

Sky Lounge -- (12F)

TU3A • Advanced Transmission Systems --- continued

**15:00-15:15 TU3A-(13)-5
Design of distributed and
discrete broadband amplifier
systems with accurate gain
profile and optimal fiber
combination**

*Jer-Shien Chen, Hen-Wai Tsao,
and San-Liang Lee
National Taiwan University, Taiwan*
We point out the limitation of using an approximate gain profile in designing distributed fiber Raman amplifier (FRA) and design a broadband FRA based on the measured gain profile. A design of discrete amplifiers for ultra-long-haul transmission.....

**15:15-15:30 TU3A-(13)-6
A polarimetric approach for
waveform restoration in
semiconductor optical
amplifiers**

*Kit Chan, Chun-Kit Chan,
Lian-Kuan Chen, and Frank Tong
Chinese University of Hong Kong,
Hong Kong*
We present a simple and effective polarimetric approach for waveform restoration in semiconductor optical amplifier. Pattern dependent distortion caused by gain dynamics of SOA can be alleviated with an enhancement in input power dynamic range by 7 dB.

**15:30 – 16:00
Coffee/Tea Break**

December 16, Tuesday

Room 101 -- (1F)**Room 105 -- (1F)****Room 106 -- (1F)****Room 107 -- (1F)****Room 110 -- (1F)**

16:00-18:00
TU4I · Optical MEMS (I)
Norman Tien, UC Davis, USA,
Presider

16:00-16:30 TU4I-(15)-1
(Invited)
**Applications of MEMS in
nano-photonic integrated
circuits**
Ming Wu
UCLA, USA

16:00-18:15
TU4H · Optical Information
Processing (I)
Toyohiko Yatagai, Tsukuba
University, Japan, Presider

16:00-16:15 TU4H-(9)-1
**On optimal structure and
geometry of high-speed
integrated photodiodes in a
standard CMOS technology**
*Saša Radovanoviæ, Anne Johan
Annema, and Bram Nauta*
*University of Twente, The
Netherlands*
Analyses of the influence of different
geometries (layouts) and structures of
high-speed CMOS photodiodes on their
physical and electrical bandwidths are
presented. Three photodiode structures
are studied: nwell/p-substrate,
p+/nwell/p-substrate and p+/nwell.

16:15-16:30 TU4H-(9)-2
**Three-dimensional integral
imaging with large depth of
focus using real and virtual
image fields**
*Fushou Jin, Ju-Seog Jang, and
Bahram Javidi*
*Pukyong National University,
Korea; University of Connecticut,
USA*
In this paper we present an integral
imaging method to enhance the depth
of a reconstructed three-dimensional
image by displaying it throughout real
and virtual image fields without
introducing any additional system
complexity

16:00-17:45
TU4E · Solid-State Lighting (II)
J. T. Hsu, Industrial Technology
Research Institute, Taiwan,
Presider

16:00-16:30 TU4E-(SS1)-1
(Invited)
GaN LEDs for solid-state lighting
V. Haerle
*OSRAM Opto Semiconductor,
Germany*

16:00-18:00
TU4G · Femtosecond
Materials and Device
Application
Chi-Kuang Sun, National
Taiwan University, Taiwan,
Presider

16:00-16:30 TU4G-(6)-1
(Invited)
**Femtosecond photonic devices
using nano-structure materials
for ultrafast optical
communications**
Osamu Wada
Kobe University, Japan
Ultrafast photonic devices will become
indispensable in future systems with
the data rate beyond 100 Gb/s. This
paper reviews recent progresses in
various femtosecond photonic devices
including quantum well intersubband
transition switches and quantum dot
optical amplifier devices.

Int'l Reception Hall -- (1F)

16:00-18:15
TU4F · Quasi Phase Matching Devices and Application (II)
Jun-ichi Shikata, Tohoku University, Japan, Presider

16:00-16:15 TU4F-(5)-1
Distributed feedback optical parametric oscillation by using a two-photon photorefractive grating in periodically-poled lithium niobate

Y. Y. Lin, A. C. Chiang, C. Y. Chien, Y. C. Huang, and J. T. Shy
National Tsing-Hua University, Taiwan

We successfully demonstrated a distributed-feedback optical parametric oscillation (DFB OPO) by writing two-photon photorefractive gratings in a periodically poled lithium niobate crystal. Evidence of OPO was observed from the spectral narrowing at the 619.3 nm.

