

Dr. Kenneth A. Herren

Education:

PhD/Physics 2005 University of Alabama in Huntsville, Dissertation Title: "In Situ Molecular Contaminant Scattering in the Vacuum Ultraviolet"
BS/Physics 1977 University of Alabama in Huntsville, Huntsville, AL
MS/Physics 1981 University of Alabama in Huntsville, Huntsville, AL

Professional Experience

- 2009-Present Retired, part-time at UAH serving on thesis committees
- 1991- 2009 NASA/MSFC Huntsville, Alabama. Physicist with the Optics Group and member of the Advanced Concepts Group of the Space Optical Manufacturing Technology Center (SOMTC) at MSFC. Ongoing work includes the design of optical stray light tests in the Stray Light Test Facility, a part of the SOMTC. Also lead for the Quantum Optics lab where design and analysis of various novel lasers and laser test systems is conducted. Recent work includes the phase locking of multiple physically separated diode lasers, development of a novel new thermally pumped solid state laser and development of solid state dye laser amplifiers. Also, this lab has been used to investigate the coherent properties of fresnel optics manufactured in the SOMTC. In addition, other work includes management of the Ion Figuring Facility and the mentoring of three UAH graduate students through their master's thesis using these facilities. The ion milling facility is capable of figuring optical flats and other aspheric optical surfaces. Recent ion milling work has been to develop a method for producing super flats for use in X-ray interferometry.
- 1990-1991 Sparta, Inc., Huntsville, Alabama. Work involved detailed mathematical modeling of the ground based laser system selected for use in a U.S. strategic defense anti-satellite program.
- 1989-1991 Athens College, Athens, Alabama. Part time physics instructor. Taught Mechanics and Electricity & Magnetism courses at the junior/senior undergraduate level.
- 1986-1988 General Research Corporation, Huntsville, Alabama. Task leader for the Space Mirrors Task on the Directed Energy Weapons Technology Analysis and Assessment contract in support of the DEW office of the Strategic Defense Command, Huntsville. Major effort involved engineering support on USASDC's Ground Based Laser Concept with emphasis on the technology integration aspects of the spaced based mirror concepts. Served as consultant to the office in laser physics and laser system engineering.
- 1980-1986 U.S. Army Research, Development and Engineering Center, Huntsville, Alabama. Research Physicist employed with the U.S. Army Micom, work included research on far-infrared lasers and on laser absorption in the far infrared region of the spectrum, measurement of the optical cross-section of tactical Army optical systems and laser radar cross-section of strategic BMD targets and development work on optical computers. Also participated in the U.S. Army's program of optical hardening and laser eye safety for tactical sensor systems.

Open Literature Publications

- K.A. Herren and D.A. Gregory, "Bidirectional Reflectance Function Measurement of Molecular Contaminant Scattering in the UV, VUV and Visible Ranges", *Optical Engineering*, 46(11), 113601 (1 November 2007).
- T. Andrew Manning, Dennis Tucker, Kenneth A Herren and Don A. Gregory, "Vacuum Strength of Two Candidate Glasses for a Space Observatory", *Journal of the American Ceramic Society*, vol. 90, no. 10, October 2007, pp. 3318-3319(2).
- K.A. Herren and D.A. Gregory, "Mie Scattering of Growing Molecular Contaminants", *Optical Engineering* 46(03), 033602 (1 March 2007).
- D.A. Gregory and K.A. Herren, "Ion Milling of Sapphire", *Journal of the Electrochemical Society* 152 (9), J117-J119 (2005).

Reports and Conference Papers:

