

partnering in photonics

Through interdisciplinary and public-school alliances, the University of New Mexico leads the way in integrative optics education.

By Sudhakar Prasad, Mansoor Sheik-Bahae, and Art Guenther, University of New Mexico

New Mexico boasts a long tradition of pioneering research in science and technology, dating back to the heady times of rocketry and the harnessing of nuclear energy through the modern era of highly distinguished optics and materials research at its federal laboratories. The present times definitely belong to optics and photonics, a discipline that has long enabled numerous important technologies. Of the six identified clusters of industrial excellence and promise under the Next Generation Economic Initiative in New Mexico, the optics industrial cluster not surprisingly carries the highest prominence.

The University of New Mexico (UNM; Albuquerque, NM), the state's largest research institution, has led the graduate education and research training of optics professionals, graduating more than 70 PhDs over the past two decades and anticipating the major recommendations of a comprehensive study of the National Academies of Science and of Engineering published in 1998. In May 2002, a new MS degree in optical science and engineering (OSE) was approved at UNM to further enhance the graduate program. The MS program is an industrially driven initiative that is likely to help New Mexico's optics industry meet its workforce needs from a local pool of uniquely qualified graduates. A similar industrial demand had led to the establishment of a well-regarded AAS degree program at the Albuquerque Technical Vocational Institute (TVI) in 2001 to produce skilled photonics technicians.

Like the PhD program, the MS degree is administered jointly by the departments of physics and astronomy and electrical and computer engineering, a partnership that underscores the cross-disciplinary nature of this field. The degree requires successful completion of courses that represent the broad science and engineering emphases of the field. There are three different tracks to the degree, so a student may either complete further course work only, undertake research thesis work, or sign up for an internship course in conjunction with other courses to meet degree requirements.

Under the third option, a student can perform a six- to 12-month internship either at an industry or at a federal government laboratory. This option provides new opportunities for industry to supervise and evaluate potential future employees, to send its existing employees for further training, and for graduating students to preview and evaluate industrial career options. An industrial/laboratory advisory Committee consisting of representatives of New Mexico's commercial and government R&D sectors works closely with the optics graduate committee at UNM to provide oversight



Laser and photonics research at the Center for High Tech Materials, UNM.

needed to run this internship option effectively in the face of evolving industrial needs and priorities. A recent NSF-Integrative Graduate Education and Research Traineeship award has further enhanced these research programs, enabling the hiring of new faculty and funding of several graduate students in interdisciplinary application areas.

The educational ladder has its roots at the middle-school level, where students are being prepared to join a Photonics Academy at West Mesa High School. A pending joint UNM-Albuquerque Public Schools proposal to NSF under its math-science partnership initiative will expand the notion of photonics academies to other high schools under a comprehensive curricular enhancement starting at the middle-school level. The TVI photonics program will be a natural choice for many academy graduates, the rest likely applying to four-year BS programs in optics. Efforts are under way to establish a BS degree in OSE at UNM, which will furnish a useful career option to many high-school students and will complete the local ladder of OSE educational programs. By its multiple entry and exits points, the ladder empowers aspiring students to evaluate the full range of career pathways. **oe**

Sudhakar Prasad is director of the Center for Advanced Studies and professor of physics and astronomy, Mansoor Sheik-Bahae is an associate professor in the departments of physics and astronomy and electrical and computer engineering, and Arthur Guenther is a research professor for the Center for High Tech Materials and the department of electrical and computer engineering at the University of New Mexico, Albuquerque, NM. For questions, contact Prasad by phone: 505-277-5876; fax: 505-277-1520; e-mail: sprasad@unm.edu.