16:15-16:30 TU4F-(5)-2
Surface-emitted terahertz-wave generation using double injection seeded optical parametric generation

Yuzo Sasaki, Koji Suizu, and Hiromasa Ito
Tohoku University; Photodynamics Research Center, RIKEN, Japan
Terahertz (THz) -wave generation from PPLN using double injection seeded optical parametric generation (OPG) was demonstrated. THz-wave output with double seeding for OPG was approximately 30 times higher than that without seeding.

Ever Green Room -- (10F)

16:00-18:00
TU4B · Tunable Lasers and Broadband Light Sources
C. E. Zah, Corning Inc., USA, Presider

16:00-17:00 TU4B-(2)-1
(Tutorial)
Wavelength tunable semiconductor lasers

Jens Buus
Gayton Photonics Ltd, UK
Wavelength tunable semiconductor lasers have been a hot topic for several years due to their application advantages in optical communication networks. In this tutorial we will look at applications, device properties and options, and specific examples.

Spanish Room -- (10F)

16:00-18:00
TU4D · New Advances in Some Ultrafast Intense Laser Laboratories (II)
K. Miyazaki, Kyoto University, Japan, Presider

16:00-16:30 TU4D-(SS3)-1
(Invited)
Generation and applications of high harmonic x-ray sources at KAIST

C. H. Nam
Korea Advanced Institute of Science and Technology, Korea

Auditorium -- (10F)

16:00-18:00
TU4C · Photonic Crystal and Devices for Communications
E. Yablonovitch, UCLA, USA, Presider

16:00-16:30 TU4C-(16)-1
(Invited)
Photonic crystal WDM components

Thomas F. Krauss
University of St. Andrews, UK

Sky Lounge -- (12F)

16:00-18:00
TU4A · Optical Communication Systems Modeling
P. -K. A. Wai, Hong Kong Polytechnic Univ., Hong Kong, Presider

16:00-17:00 TU4A-(14)-1
(Tutorial)
Accurate calculation of bit error ratios in optical fiber communications systems

Curtis R. Menyuk
University of Maryland, USA
We describe recently developed theoretical methods that allow users to accurately calculate bit error ratios (BERs) in realistic optical fiber communications systems.

December 16, Tuesday

Room 101 -- (1F)

TU4I · Optical MEMS (I) --- continued

**16:30-16:45 TU4I-(15)-2
Design, test and qualification of stiction-free MEMS optical switches**

*Guo-Dung John Su, Fukang Jiang, E. Chiu, A. Avakian, J. Dickson, D. Jia, and T. Tsao
Umachines, Inc., USA*

We report design, test and qualification of stiction-free optical switches based on MEMS technology. Driven by electromagnetic force, the MEMS actuator could be operated by less than 1Volt.

**16:45-17:00 TU4I-(15)-3
350X350 modular optical cross-connect with closed-loop controlled MEMS mirrors**

*P. B. Chu, J. I. Dadap, C. D. Lee, I. Brener, M. Tsai, C. Pu, D. Peale, R. Harel, C. Wu, S. Lee, R. Rodriguez, J. Johnson, S. Park, D. Tong, M. Chou, R. Doran, K. Bergman, N. Bonadeo, T. Chau, W. Zhong, R. Gibson, E. Goldstein, L. Lin, and J. A. Walker
Tellium Inc., USA*

We describe a modular MEMS based optical cross-connect switch. Each module has 16 ports with closed-loop servo-controlled mirrors. We have achieved switching times of < 10 ms, excellent optical power stability, and immunity to stochastic vibrations.

Room 105 -- (1F)**Room 106 -- (1F)**

TU4H · Optical Information Processing (I) --- continued

**16:30-16:45 TU4H-(9)-3
Analysis of lens array relay in three-dimensional integral imaging system**

*Sung-Wook Min, Jisoo Hong, and Byoungho Lee
Seoul National University, Korea*

Lens array relay used in integral imaging for image depth conversion is analyzed. We present a theory of the image depth conversion and the relation between the gap of lens arrays and the image depth.

**16:45-17:00 TU4H-(9)-4
Visibility control of image using light scattering medium and contrast discrimination method in low-temporal coherence readout**

*Y. Matsuba, S. Tamano, H. Yamamoto, Y. Hayasaki, and N. Nishida
Univ. of Tokushima, Japan*

A visibility control of binary image by covering it with a light scattering medium. The low-temporal coherence interference technique is applied to readout the binary image.

