



理論光學研究群 Theoretical Optics Group



李瑞光 Ray-Kuang Lee

博士後研究員: 楊文星博士,

博士班學生: 林元堯, 李瑞珍, 吳建明, 莊又霖, 陳一宏, 鄭景仁

碩士班學生: 蔡德儒, 陳治堯, 簡瑋

<http://mx.nthu.edu.tw/~rklee>



Institute of Photonics Technologies and Department of Electrical Engineering
National Tsing-Hua University, Hsinchu, Taiwan

Research topics

Nonlinear Optical/Atomic systems:

- ◆ Nonlocal solitons, with Y.S. Kivshar (Australia) in Theory
- ◆ Nonlinear photonic crystals, with A. Kung (Sinica) in Exp.
- ◆ Nonlocal vortex, with B.A. Malomed (Israel) in Theory
- ◆ Dipolar Bose-Einstein condensates, with T.J. Jiang (NCTU) in Theory
- ◆ Cavity solitons in VCSELS, with T.D. Lee (NYUST) in Exp.
- ◆ MI, TI, and chaotic patterns, with C.J. Cheng (NCHU) in Exp.
- ◆ Slow lights, with I. Yu (NTHU) and J. Chi (ITRI) in Exp.

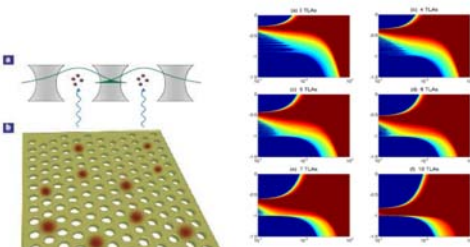
Quantum Optics:

- ◆ Quantum soliton squeezing, with Y. Lai (NCTU) in Theory
- ◆ Quantum phase transition of light, with T.K. Ng (Hong Kong) in Theory
- ◆ Quantum memory, with G. Leuchs (Germany) in Exp.
- ◆ Quantum optics in Comb lasers, with W.Y. Cheng (Sinica) in Exp.
- ◆ Quantum control in light harvesting, with C.D. Lin (Kansas) in Theory

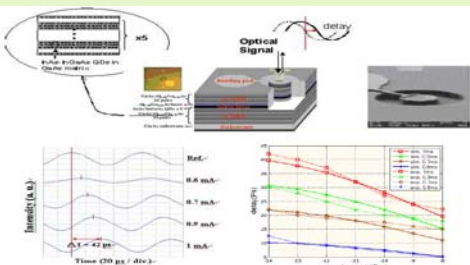
Optical device inverse design:

- ◆ Fiber Bragg grating synthesis, with C.L. Lee (NUU) in Algorithm

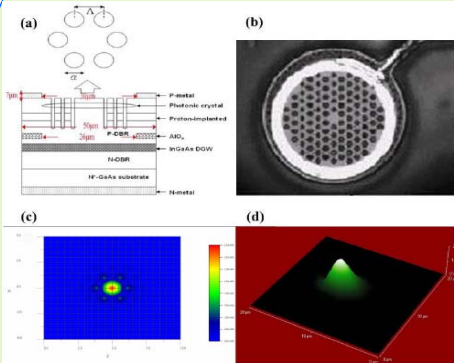
Highlights of Research Gallery



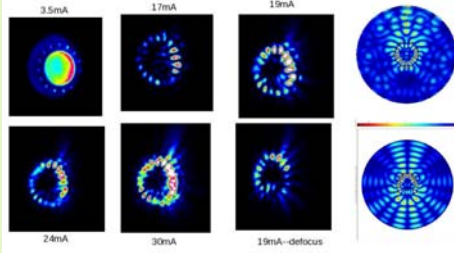
Quantum phase transition of light [15]



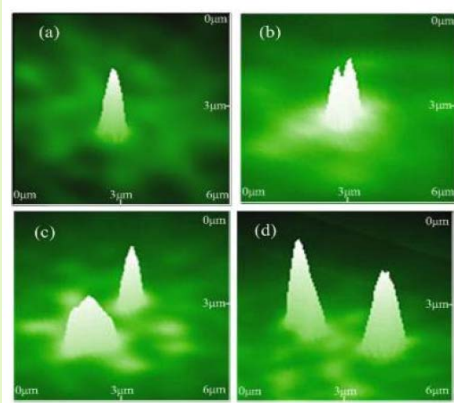
Slow optical light in VCSELS[11]



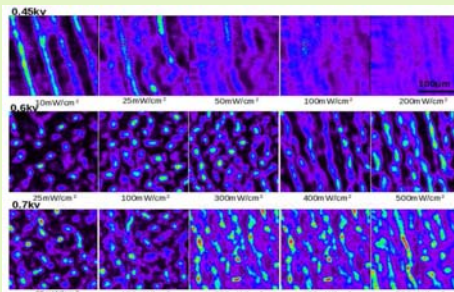
Design and fabrication of VCSELS with photonic crystals[7]



