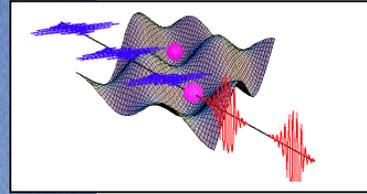


Research and  
Education in  
Optics and  
Photonics at the  
**University of  
New Mexico**



## **Research and Education in Optics and Photonics at the University of New Mexico\***

Ever wonder which of the 50 United States has the greatest concentration of physical scientists per capita? Might it be California? Massachusetts? Michigan? Texas? If you guessed New Mexico, you'd be right! This sparsely populated state of magnificent natural beauty, situated between Arizona and Texas in the southwest corner of the country, has been a Mecca for scientists and engineers since the days of the Manhattan Project more than a half century ago when Los Alamos National Laboratory (LANL) was in its infancy. New Mexico has since added Sandia National Laboratories (SNL) and the Air Force Research Laboratories (AFRL) at the Kirtland Air Force Base near Albuquerque to its list of top-flight scientific research institutions. The state has also seen the blossoming of a public university system that features research universities in Albuquerque, Las Cruces, Las Vegas and Socorro (also the site of the Very Large Array radio telescope) as well as a burgeoning commercial high-technology industry.

If you want to work with and study optics, optical materials, and laser physics, the University of New Mexico (UNM) in Albuquerque provides the venue and resources for world-class optics education and research. It is one of only a handful of American universities granting a PhD degree in optics. There are a total of 17 professors engaged in optical science and engineering research in the Departments of Physics and Astronomy (P&A) and Electrical Engineering and Computer Engineering (EECE). Interdisciplinary optical research at UNM has also included the Medical School and other engineering and science departments.

Two degree programs with a concentration in optical disciplines are available at UNM: (1) a Ph.D. in Optical Sciences offered jointly by the Departments of P&A and EECE and (2) an MS and a Ph.D. in Physical Electronics and Photonics through the Department of ECEE. The university is also home to the Center for High Technology Materials (CHTM), an interdisciplinary center of excellence for research in opto-electronics, microelectronics, optics, and material science. Several of the optics faculty are affiliated with CHTM.

The university consistently ranks among the top research institutions for the number of papers presented at CLEO – arguably the most important annual lasers and optics conference in the world. Research funding at the picturesque Albuquerque campus is growing at a rate matched

by few universities in the country. The annual budget for research in optics and photonics at the UNM campus is currently around \$8M.

The ongoing, collaborative ties with the nearby federal laboratories offer students the unique opportunity to participate in large high-visibility research projects. Many graduate students perform their research at one or more of these labs, creating a network of contacts of lasting value to their professional careers. The Alliance for Photonics Technology was formed in 1992 to coordinate research and technology transfer between the university, Sandia, Los Alamos, the Air Force Research Labs and the local industry. Graduates of the optical sciences programs who are not immediately hired by one of the government laboratories often find lucrative employment in New Mexico industry. The development of the state's optics industry has been so prolific in recent years that a New Mexico Optics Cluster was formed in 1998, patterned after the synergistic coalitions of optics firms and research and educational institutions in Arizona, California, and Florida.

The University of New Mexico has made major commitments to optics education and research. Established in 1983, the Optical Sciences Ph.D. program currently boasts more than 50 graduate students. Total optics doctorates conferred now number in excess of 100. The university offers research and teaching assistantships to qualified students interested in optics and photonics. In addition to the excellent research opportunities, students can choose from more than 10 lecture courses per year in optics and optics-related disciplines. Preparation for independent graduate research in experimental optics is provided with two Optics Laboratory courses, offering hands-on experience with modern lasers and measurement techniques.

Efforts are underway to establish a Masters degree in Optical Science and Engineering to address the growing need of industry. This program will have a strong industrial component, and set the stage for a long-term partnership between UNM and the optics and photonics industry within the state and nationally.