Room 107 -- (1F)

TU4E · Solid-State Lighting (II) --- continued

**16:30-17:00 TU4E-(SS1)-2
(Invited)
New approach of efficiency enhancement on GaN LED devices**

*J. T. Hsu
ITRI, Taiwan*

Room 110 -- (1F)

TU4G · Femtosecond Materials and Device Application --- continued

**16:30-16:45 TU4G-(6)-2
Polymer-TiO₂ hybrid nanocomposites for all-optical switching**

*W. Ji, H. I. Elim, A. H. Yuwono, J. M. Xue, and J. Wang
National University of Singapore, Singapore*

Large and ultrafast cubic optical nonlinearities in thin films containing poly(methyl methacrylate) (PMMA)-TiO₂ nanocomposites were observed using 780-nm, 250-fs laser pulses. The recovery times of the nonlinearities were found to be ~1.5 ps.....

**16:45-17:00 TU4G-(6)-3
Femtosecond pump-probe studies on carrier dynamics in InGaN/GaN quantum wells with indium aggregated quantum dot structures**

*Hsiang-Chen Wang, Cheng-Yeh Tsai, Yung-Chen Cheng, En-Chiang Lin, Shih-Wei Feng, C. C. Yang, Kung-Jen Ma, Cheng-Ta Kuo, and Jian-Shih Tsang
National Taiwan University; Chung Hua University; Advanced Epitaxy Technology Inc., Taiwan*

Temperature-dependent pump-probe measurements were conducted for observing the process of carrier relaxation into localized states of quantum dots, which were formed through indium aggregation in InGaN/GaN quantum well structures of various parameters.

December 16, Tuesday

Int'l Reception Hall -- (1F)

TU4F · Quasi Phase Matching Devices and Application (II) --- continued

**16:30-16:45 TU4F-(5)-3
Development of compact and coherent green/blue light source using waveguided PPLN and laser diode**

Satoshi Tokuhisa, Yuji Oki, Yasuhide Okada, Tatsuo Okada, and Mitsuo maeda

Kyushu University, Japan

An all solid state and compact cw blue and green laser in novel scheme was demonstrated using laser diodes of 940nm and 1060nm coupled with waveguided PPLN crystal.

**16:45-17:00 TU4F-(5)-4
Optical parametric oscillation with periodically poled stoichiometric lithium tantalite**

Nan Ei Yu, Sunao Kurimura, Masaru Nakamura, Yoshiyuki Nomura and Kenji Kitamura, Jun Sakuma, Yoshio Otani, and Akira Shiratori

National Institute for Materials Science (NIMS); Cyber Laser Inc., Japan

A low-threshold (106-mW) singly resonant optical parametric oscillation (OPO) was demonstrated in near-stoichiometric periodically poled LiTaO₃. A simple oscillator, with a two-mirror cavity was pumped by a Nd:YVO₄ laser.....

Ever Green Room -- (10F)

TU4B · Tunable Lasers and Broadband Light Sources --- continued

Spanish Room -- (10F)

TU4D · New Advances in Some Ultrafast Intense Laser Laboratories (II) --- continued

**16:30-17:00 TU4D-(SS3)-2
(Invited)
Relativistic femtosecond Laser Plasmas**

R. Sauerbrey

Friedrich-Schiller University of Jena, Germany

Auditorium -- (10F)

TU4C · Photonic Crystal and Devices for Communications --- continued

**16:30-17:00 TU4C-(16)-2
(Invited)
Manipulation of photons by artificial defects in photonic crystals**

Susumu Noda

Kyoto University, Japan

Sky Lounge -- (12F)

TU4A · Optical Communication Systems Modeling--- continued

December 16, Tuesday

Room 101 -- (1F)

TU4I · Optical MEMS (I) --- continued

**17:00-17:15 TU4I-(15)-4
Protection scheme and system availability in large-capacity MEMS-based optical crossconnect**

Dennis T. K. Tong, Siu L. Lau, and Ming H. Chou

Hong Kong University of Science and Technology, Hong Kong; HC Photonics, Taiwan

A fast and scalable protection scheme for large-port-count MEMS-based OXC systems is proposed. Direct communication between input and output ports, and continuous re-optimization of mirror alignment in the protection fabric result in significant improvement in connection restoration time and system availability.