- J. Rakoczy and K. Herren, "Space Vehicle Pose Estimation via Optical Correlation and Nonlinear Estimation", SPIE Orlando accepted for presentation April 2008.
- James T. Mooney, Don A. Gregory, Kenneth A. Herren and Tom Howsman, "Large Lightweight Telescopes Via In-Space Manufacturing", SPIE Newsroom, July 2006.
- James T. Mooney, Patrick Reardon, Don A. Gregory, Andrew Manning, James Blackmon, Thomas Howsman, Phillip Williams, Whitt Brantley, John M. Rakoczy, Kenneth A. Herren, Dennis Tucker and Anup Sharma, "Novel In-Space Manufacturing Concepts for the Development of Large Space Telescopes", SPIE Conference on Astronomical Telescopes and Instrumentation, Vol. 6265, Orlando, FL, May 2006.
- D.A. Gregory and K.A. Herren, "Specific Impulse Definition for Ablative Laser Propulsion", Third International Symposium on Beamed Energy Propulsion, Troy, NY, 2004, edited by Andrew V. Pakhomov and Leik N. Myrabo, American Institute of Physics Conference Proceedings 766, 406-413 (2005).
- T. Cohen, K.A. Herren, M.S. Thompson, J. Lin and A.V. Pakhomov, "Initial Demonstration of Ablative Laser Propulsion", Third International Symposium on Beamed Energy Propulsion, Troy, NY, 2004, edited by Andrew V. Pakhomov and Leik N. Myrabo, American Institute of Physics Conference Proceedings 766, 406-413 (2005).
- K.A. Herren, J. Lin, T. Cohen, A.V. Pakhomov, M.S. Thompson, "Status of the Ablative Laser Propulsion Studies by Laser Propulsion Group", UAH, 15th Annual NASA/JPL/MSFC Advanced Space Propulsion Workshop (ASPW 2004), Pasadena, California, June 15-17, 2004
- A.V. Pakhomov, J. Lin, and K.A. Herren, "Effect of air pressure on propulsion with TEA CO₂ laser", presented at 5th SPIE High-Power Laser Ablation Symposium, High Power Laser Ablation V, Vol. 5448, April 2004, Taos, NM.
- A.V. Pakhomov, T. Cohen, J. Lin, M.S. Thompson, and K. Herren, "Ablative Laser Propulsion: An Update, Part I", Second International Symposium on Beamed Energy Propulsion, Sendai, Japan, 2003, edited by Kimiya Komurasaki, American Institute of Physics Conference Proceedings 702, 166-177 (2004).

- M.S. Thompson, K.A. Herren, J. Lin, and A.V. Pakhomov, "Effects of Time Separation on Double-Pulsed Laser Ablation of Graphite", First International Symposium on Beamed Energy Propulsion, Huntsville, Alabama, 2002, edited by Andrew V. Pakhomov, American Institute of Physics Conference Proceedings **664**, 206-213 (2003).
- M.S. Thompson, A.V. Pakhomov, and K.A. Herren, "Effects of Two-Pulse Sequencing on Characteristics of Elementary Propellants for Ablative Laser Propulsion", First International Symposium on Beamed Energy Propulsion, Huntsville, AL, United States, 5-7 Nov. 2002.
- "Ceramic Rare-earth Oxide Selective Emitter Fabrication and Evaluation", Bryan D. Jennette, Dennis S. Tucker, Kenneth A. Herren, and Don A. Gregory, Ceramics Conference, Hawaii, November 2, 2001.
- "The Calculation of Fractal Dimension in the Presence of Non-Fractal Clutter", K.A. Herren and D.A. Gregory, SPIE Aerosense Conference, 8 April 1999.
- "Determining the Fractal Dimension of an Image Using Wavelet Analysis", K.A. Herren, MSFC Research and Technology Annual Report, NASA TM-108501, p.58, November 9, 1998.
- "Phase Correction in a Semiconductor Amplifier Array", K.A. Herren, et. al., MSFC Research and Technology Annual Report, NASA TM-108501, p.65, November 9, 1998.
- "Phase correction in a semiconductor amplifier array using fiber optics", P.D. Burke, D.A. Gregory, K.A. Herren and E.E. Montgomery, 80th Anniversary OSA Annual Meeting, Optical Society of America Proceedings, Rochester New York. October, 1996.
- "An Enhanced Whipple Bumper System: Impact Resistance of Composite Materials", J. Zwiener, A. Mount, K. Herren, A. Nettles, C. Semmel and J. Sims, AIAA Space Programs and Technologies Conference, Mar. 24-27, 1992.
- "In Situ Scattering Measurements in the Vacuum Ultraviolet", K.A. Herren, OSA Annual Meeting, Boston, Mass., 5-9 Nov 1990.
- "In Situ Measurements of Scattering from Contaminated Optics in the Vacuum Ultraviolet", K.A. Herren, A.F. Whitaker and R.C. Linton, 20th Intl Conf. on Environmental Systems (SAE), Williamsburg, Va., 9-12 July, 1990.
- "Measurement of Polarization Scattering in the Vacuum Ultraviolet", K.A. Herren, *Polarization Considerations for Optical Systems II*, SPIE, vol. 871, (1989).
- "Alternate Approaches to Measurement of Non-Steady Properties", R.L. Glick, R.O. Hessler and K.A. Herren, Proceedings of the 17th Aerospace Sciences Meeting, (1979).
- "Reflective Target Imaging at 1.2 Millimeters", J.L. Johnson, K.A. Herren, R.L. Morgan and G.L. Tanton, 1981 International Conference on Infrared and Millimeter Waves, Miami, FL, 6-11 Dec 1981.
- "Active Imaging of Range Targets at 1.2 Millimeters", J.L. Johnson, K.A. Herren, R.L. Morgan and G.L. Tanton, 1982 Army Sciences Conference, West Point, NY, 15-18 June 1982.