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PATENTS AND SELECTED PUBLICATIONS: ELSA GARMIRE

Patents

"Automated Apparatus for Removal of Laser Graffiti" (Garmire, Russell, Liu) 1996
"New Infrared Imaging Detector" (Kuroda and Garmire) 1994
"Photorefractive Optical Switching Device" (Kost, Partovi, Garmire, Valley, Klein) 1990
"Temperature independent semiconductor Laser" (Hasenberg and Garmire) 1987
"Flexible Infrared Waveguide" (Garmire, Bass, McMahon) 1976
"Ultrasonic Wave Generator" (Garmire, Chiao, Townes) 1972
"Optical Frequency Waveguide" (Chiao, Garmire, Townes) 1971
"Optical Frequency Waveguide Transmission System" (Chiao, Garmire, Townes) 1971
"Laser Machining Apparatus" (Chiao, Garmire, Townes) 1971

Edited Books and Special Issues

Tech Tally: Approaches to Assessing Technological Literacy (E. Garmire and G. Pearson), National Academy Press, Washington DC, 2006.

Nonlinear Optics in Semiconductors Vol. I, ed. E. Garmire, A. Kost, (Academic Press, San Diego, 1998) 436 pgs.

Nonlinear Optics in Semiconductor Vol. II, ed. E. Garmire, A. Kost, (Academic Press, San Diego, 1998) 334 pgs.

Special Issue on Nonlinear Optics, Physics Today, May, 1994, invited introduction and 4 edited articles.

Laser Optics of Condensed Matter Vol. 2, ed. Elsa Garmire, A. Maradudin, K. Rebane, (Plenum Press, New York, 1991) 447 pages.

Nonlinear Dynamics in Optical Systems, ed. N. B. Abraham, E. Garmire, P. Mandel, (Opt. Soc. Am. Washington, 1991) OSA Proceedings Series Vol. 7, 605 pages

Special Issue on Optical Bistability, IEEE J. Quantum Electronics, September, 1985, 250 pages

Guided Wave Optical Systems I, ed. E. Garmire, (SPIE, WA, 1978) SPIE Proceedings Series, vol. 139, 255 pages.

Guided Wave Optical Systems II, ed. E. Garmire, (SPIE, WA, 1979) SPIE Proceedings Series, vol. 157, 320 pages.

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Invited Book Chapters

"Sources, Modulators and Detectors for Fiber Optic Systems" (E. Garmire) in *Handbook of Optics, Vol IV*, ed. M. Bass pp. 4.1 - 4.80 (McGraw Hill, 2001). Also in *Fiber Optics Handbook*, pp. 4.1 - 4.80 (McGraw Hill, 2002)

"Optical Nonlinearities in Semiconductors Enhanced by Carrier Transport" (E. Garmire) in *Nonlinear Optics in Semiconductors I*, (Acad. Press, San Diego, 1998) pp. 55-173

"Near-resonant Photorefractive Effects in Bulk Semiconductors" (J.E. Millerd, E.M. Garmire, A. Partovi), in *Photorefractive Effects and Materials*, ed. D. D. Nolte, (Kluwer Academic Publishers, Boston, 1995) pp 311-368.

"Nonlinear optics in Semiconductors" (E. Garmire) *Special Issue on Nonlinear Optics*, Physics Today, May, 1994 pp. 42-48.

"Applications of Lasers" (E. Garmire) Applications Chapter in *Fundamentals of Physics*, by Halliday and Resnik, Fourth Edition, published by Wiley, fall 1992.

"Integrated Optics for Optical Computing" (Garmire) *Workshop on Photonic Logic and information Processing*, Proc. SPIE 79, 67-80 (1988)

"Fundamentals of Optical Waveguides" (E. Garmire) *Electro-magnetic Surface Excitations*, ed. R. F. Wallis and G. Stegeman, (Springer-Verlag, 1986), pp. 188-201.

"Integrated Optics Technology" (E. Garmire) *Electro-magnetic Surface Excitations*, ed. R. F. Wallis and G. Stegeman, (Springer-Verlag, 1986), pp. 202-210

"Semiconductor Components for Monolithic Integrated Optics" (Garmire) *Integrated Optics*, Topics in Applied Physics, Vol. 7, ed. Tamir (Springer-Verlag, Berlin, 1975) pp. 243-304

Selected Refereed Papers in Nonlinear Optics (total of 63 papers)

"Coherently Driven Molecular Vibrations and Light Modulation" (Garmire, Pandarese, Townes) Phys. Rev. Lett. 11, 160 (1963).