**17:15-17:30 TU4I-(15)-5
High performance MEMS-based 8x8-port optical switch**

D. A. Horsley, M. J. Daneman, M. R. Hart, K. Hogan, T. Beerling, B. Behin, and M. H. Kiang

Onix Microsystems, USA

This paper describes a MEMS-based 8x8-port fiber-optic switch. Precision mirror positioning results in uniformity within 1 dB and repeatability below 0.12 dB. Measured worst-case insertion loss was 2 dB, while average loss was 1.4 dB.

Room 105 -- (1F)**Room 106 -- (1F)**

TU4H · Optical Information Processing (I) --- continued

**17:00-17:15 TU4H-(9)-5
Exact error probability of DQPSK signal with nonlinear phase noise**

Jen-An Huang and Keang-Po Ho
National Taiwan University, Taiwan

The exact error probability of DQPSK systems is derived analytically when the signal is contaminated by nonlinear phase noise. The error probability is calculated with and without compensation using the receive intensity.

**17:15-17:30 TU4H-(9)-6
Multi-level quantized reference function for synthetic aperture radar image detection**

Jian-Shuen Fang and Chulung Chen

National Chiao Tung University; Yuan Ze University, Taiwan

The reference filter is a spatial domain function that with finite levels, which can be implemented in the input of a non-zero order joint transform correlator (NOJTC). It is suitable for implementation using current spatial light modulators (SLM).

Room 107 -- (1F)

TU4E · Solid-State Lighting (II) --- continued

**17:00-17:15 TU4E-(SS1)-3
A feasibility study of white light LEDs with omni-directional reflectors**

Jung-Chieh Su, Jun-Ren Lo, Chung-Hsiang Lin, and Jim Y. Chi
Industrial Technology Research Institute, Taiwan

An experimental feasibility study of novel white light LED structure with omni-directional reflectors has been demonstrated. A comparison of the fluorescence with or without omni-directional reflector coating shows that the fluorescence intensity from the phosphor grain layer has been enhanced significantly.....

**17:15-17:30 TU4E-(SS1)-4
Luminescence efficiency of InGaN-based multiple quantum well UV-LEDs**

Chang-Chi Pan, Chia-Ming Lee, Wen-Jay Hsu, Guan-Ting Chen, and Jen-Inn Chyi

National Central University, Taiwan
Luminescence efficiency of ultraviolet light-emitting diodes (UV-LEDs) is investigated using electroluminescence measurements. The effects of thermal and layer structure on the external quantum efficiency at different current densities are discussed and clarified.

Room 110 -- (1F)

TU4G · Femtosecond Materials and Device Application --- continued

**17:00-17:15 TU4G-(6)-4
Femtosecond carrier dynamics in InGaAsN single quantum well**

Chia-Lung Hsieh, Tzu-Ming Liu, Ming-Chun Tien, Chi-Kuang Sun, Li-Wei Sung, and Hao-Hsiung Lin
National Taiwan University, Taiwan

Femtosecond carrier dynamics in InGaAsN single quantum well were studied for the first time. Pump-probe measurement shows the enhanced free carrier absorption due to highly excited carriers with a delayed carrier cooling time around 2~3.7 ps

**17:15-17:30 TU4G-(6)-5
Optical beam induced current microscopy at dc and radio frequency**

Fu-Jen Kao, Jian-Cheng Chen, and Sheng-Lung Huang
National Sun Yat-sen University, Taiwan

In this paper we have made a comparison of optical beam induced current (OBIC) imaging with DC and radio frequency (RF) contrast on a photodetector. The DC and RF contrasts are generated by a cw argon-krypton.....

Int'l Reception Hall -- (1F)

TU4F · Quasi Phase Matching Devices and Application (II)
--- continued

**17:00-17:15 TU4F-(5)-5
Nonlinear three-wave
interactions upon all optical
poling of oxide glass**

*M. K. Balakirev, V. A. Smirnov, and
L. I. Vostrikova
Institute of Semiconductor Physics
SB RAS, Russia*

All optical poling of glass leads to removal of the ban on three-wave interactions. Photoinduced processes of second harmonic generation and parametric amplification of light have been investigated theoretically and experimentally in bulk oxide glass.