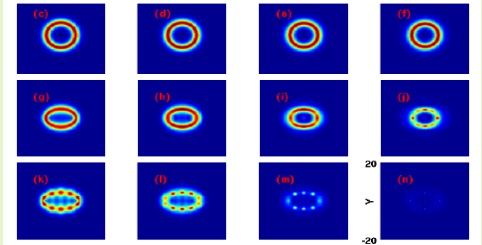
Uni-directional lasing from VCSELS[2]



Observation of cavity solitons[1]



Modulation instability patterns[20]



Evolutions of elliptical solitons[5]

Publications:

1. YuanYao Lin, Wun-Jhang Lin, Han-Zhong Liao, Jin-Shan Pan, Tsin-Dong Lee, RKL, "Observations of Cavity Dipole Solitons and Vortex Soliton Clusters in VCSELS with a Surface Photonic Crystal Structure," *CLEO/QELS*, San Jose, California, USA, QTuC5 (2008).
2. Chih-Yao Chen, YuanYao Lin, Chen-Ye Shen, Kuo-Yu Tang, Hung-Pin D. Yang, Tsin-Dong Lee, and RKL, "Direct Observation of Higher-Order Whispering-Gallery Modes in a Defect-Free Surface Micro-Structure VCSEL," *CLEO/QELS*, California, USA, JThA91 (2008).
3. Yinchieh Lai and RKL, "Optimum Detection of Quantum Entangled Fiber Solitons," *CLEO/QELS*, San Jose, California, USA, JTuA109 (2008).
4. Wen-Xing Yang and RKL, "Slow optical solitons via intersubband transitions in a semiconductor quantum well," arXiv: 0803.1886 (2008).
5. YuanYao Lin and RKL, "Symmetric-breaking instabilities of generalized elliptical solitons," to *Opt. Lett.* (2008).
6. Wen-Xing Yang and RKL, "Giant Kerr nonlinearities and slow optical solitons in coupled double quantum-wells," arXiv:0803.1885 (2008).
7. Tsin-Dong Lee, Chih-Yao Chen, YuanYao Lin, Chia-Yu Chang, Ming-Chiu Chou, Hung-Ping D. Yang, Te-ho Wu, and RKL, "Direct observation of higher-order whispering-gallery modes in VCSELS at room temperature by embedding a defect-free surface micro-structure," arXiv:0711.2126 (2007).
8. RKL and Yinchieh Lai, "Atomic dipole moment noises on squeezing and correlation of self-induced transparency solitons," to *Phys. Rev. A* (2008).
9. YuanYao Lin, RKL, Yee-Mou Kao, and Tsin-Fu Jiang, "Band structures of a dipolar Bose-Einstein condensate in one-dimensional lattices," to *Phys. Rev. A* (2008).
10. Wen-Xing Yang, Jing Xu, and RKL, "Suppression of absorption by quantum interference in intersubband transitions of tunnel-coupled double quantum wells," arXiv: 0803.1888 (2008).
11. Chia-Sheng Chou, RKL, Peng-Chun Peng, Hao-chung Kuo, Gray Lin, Hung-Ping Yang and Jim Y. Chi, "A Simple Model for Cavity Enhanced Slow Lights in Vertical Cavity Surface Emission Lasers," *J. Opt. A: Pure and Applied Optics* (special issue, April 2008).
12. YuanYao Lin, RKL, and Yuri S. Kivshar, "Soliton transverse instabilities in nonlocal nonlinear media," *J. Opt. Soc. Am. B* (April, 2008).
13. YuanYao Lin, I-Hong Chen, and RKL, "Breather-like Collision of Gap Solitons in Bragg Gap Regions within Nonlocal Nonlinear Photonic Crystals," *J. Opt. A: Pure and Applied Optics* (special issue, April 2008).
14. Wen-Xing Yang, Jing-Min Hou, and RKL, "Ultraslow bright and dark solitons in semiconductor quantum wells," *Phys. Rev. A* 77 (March 2008).
15. Soi-Chan Lei and RKL, "Quantum Phase Transitions of Light in the Dicke-Bose-Hubbard model," *Phys. Rev. A* 77, 033827 (2008).
16. Cheng-Ling Lee, RKL, and Yee-Mou Kao, "A Lagrange Multiplier Constrained Optimization Method for the Design of Narrowband Dispersionless Fiber Bragg Gratings," *Optical Engineering* 47, 015005 (2008).
17. Cheng-Ling Lee, RKL, and Yee-Mou Kao, "Synthesis of Long-Period Fiber Gratings with a Lagrange Multiplier Optimization Method," *Optics Comm.* 281, 61 (2008).
18. Yuan Yao Lin and RKL, "Dark-bright soliton pairs in nonlocal nonlinear media," *Opt. Express* 15, 8781 (2007).
19. Cheng-Ling Lee, RKL, and Yee-Mou Kao, "Design of multichannel DWDM fiber Bragg grating filters by Lagrange multiplier constrained optimization," *Opt. Express* 14, 11002 (2006).
20. Chien-Chung Jeng, Yuang-Yao Lin, and RKL, "Spatial-temporal modulation instability patterns," in preparation (2008).