"Self-Trapping of Optical Beams" (Chiao, Garmire, Townes) Phys. Rev. Lett. 13, 479 (1964).

"Stimulated Brillouin Scattering in Liquids" (Garmire, Townes) Appl. Phys. Lett. 5, 84 (1964).

"Stimulated Four-Photon Interaction and its Influence on Stimulated-Rayleigh-Wing Scattering" (Chiao, Kelley, Garmire) Phys. Rev. Lett. 17, 1158 (1966).

"Dynamics and Characteristics of the Self-Trapping of Intense Light Beams" (Garmire, Chiao, Townes) Phys. Rev. Lett. 16, 347 (1966).

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"Stimulated Raman Scattering in Liquids" (E. Garmire) Physics of Quantum Electronics, Kelley, Lax and Tannenwald, eds. (McGraw-Hill, New York, 1966) pp. 167-179.

"Laser Mode-Locking with Saturable Absorbers" (Garmire, Yariv) IEEE J. Quant. Electr. QE-3, 222 (1967).

"Observation of Mode-Locking and Ultra-Short Pulses in Anisotropic Molecular Liquids" (Comly, Garmire, Laussade, Yariv) Appl. Phys. Lett. 13, 176 (1968).

"Second Harmonic Generation from Short Pulses" (J. Comly, E. Garmire) Appl. Phys. Lett. 17, 7 (1968).

"Incoherent Mirrorless Bistable Optical Devices" (Garmire, Marburger, Allen) Appl. Phys. Lett. 32, 320 (1978).

"Theory of Bistability in Nonlinear Distributed Feedback Structures" (H. Winful, J. Marburger, E. Garmire) Appl. Phys. Lett. 35, 379-381 (1979).

"Transient Response of Hybrid Bistable Optical Devices" (Garmire, Marburger, Allen, Winful) Appl. Phys. Lett. 34, 374-376 (1979).

"On the Dynamic Response of Nonlinear Fabry-Perot Interferometers" (Goldstone, Garmire) IEEE J. Quantum Electr. QE-17, 366-374 (1981)

"Optical Bistability in BDN Dye" (Zhu and Garmire) IEEE J. Quantum Electr. QE-19, 1495 (1983)

"Optical Bistability at the Band Gap in InAs" (Poole and Garmire) Appl. Phys. Lett. 44, 363-365, (1984).

"Intrinsic Optical Bistability in Nonlinear Media" (Goldstone and Garmire) Phys. Rev. Lett., 53, 910 (1984).

"Bandgap Resonant Optical Nonlinearities in InAs and Their Use in Optical Bistability (Poole and Garmire) J. of Quantum Electron. QE-21, 1370-1378, (1985).

"Degenerate Four Wave Mixing in Mercury Vapor Discharges" (W. Richardson, L. Maleki and E. Garmire) Optics Letters, 11, 572-574 (1986)

"Nonlinear Absorption in AlGaAs/GaAs Multiple Quantum Well Structures Grown by Metalorganic Chemical Vapor Deposition" (H. C. Lee, A. Hariz, P. D. Dapkus, A. Kost, E. Garmire), Appl. Phys. Lett. 50, 1182, (1987)

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"Optical Bistability and Nonlinear Switching due to Increasing Absorption in Single Crystal ZnSe Waveguides" (B.G.Kim, E.Garmire, N.Shibata, S.Zembutsu), Appl. Phys. Lett. 51, 475 (1987)

"Nonlinear optical absorption in semiconductor epitaxial depletion regions" (N.M. Jokerst and E.Garmire), Appl. Phys. Lett, 53, 897-899 (1988)

"Large optical nonlinearities in a GaAs/AlGaAs hetero-nipi Structure" (A. Kost, E. Garmire, A. Danner and P. D. Dapkus) Appl. Phys. Lett, 52, 636-639 (1988)

"Nonlinear absorption properties of AlGaAs/GaAs multiple quantum wells" H. C. Lee, A. Kost. M. Kawase, A. Hariz, P. D. Dapkus, E. Garmire) IEEE J. Quantum Electr. 24, 1581-1592 (1988)

"Criteria for Optical Bistability in a Lossy Saturating Fabry- Perot" (E. Garmire) IEEE J. Quantum Electr. 25, 289-295 (1989).