**17:15-17:30 TU4F-(5)-6
Fabrication of
periodically-inverted GaAs
waveguides for quasi-phase-
matching nonlinear optical
devices**

*Tomonori Matsushita, Hiroaki
Tachibana, Shinji Koh, and Takashi
Kondo*

*The University of Tokyo;
Nanostructure and Material
Property PRESTO, JST, Japan*
A process developed for fabricating high-quality periodically-inverted GaAs waveguides based on sublattice reversal epitaxy and regrowth technique is presented. By using this process, we can fabricate low-loss GaAs wavelength conversion devices with $\sim 6 \mu\text{m}$ QPM periods.

Ever Green Room -- (10F)

TU4B · Tunable Lasers and Broadband Light Sources --- continued

**17:00-17:15 TU4B-(2)-2
Widely tunable sampled grating
distributed feedback laser diode
integrated with sampled grating
distributed Bragg reflector**

*Suhyun Kim, Youngchul Chung,
Soo-Hwan Oh, and Moon-ho Park
Kwangwoon University;*

*Electronics and
Telecommunications Research
Institute, Korea*

A new widely tunable laser diode structure is proposed. Simulation results show that only two tuning currents are required and higher output power is obtainable compared with a SG-DBR laser diode with similar parameters.

**17:15-17:30 TU4B-(2)-3
Multi-channel dual-mode pulse
generation for DWDM and
fiber-wireless system
application**

*H. C. Bao, Y. J. Wen, H. F. Liu,
and A. Nirmalathas
The University of Melbourne,
Australia*

In this paper we propose a novel technique for the generation of wideband dual-mode pulses from a single subharmonically synchronous mode-locked laser diode (LD). The obtained pulse source exhibits high extinction ratio ($>15 \text{ dB}$).....

Spanish Room -- (10F)

TU4D · New Advances in Some Ultrafast Intense Laser Laboratories (II) --- continued

**17:00-17:30 TU4D-(SS3)-3
(Invited)**

**Strong-field science and
technology at APRC, JAERI**

*H. Daido
Advanced Photon Research
Center, JAERI, Japan*

Auditorium -- (10F)

TU4C · Photonic Crystal and Devices for Communications --- continued

**17:00-17:15 TU4C-(16)-3
Design and characterization of a
coupling-strength-controlled
directional coupler based on
photonic crystal waveguide**

*Y. Sugimoto, Y. Tanaka, N. Ikeda, T.
Yang, H. Nakamura, K. Inoue, K.
Miyashita, T. Maruyama, K. Ishida, Y.
Watanabe, and K. Asakawa
The Femtosecond Technology
Research Association; Chitose Institute
of Science and Technology; National
Institute of Advanced Industrial Science
and Technology, Japan*

Numerical and experimental studies on photonic crystal waveguide directional couplers (DCs) with coupling- strength-control defects are reported. Fundamental operation as the DC at a wavelength of $\sim 1.3 \mu\text{m}$ is observed.....

**17:15-17:30 TU4C-(16)-4
Wavelength division
multiplexing for 1.3 and 1.55
micron by photonic crystal
directional couplers**

*Chii-Chang Chen, Chih-Yu Chen,
S. C. Yang, W. K. Wang, C. K. Lin,
and Yi-Jen Chan
National Central University, Taiwan*

We report the photonic crystal directional couplers to separate the wavelengths for 1.3 and 1.55micron. The extinction ratios of the output ports is around 10dB. This structure can be used to realize the PC nano-detection system for WDM purpose.

Sky Lounge -- (12F)

TU4A · Optical Communication Systems Modeling --- continued

**17:00-17:30 TU4A-(14)-2
(Invited)
Modeling and performance
evaluation of improved data
formats for optical
communications**

*Werner Rosenkranz and Jochen
Leibrich*

University of Kiel, Germany
Simple on-off keying with intensity modulation using NRZ or RZ-data format is not optimum in the sense of spectral efficiency and robustness towards channel impairments. In this contribution alternative modulation formats are investigated.

December 16, Tuesday

Room 101 -- (1F)**Room 105 -- (1F)****Room 106 -- (1F)****Room 107 -- (1F)****Room 110 -- (1F)**

TU4I · Optical MEMS (I) ---
continued

17:30-17:45 TU4I-(15)-6
Design and characterization of electrothermal actuator from reliability and robust aspects
Yen-Jyh Lai, Chia-Yu Wu, Chengkuo Lee, Yu-Shen Lin, Wen-Chih Chen, Chihchung Chen, Ruey-Shing Huang, and Min-Shyong Lin
Asia Pacific Microsystems, Inc., Taiwan

We propose a layout design for U-shape electrothermal to overcome the severe sticking problem induced by the accumulated charge. Then, we suggest proper device parameter designs for unloaded and heavily loaded applications.

