Luke F. Lester, Senior Member, IEEE
Associate Professor,
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Department of Electrical and Computer Engineering
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Role in the Center: Co-Investigator

Areas of Research: High speed and high power semiconductor lasers. High temperature electronics, microwave devices, tunable lasers, III-V semiconductor devices.

A. PROFESSIONAL PREPARATION

Cornell University	Engineering Physics, B.S., 1984
Cornell University	Electrical Engineering, Ph.D., 1992

B. APPOINTMENTS

Associate Director, Center for High Technology Materials	2004-present
Associate Professor, ECE Department, University of New Mexico	2000-present
Assistant Professor, ECE Department, University of New Mexico	1994-2000
Co-founder and CTO, Zia Laser, Inc.	2005

C. SYNERGISTIC ACTIVITIES

Prof. Lester has 14 years of experience in solid-state physics devices, modeling, and fabrication techniques, and is leading a large research group. Over the past 14 years, he has graduated 9 Ph.D. and 8 M.S. students. He has served as the Principal Investigator on many projects sponsored by ARO, ONR, ARL, NSF, DARPA, NASA, and many industries. He has published many book chapters and more than 150 papers in refereed journals and invited presentations in many national and international conferences.

As Associate Director of CHTM his duties include: directing a technical staff of 11 on the scope, construction and facilitation of laboratories for CHTM faculty; coordination and lead of multi-investigator grants and proposals to NSF and DoD; has raised over $7M in research and equipment funds from NSF, DoD, and private industry since 1994. Oversee technical operations and incoming research proposals for Nanoscience at UNM, which is the local node of the NSF's National Nanotechnology Infrastructure Network. Facilities managed include a 4,000 sq. ft. class 1000 cleanroom, MBE chamber, and a 5,500 sq. ft. MOCVD crystal growth building.

In 1998 he was awarded the School of Engineering Research Award, and in 1994 he was awarded the Martin Marietta Manager Award.

His recent research accomplishments include: Sub-picosecond jitter quantum dot mode-locked lasers for optical clocking (2005). Pioneer in quantum dot lasers with the lowest report threshold current density (13 A/cm^2) and smallest linewidth enhancement factor (0.1) of any semiconductor laser (2000). Fastest long-wavelength photodetectors with 1.3 ps response time (1993). Designed, fabricated, and tested the first quantum well laser diode with 3-dB bandwidth greater than bulk lasers (1992). High-speed quantum well laser diodes are now an industry standard. Designed and fabricated the highest speed transistor (at the time), a 0.15 micron gate-length pseudomorphic HEMT with an f_{max} of 350 GHz (1989). This transistor was featured in the Guinness Book of World Records for about a decade.

D. RELATED PUBLICATIONS

1. Y. C. Xin, Y. Li, A. Martinez, T. J. Rotter, H. Su, L. Zhang, A. L. Gray, S. Luong, K. Sun, Z. Zou, J. Zilko, P. M. Varangis, L. F. Lester, "Optical gain and absorption of quantum dots measured using an alternative segmented contact method," IEEE Journal of Quantum Electronics, 42, 725-732 (2006).
2. H. Su, H. Li, L. Zhang, Z. Zou, A. L. Gray, R. Wang, P. M. Varangis, and L. F. Lester, "Nondegenerate Four-Wave Mixing in Quantum Dot Distributed Feedback Lasers," IEEE Photon. Technol. Lett., 17,