"Nonlinear Bragg Reflector based on Saturable Absorption" (B. G. Kim and E. Garmire) Appl. Phys. Lett., 54, 1095-1097 (1989).

"Optical Nonlinearities Due to Carrier Transport in Semiconductors" (E. Garmire, N. M. Jokerst, A. Kost, A. Danner and P. D. Dapkus) J. Opt. Soc. Am. B, 6 579-587 (1989).

"The Influence of Velocity-Changing Collisions on Degenerate Four-Wave Mixing" (W. H. Richardson, L. Maleki and E. Garmire) IEEE J. Quantum Electr. 25 382-394 (1989).

"Room-temperature 1.06-0.53 μm second-harmonic generation with MgO:LiNbO₃" (J. Q. Yao, W. Q. Shi, J. E. Millerd, G. F. Xu, E. Garmire and M. Birnbaum) Opt. Lett. 15, 1339-11341 (1990)

"Band-edge Photorefractive Effect in Semiconductors" (A. Partovi, A. Kost, E. Garmire, G. C. Valley and M. B. Klein), Appl. Phys. Lett. 56, 1089-1091 (1990)

"Photorefractivity at 1.5 μm in CdTe:V (A. Partovi, J. Millerd, E. M. Garmire, M. Ziari, W. H. Steier, S.B. Trivedi and M.D. Klein) Appl. Phys. Lett. 59, 846-848 (1990)

"Photorefractive gain enhancement in InP:Fe using band-edge resonance and temperature stabilization" (J. Millerd, S. Koehler, E. Garmire, A. Partovi, A. Glass and M. B. Klein) Appl. Phys. Lett. 57, 2776-2778 (1990)

"Understanding the formation of the Stimulated Raman Scattering Stokes Spectrum in Fused Silica Fibers" (K. X. Liu and E. Garmire), IEEE J. Quant. Electr. QE-27, 1022-1030 (1991)

"Band-edge Photorefractivity in Semiconductors: Theory and Experiment" (A. Partovi and E. Garmire) J. App. Phys., 69, 6885-6898 (1991).

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"Combined local and carrier transport optical nonlinearities in a hetero n-i-p-i structure" (A. Kost, M. Jupina, E. Garmire and T. C. Hasenberg), Appl. Phys. Lett. 58, 1018 (1991)

"Self-pumped phase conjugation in InP:Fe using band-edge resonance and temperature stabilization: theory and experiments" (James Millerd, E. Garmire and M. B. Klein) Optics Letters 17, 100-102 (1992)

"Photorefractive response at high modulation depths in $\text{Bi}_{12}\text{TiO}_{20}$ " (James Millerd, E. Garmire, M. B. Klein, B.A.Wechsler, F.P.Strohkendl and G. Brost) J.Opt.Soc.Am. B, 9, 1449-1453 (1992).

"Passive Q-switching of Nd:YAG lasers using bulk semiconductors" (Y. Tsou, E. Garmire, W. Chen, M. Birnbaum and R. Asthana). Opt. Lett., 18, 1514-1516 (1993).

"Single-pulse pump-probe measurement of optical nonlinear properties in GaAs/GaAlAs multiple quantum wells" (M. Kawase, E. Garmire, H.C.Lee and P.D.Dapkus) IEEE J. Quantum Electr, 30, 981-988 (1994)

"Nonlinear absorption in (Cd,Zn)Se/ZnSe single quantum wells" (Glenn D. Houser and E. Garmire) J. Appl. Phys. 76, 97-103 (1994)

"Optical nonlinearities in semiconductors enhanced by carrier transport" (E. Garmire) Semiconductors and Semimetals 58, 55-173 (1999)

"Resonant optical nonlinearities in semiconductors," (E. Garmire) IEEE J. Sel. Top. Quantum Electron. 6 (#6), pp. 1094-1110 (2000). INVITED REVIEW PAPER, in "Millennium Issue"