17:45-18:00 TU4I-(15)-7
Bi-directional differential actuator with two degree-of-freedom
Hsiao-Wen Lee, Shih-Yi Wen, and Wu-Zheng Guo
Industrial Technology Research Institute, Taiwan

A novel bi-directional differential actuator with in-plane and out-of-plane two degrees of freedom is demonstrated. The design of the actuator utilizes four-suspension-arm differential structure and differential driving. Out-of-plane deflection as high as 10 μm is achieved with 7-V drive.

TU4H · Optical Information Processing (I)--- continued

17:30-17:45 TU4H-(9)-7
An optical image encryption based on Fourier domain
Yi C. Chang, Hsuan T. Chang, and Chung J. Kuo
National Chung Cheng University; National Yunlin University of Science & Technology; Wu-Feng Institute of Technology, Taiwan
Dyadic displacements of an image can be regarded as a special type of permutations of its pixel address. This property can be used to encrypt an image without information loss, damage or addition.....

17:45-18:15 TU4H-(9)-8 (Invited)
WDM Fiber Optic Component Trends for Power, Wavelength, and Configuration Management
Yao Li
Alliance Fiber Optic Products, USA

TU4E · Solid-State Lighting (II) --- continued

17:30-17:45 TU4E-(SS1)-5
Effects on emission properties of interface thin layers in InGaN/GaN quantum well structures
Yung-Chen Cheng, Horng-Shyang Chen, C. C. Yang, Zhe-Chuang Feng, and Gang Alan Li
National Taiwan University; LED Expert Corporation, Taiwan
We report the variations of optical characteristics in InGaN/GaN quantum well samples with different thin layer (about 1 nm) structures between the wells and barriers, including silicon-doped InN and InGaN compounds.

TU4G · Femtosecond Materials and Device Application --- continued

17:30-17:45 TU4G-(6)-6
Analysis of all-optical regeneration using an injection locked two-mode surface-emitting laser
Yutaka Onishi and Fumio Koyama
Tokyo Institute of Technology, Japan
The dynamic behavior of an injection locked two-mode vertical-cavity surface-emitting laser (VCSEL) is presented. A nonlinear transition between two transverse modes with injection locking enables all-optical regeneration.

17:45-18:00 TU4G-(6)-7
A TO-packaged coaxial optical subassembly with flexible lead pin for 10Gbps ethernet application
Chiung-Hung Wang, Jason Lee, Simon Tsai, Chun-Hsing Lee, and Ming-Fa Huang
Industrial Technology Research Institute, Taiwan
The TO-packaged coaxial 10Gbps 1310nm DFB transmitter optical subassembly and PIN receiver optical subassembly with flexible lead pin have been developed and a 10km error-free-transmission at a data rate of 10.3125Gbps has been demonstrated.

Int'l Reception Hall -- (1F)

TU4F · Quasi Phase Matching Devices and Applicatio (II) --- continued

**17:30-17:45 TU4F-(5)-7
Fabrication of very high quality periodically poled KNbO₃ for efficient second-harmonic generation**

*Joong Hyun Kim and Choon Sup Yoon
Department of Physics, KAIST, Korea*

We report on the fabrication of very high quality periodically poled KNbO₃ with dimensions of $3 \times 4 \times 0.925$ ($a \times b \times c$) mm³ and a period of 32.5 μ m for second-harmonic generation.

**17:45-18:00 TU4F-(5)-8
Nucleation control for a uniform periodically poled structure**

*Y. Nomura, N. E. Yu, S. Kurimura, K. Kitamura, H. Seki, M. Maruyama, Y. Kato, H. Nakajima, J. H. Ro, and Y. Gotoh,
National Institute for Materials Science (NIMS); Waseda University; Pusan National University; Tokyo University of Science, Japan*

We demonstrate high nucleation density by separating the nucleation process from the wall movement process. The density of 4500 1/mm² is obtained at a pulse width of 0.05 s and total application time of 1500 s.