1686-1688 (2005).
3. L. Zhang, L. Cheng, A. L. Gray, S. Luong, J. Nagyvary, F. Nabulsi, L. Olona, K. Sun, T. Tumolillo, R. Wang, C. Wiggins, J. Zilko, Z. Zou, P. M. Varangis, H. Su, and L. F. Lester, "Low timing jitter, 5 GHz optical pulses from monolithic two-section passively mode-locked 1250/1310 nm quantum dot lasers for high speed optical interconnects," Paper OWM4, OFC 2005.
4. S. Osborne, Peter Blood, P. Smowton, Julie Lutti, Y. C. Xin, A. Stintz, D.L. Huffaker and L. F. Lester, "State filling in InAs quantum dot laser structures," IEEE J. Quantum Electron., 40, 1639-1645 (2004).
5. S.W. Osborne, P. Blood, P.M. Smowton, Y. C. Xin, A. Stintz, D.L. Huffaker, and L.F. Lester, "Optical absorption cross section of quantum dots," J. Phys.: Condens. Matter 16, S3749-S3756 (2004).
6. H. Su, L. Zhang, R. Wang, T. C. Newell, A. L. Gray, and L. F. Lester, "Linewidth Study of InAs- InGaAs quantum dot distributed feedback lasers," IEEE Photon Technol. Lett., 16, 2206-2208 (2004).
7. E. A. Pease, L. R. Dawson, L. G. Vaughn, P. Rotella, and L. F. Lester, "2.5-3.5 μm optically pumped GaInSb/AlGaInSb multiple quantum well lasers grown on AlInSb metamorphic buffer layers," J. of Appl. Phys., 93, 3177-81 (2003).
8. Z. Bakonyi, H. Su, G. Onischchukov, L. F. Lester, A. L. Gray, T. C. Newell, and A. Tunnermann, "High-gain quantum-dot semiconductor optical amplifier for 1300 nm," IEEE J. Quantum Electron., 39, 1409-1414 (2003).
9. H. Su, A. L. Gray, R. Wang, T. C. Newell, K. J. Malloy, and L. F. Lester, "High external feedback resistance of laterally loss-coupled distributed feedback quantum dot semiconductor lasers," IEEE Photon. Technol. Lett., 15, 1504-1506 (2003).
10. Y. C. Xin, L. G. Vaughn, L. R. Dawson, A. Stintz, Y. Lin, D. L. Huffaker, and L. F. Lester, "InAs quantum-dot GaAs-based lasers grown on AlGaAsSb metamorphic buffers," J. of Appl. Phys., 94, 2133-2135 (2003).
11. A. L. Gray, A. Stintz, K. J. Malloy, T. C. Newell, and L. F. Lester, "Morphology and relaxation in InGaAs/GaAs multi-layer structures," J. Crystal Growth, 222, 726-734 (2001).
12. G. T. Liu, A. Stintz, H. Li, T. C. Newell, A. L. Gray, P. M. Varangis, K. J. Malloy, and L. F. Lester, "The Influence of Quantum-Well Composition on the Performance of Quantum Dot Lasers Using InAs/InGaAs Dots-in-a-Well (DWELL) Structures," IEEE J. Quantum Electron., 36, 1272-1279 (2000).
13. P. M. Varangis, H. Li, G. T. Liu, T. C. Newell, A. Stintz, B. Fuchs, K. J. Malloy, and L. F. Lester, "Low-threshold quantum dot lasers with 201 nm tuning range," Electron. Lett., 36, 1544-1545 (2000).
14. L. Zhang, R. J. Shul, A. G. Baca, P. C. Chang, J. C. Zolper, U. K. Mishra, S. P. Denbaars, and L. F. Lester, "Epitaxially Grown GaN Junction Field Effect Transistors," IEEE Trans. Electron. Dev., 47, 507-511 (2000).
15. T. C. Newell, D. J. Bossert, A. Stintz, B. Fuchs, K. J. Malloy, and L. F. Lester, "Gain and Linewidth Enhancement Factor in InAs Quantum Dot Laser Diodes," IEEE Photon. Technol. Lett., 11, 1527- 1529 (1999).
16. L. F. Lester, A Stintz, H. Li, T. C. Newell, E. A. Pease, B. A. Fuchs, and K. J. Malloy, "Optical Characteristics of 1.24 μm Quantum Dot Lasers," IEEE Photon. Technol. Lett., 11, 931-933 (1999).
17. L. Zhang, L. F. Lester, R. J. Shul, C. G. Willison, and R. P. Leavitt, "Inductively Coupled Plasma Etching of III-V Antimonides in BCl_3/Ar and Cl_2/Ar," J. Vac. Sci. & Technol., B17(#3), 965-969 (1999).
18. G. T. Liu, A. Stintz, H. Li, K. J. Malloy, and L. F. Lester, "Extremely low room-temperature threshold current density diode lasers using InAs dots in $In_{0.15}Ga_{0.85}As$ quantum well," Electron. Lett., 35, 1163-1165 (1999).
19. R. J. Shul, C. G. Willison, M. M. Bridges, J. Han, J. W. Lee, S. J. Pearton, C. R. Abernathy, J. D. Mackenzie, S. M. Donovan, L. Zhang, and L. F. Lester, "Selective ICP Etching of Group-III Nitrides in Cl_2- and BCl_3-Based Plasmas," J. Vac. Sci. Technol., A16, 1621-1626 (1998).