"Nonlinear optical properties of a hetero-nipi structure with coupled quantum wells" (A. R. Kost, R. R.Carter, E. M. Garmire and T. C. Hasenberg) J. of Nonlinear Optical Physics and Materials 14, 449-460 (2005)

"Wavelength dependence of combined local and carrier transport optical nonlinearities in a hetero n-i-p-i structure" (A. R. Kost, M. H. Jupina, T. C. Hasenberg and E. M. Garmire) J. of Appl. Phys., 99 (2): Art. No. 023501 (2006)

Selected refereed papers in semiconductor electric-field effects (Total of 20 papers)

"InAs/GaAs short period strained-layer superlattices grown on GaAs as Quantum Confined Stark Effect Modulators" (M. Jupina, E. Garmire, A. Kost, T. C. Hasenberg) Appl.Phys. Lett. 60, 686-688 (1992).

"Sweep-out times of electrons and holes in an InGaAs/GaAs Multiple quantum well modulator" (C.M. Yang, D. Magherefteh, E. Garmire, L. Chen, K. Hu, A. Madhukar) Appl. Phys. Lett. 65, 995-997 (1994)

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"Optical absorption characteristics of GaAs/AlGaAs multiple quantum well structures under external anisotropic strain" (Man-fang Huang, E. Garmire, A. Partovi, M.W. Hong) Appl. Phys. Lett. 66, 736-738 (1995).

"Carrier transport in a photorefractive multiple quantum well device" (E. Canoglu, C. M. Yang, E. Garmire, D. Mahgerefteh, A. Partovi, T.H. Chiu, G. J. Zyzdik), Appl. Phys. Lett. 69, 316-318 (1996)

"Measurement of effective drift velocities of electrons and holes in shallow multiple quantum well p-i-n modulators" (C. M. Yang, E. Canoglu, E. Garmire, K.W. Goossen,) IEEE J. Quant. Electr. 33, 1498-1506 (1997)

"Optical studies of carrier kinetics in a type II multiple quantum well hetero-n-i-p-i structure" Z. Y. J. Yang, E. Garmire, D. Doctor, J. Appl. Phys. 82, 3874-3880 (1997)

"Pre-illumination to Control The Active Trap Density in a Semi-Insulating MQW Device" Ergun Canoglu, Elsa Garmire, I. Lahiri, D.D. Nolte, M. R. Melloch, IEEE J. Quantum Electr. 34, 1877-1881 (1998).

"Photorefractive MQW devices approaching diffraction limited resolution" A. K. Abeeluck, E. Garmire, E. Canoglu, A. Jehanno, P. Tayebati, R. N. Sacks, Appl. Phys. Lett. 74, 1543 (1999)

"The resolution of distributed photorefractive multiple quantum well devices," A. K. Abeeluck, E. Garmire, E. Canoglu, J. Appl. Phys., 88, pp. 5859-5864 (2000).

"Speed enhancement in a photorefractive multiple quantum well modulator by pulsed illumination," A. K. Abeeluck, P. Heinz, E. Garmire, Appl. Phys. Lett., 79, (3), pp. 311-313 (2001).

A. K. Abeeluck, E. Garmire, "Diffraction response in a low-temperature-grown photorefractive multiple quantum well modulator," J. Appl. Phys., 91 (5), pp. 2578-2586 (2002).

E. Garmire, "Analytic Performance Analysis based on Material Properties for Electro-absorptive Asymmetric Fabry-Perot Reflection Modulators," Applied Optics, 41 (8), pp. 1574-1583, (2002).

Heinz P, Garmire E, "Optical vibration detection with a photoconductance monitoring array," Applied Physics Letters 84 (16): 3196-3198 (2004)

P. Heinz, E. Garmire, "Low-power optical vibration detection by photoconductance monitoring with a laser speckle pattern" Optics Letters 30 (22): 3027-3029 (2005)

P. Heinz and E. Garmire, "Photoconductive arrays for monitoring motion of spatial optical intensity patterns" Applied Optics, January, 2008.

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Refereed papers on Guided Wave Optics (Total of 44 papers)

"Observation of Propagation Cut-off and Its Control in Thin Optical Waveguides" (Hall, Yariv, Garmire) Appl. Phys. Lett. 17, 127 (1970).