Ever Green Room -- (10F)

TU4B · Tunable Lasers and Broadband Light Sources --- continued

**17:30-17:45 TU4B-(2)-4
Extremely broadband superluminescent diodes/semiconductor optical amplifiers in optical communication band**

*Chia-Wei Tsai, Gagik Sh. Shmavonyan, Yi-Shin Su, and Ching-Fuh Lin
National Taiwan University, Taiwan*

Superluminescent diodes with broad emission bandwidth characteristics and the mechanism of carrier distribution in the active layer are explored. Using InP substrate with five 6nm InGaAsP quantum wells and two 15nm InGaAs quantum wells.....

**17:45-18:00 TU4B-(2)-5
Mode competition in wide-range tunable dual-wavelength semiconductor laser using nonidentical InGaAsP quantum wells**

*Chi-Chia Huang, Chin-Hui Cheng, Yi-Shin Su, and Ching-Fuh Lin
National Taiwan University, Taiwan*

Different mode competition has been observed in a wide-range tunable dual-wavelength semiconductor laser. When the wavelength separation is large enough, the competition behavior between the two modes is opposite to usual mode competition.

Spanish Room -- (10F)

TU4D · New Advances in Some Ultrafast Intense Laser Laboratories (II) --- continued

**17:30-18:00 TU4D-(SS3)-4 (Invited)
High-field laser physics research at SIOM**

*Z. Z. Xu, R. Li, and Z. Zhang
Shanghai Institute of Optics and Fine Mechanics, China*

Auditorium -- (10F)

TU4C · Photonic Crystal and Devices for Communications --- continued

**17:30-17:45 TU4C-(16)-5
A channel drop filter in a two-dimensional triangular photonic crystal**

*Min Qiu and Bozena Jaskorzynska
Royal Institute of Technology, Sweden*

A design of a channel drop filter in a two-dimensional photonic crystal with a triangular lattice of air holes is presented, where no additionally incorporated materials and no extra small feature size are needed.

**17:45-18:00 TU4C-(16)-6
Photonic crystal k-vector superprism**

*Takashi Matsumoto and Toshihiko Baba
Yokohama National University, Japan*

We propose a new photonic crystal superprism named "k-vector prism", in which a peculiar k-vector characteristic is utilized. High resolution and drastic minturization in a WDM filter will be possible, compared with the conventional superprism.

Sky Lounge -- (12F)

TU4A · Optical Communication Systems Modeling --- continued

**17:30-17:45 TU4A-(14)-3
Fast method for obtaining pulse parameters in grating compensated dispersion-managed soliton systems**

*K. Nakkeeran, Y. H. C. Kwan, and P. K. A. Wai
The Hong Kong Polytechnic University, Hong Kong*

We present a useful method to estimate the soliton energy for a given bit rate in dispersion-managed soliton systems compensated by chirped fiber gratings. The estimates are in good agreement with the numerical results.

**17:45-18:00 TU4A-(14)-4
Effectiveness of raised-cosine RZ pulses in dispersion-managed fiber systems**

K. Nakkeeran, Y. H. C. Kwan, P. K. A. Wai, P. Tchofo Dinda, and A. Labruy

The Hong Kong Polytechnic University, Hong Kong; Laboratoire de Physique de l'Universit 'e de Bourgogne, France
We show that the raised-cosine return-to-zero pulses are as effective as the Gaussian pulses in dispersion-managed fiber systems.

December 16, Tuesday

Room 101 -- (1F)

Room 105 -- (1F)

Room 106 -- (1F)

Room 107 -- (1F)

Room 110 -- (1F)

18:30-20:00
Conference Reception

December 16, Tuesday

Int'l Reception Hall -- (1F)**Ever Green Room -- (10F)****Spanish Room -- (10F)****Auditorium -- (10F)****Sky Lounge -- (12F)**

TU4F · Quasi Phase Matching
Devices and Application (II) ---
continued

18:00-18:15 TU4F-(5)-9
**Improved analysis of modulation
instability in fiber optics**

S. Tariq
*Lahore University of Management
Sciences Sector U, DHA, Lahore,
Pakistan*

An improved analysis for modulation
instability is presented. A
semi-analytical solution of the nonlinear
Schrodinger equation (NLSE) is
presented. It is shown that the coupled
wave equations resulting from NLSE
lead to Riccati differential equations

18:30-20:00
Conference Reception

December 16, Tuesday