The list of faculty in the Departments of P&A and EECE with research activities in optics and photonics is as follows:

**Steven Brueck, Ph.D. MIT, 1971.**

Professor - Electrical Engineering and Physics, Director Center High Technology Materials,  
*Laser-material interactions, laser spectroscopy, nonlinear optics, high-speed detectors, Si  
manufacturing, metrology*

**Carlton Caves, Ph.D. Caltech, 1979.**

Professor- Physics

*Quantum optics, laser cooling and atom trapping, quantum information and computation*

**Julian Cheng Ph.D. Harvard, 1973.**

Professor- Electrical Engineering

*Optoelectronic interconnects, III-V devices, surface-emitting lasers*

**Ivan Deutsch, Ph.D. Berkeley, 1992**

Assistant Professor, Physics

*Quantum optics, optical lattices and ion traps, laser cooling, quantum computation.*

**Jean-Claude Diels, Ph.D. Brussels, 1973.**

Professor- Physics and Electrical Engineering

*Ultrafast spectroscopy, nonlinear optics*

**Art Guenther, Ph.D. Penn State, 1957**

Research Professor – Electrical Engineering

*Nonlinear optics, optical damage*

**Steve Hersee, Ph.D. Brighton Polytechnic, 1975.**

Professor- Electrical Engineering

*MOCVD growth, III-V materials*

**Ravi Jain Ph.D. California, Berkeley, 1974.**

Professor- Electrical Engineering and Physics

*Microelectronics - ultrafast optics, fiber amplifiers*

**Kenneth Jungling Ph.D. Illinois, 1970.**

Professor and Department Chair, Electrical Engineering

*Semiconductor bridge technology, float polishing*

**V. M. Kenkre, Ph.D. SUNY, Stony Brook, 1971.**

Professor- Physics

*Optical properties of condensed matter, transport of excitations*

**Luke Lester, Ph.D. Cornell, 1992.**

Assistant Professor- Electrical Engineering

*Fabrication, design and testing of microwave/millimeter-wave optoelectronic devices and circuits and development of millimeter-wave power HEMT transistors*

**Kevin Malloy, Ph.D. Stanford, 1983.**

Professor- Electrical Engineering

*Si:Ge heterostructures, semiconductor materials, nonlinear optics of semiconductors, quantum well physics, ultra wideband electromagnetics, photonic crystals*

**Jack McIver, Ph.D. Rochester, 1978.**

Professor- Physics and Electrical Engineering, P&A Department Chair

*Intense-field interactions with condensed matter, optically pumped gas lasers*

**Robert McNeil, Ph.D. Colorado State, 1977.**

Professor- Electrical Engineering

*Optical scatter and diffraction for metrology applications in the micro- and opto-electronics industries*

**Marek Osinski, Ph.D. Polish Academy of Sciences, 1979.**

Associate Professor-Physics and Electrical Engineering

*Theory of optoelectronic devices, modal analysis of diode laser arrays, thermal effects in surface-emitting lasers*

**Sudhakar Prasad, Ph.D. Harvard, 1983.**

Professor- Physics

*Optical imaging, including astronomical interferometry, and quantum optics.*

**Wolfgang Rudolph, Ph.D. Jena, 1985.**

Professor- Physics and Electrical Engineering

*Ultrafast lasers and spectroscopy, nonlinear optics and imaging,*

**Mansoor Sheik-Bahae, Ph.D. SUNY, Buffalo, 1987.**

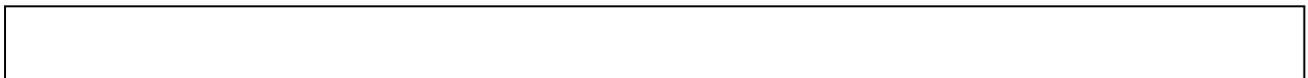
Assistant Professor- Physics

*Nonlinear optics of semiconductors, ultrafast optical processes and optical refrigeration in solids.*

**K. Wodkiewicz, Ph.D. Rochester, 1977.**

Visiting Professor -Physics

*Quantum optics, quantum measurement theory*





A view of the picturesque UNM campus in Albuquerque.



Fig. 3

The new CHTM building located in the Albuquerque Research Park near UNM campus.



no caption