"Propagation Losses in Metal-Film-Substrate Optical Waveguides" (Garmire, Stoll) IEEE J. Quantum Electr. QE-8, 763 (1972).

"Optical Waveguiding in Proton-Implanted GaAs" (Garmire, Stoll, Yariv, Hunsperger) Appl. Phys. Lett. 21, 87 (1972).

"Channel Optical Waveguide Directional Couplers" (Somekh, Garmire, Yariv, Garvin, Hunsperger) Appl. Phys. Lett. 22, 46 (1973).

"Ion Beam Micromachining of Integrated Optics Components" (Garvin, Garmire, Somekh, Stoll, Yariv) Appl. Optics 12, 455 (1973).

"Optical Waveguides in Single Layers of Ga_{1-x}Al_xAs Grown on GaAs Substrates" (Garmire) Appl. Phys. Lett. 23, 403 (1973).

"Diffused Two-Dimensional Optical Waveguides in GaAs" (Garmire, Lovelace, Thompson) Appl. Phys. Lett. 26, 329 (1975).

"Flexible Infrared Transmissive Waveguides" (Garmire, McMahon, Bass) Appl. Phys. Lett. 29, 254 (1976).

"Propagation of Infrared Light in Flexible Hollow Waveguides" (Garmire, McMahon, Bass) Appl. Opt. 15, 145 (1976).

"Low-Loss Optical Transmission Through Bent Hollow Metal Waveguides" (Garmire, McMahon, Bass) Appl. Phys. Lett. 31, 92 (1977).

"Multimode Integrated Optical Bistable Switch" (Garmire, Marburger, Allen, Verber) Opt. Lett. 3, 69-71 (1978).

"Calorimetric Measurement of LiNbO₃ Waveguide Absorption Losses" (Allen, Garmire, Bass, Packer) Appl. Phys. Lett. 34, 257 (1979).

"A Comparison of Losses in Imperfect Surface Diffused and Buried Optical Waveguides" (Findakly, Garmire, Moon) Opt. Lett. 4, 149-151 (1979).

"Flexible Infrared Waveguides for High Power Transmission" (Garmire, McMahon, Bass) IEEE J. Quantum Electr. QE-16, 123-132 (1980) -- INVITED

"Reduction and Control of Optical Waveguide Losses in Glass" (Findakly, Garmire) Appl. Phys. Lett. 37, 855 (1980).

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"Low-Order TE_{0q} Operation of a CO₂ Laser for Transmission Through Circular Metallic Waveguides" (Marhic, Garmire) Appl. Phys. Lett. 38, 743-746 (1981)

"Photorefractive Effect in LiNbO₃ Directional Couplers" (C. T. Mueller, E. Garmire) Appl. Opt. 23, 4348 (1984).

"Characteristics of an Integrated Optics Ring Resonator in Glass" (K. Honda and E. Garmire) J. Lightwave Technology, LT-2, 714-719 (1984).

"Depolarization in Channel Glass Waveguides" (E. Garmire and K. Honda) Journal of Lightwave Technology, LT-4, 220-227 (1986).

"Single-mode Fiber-Film Directional Coupler" (M. Zhang and E. Garmire), IEEE J. Lightwave Technology, LT-5, 260-267 (1987)

"Analysis of Absorbing and Leaky Planar Waveguides: A Novel Method" (M. R. Ramadas, E. Garmire, A. K. Ghatak, T. Thyagarajan, M. R. Shenoy) Opt. Lett. 14 376-378 (1989).

"Electro-absorption and Electro-optic modulation in single crystal ZnSe-ZnSSe waveguides grown by OMVPE on GaAs" (M. Jupina, E. Garmire, M. Zembutsu, N. Shibata), IEEE J. Quantum Electr, 28, 663-669 (1992).

"Temporal/Spatial Optical CDMA Networks - Design, Demonstration, and Comparison with Temporal Networks" (E. Park, A. Mendez, E. Garmire) Photonics Technology Letters, 4, 1160-1162 (1992).

"High-efficiency generation of ultrashort second-harmonic pulses based on the Cerenkov geometry" G.Wang, E.Garmire, Opt.Lett. 19, 254-256 (1994)

"All-Binary InAs/GaAs Optical Waveguide Phase Modulator At 1.06 μm " (T. C. Hasenberg, S. D. Koehler, D. Yap, A. Kost, E. Garmire) IEEE Photonics Technology Letters, 6, 1210-1212 (1994).

"Experimental observation of efficient generation of femtosecond second harmonic pulses" (Gary Y. Wang, Y. Yang, E. Garmire), Appl. Phys. Lett. 66, 3416-3418 (1995)

"Design and measurement of a multiple quantum well nipi waveguide modulator for optoelectronic integrated circuits" (S.D. Koehler, E.M. Garmire, A.R. Kost, D. Yap, E.P. Docter, T.C. Hasenberg), IEEE J. Quantum Electron. 32, 1029-1038 (1996).

"Single Mode Fiber - Channel Waveguide Coupler in Silicon "V" Groove" (A. Angelow, P. Menendez, E. Garmire, G. Houser), J. Mat. Sci. and Technol. 5 32-40 (1997).

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Refereed papers on miscellaneous topics (Total of 13 papers)

"Calculation of the Optical Effects of a 90-foot Spherical Mirror" (Garmire) Appl. Opt. 10, 2799 (1971).

"Effect of front facet reflections on the reflectivity of Bragg reflectors" (B.G. Kim, E. Garmire) Optics Letters, 16, 1065-1067 (1991)

"An Empirical Rule for Band Offsets between III-V Alloy Compounds" (A. Ichii, Y. Tsou, E. Garmire) J. Appl. Phys. vol. 74 2112-2113 (1993).

"Absorption anisotropy for lattice matched GaAs/AlGaAs multiple quantum well structures under external anisotropic biaxial strain" (M. F. Huang, E. Garmire, Y. K. Kuo), Jap. J. Appl. Phys., vol. 139, pp. 1776-1781 (2000).

"Theory of quarter-wave-stack dielectric mirrors used in a thin Fabry-Perot filter" (E. Garmire) Appl. Opt. 42 5442-5449 (2003)

Selected Refereed Papers on Semiconductor Lasers (Total of 16 papers)

"Laser Oscillation in Epitaxial GaAs Waveguides with Corrugation Feedback" (Nakamura, Yen, Yariv, Garmire, Somekh, Garvin) Appl. Phys. Lett. 23, 224 (1973).

"Amplification in Cleaved Substrate Lasers" (M. Chang, E. Garmire) IEEE J. Quantum Electr. QE-16, 997 (1980).

"Longitudinal Mode Control in GaAs Lasers Using a Three-Mirror Active-Passive Cavity" (E. Garmire, G. Evans, J. Niesen) Appl. Phys. Lett. 39, 789 (1981).

"Heatsink Requirements for Coherent Operation of High Power Semiconductor Laser Arrays" (E. Garmire and M. Tavis) IEEE Quantum Electr., QE-20, 1277 (1984).

"Low Threshold, High T_0 InGaAsP/InP 1.3 μm Lasers Grown on p-type Substrates" (T. Hasenberg, E. Garmire) Appl. Phys. Lett. 49, 400-402 (1986).

"Low Frequency Intensity Noise Resonance in an External Cavity GaAs Laser for Possible Characterization" (K. Tatak and E. Garmire), IEEE J. Quantum Electr. 25 1800-1807 (1989).

"Transverse-Mode Competition Effects observed in the Numerical simulation of transients in Gain-guided semiconductor laser arrays" (P. Menendez-Valdes, E. Garmire, M. Ohtaka), J. Quant. Electr. QE-26, 2075 (1990)

"Relative Intensity Noise of Laser-diode Arrays" (Ramadas Pillai, E. Garmire, P. Menendez-Valdes), Photonic Technology Lett. 3, 968-970, (1991).

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"Improving InAs Double Heterostructure Lasers with better confinement" (Y. Tsou, A. Ichii, E. Garmire) J. Quantum Electr., 28, 1261-1268 (1992).

"Paraxial-Misalignment Insensitive External Cavity Semiconductor Laser Array Emitting Near-Diffraction Limited Single-lobed Beam" (Ramadas Pillai and Elsa Garmire), IEEE J. Quantum Electr. 32, 996-1008 (1996)