Kenneth W. McLaughlin, Ph.D.

Professor of Physics & Engineering
Loras College, 1450 Alta Vista
Dubuque, Iowa 52001
(563) 588-7581

Undergraduate Education:

B.S. Chemical Engineering, University of Arkansas, graduated Summa Cum Laude (May 1979)

Research experience: Junior, summer and senior research projects with Profs. Charles Springer and Louis Thibodeaux resulting in the reports *The Evaporation and Dispersion of Hydrazine Propellants from Ground Spills* for the Air Force Systems Command and *Spill of Soluble, High Density, Immiscible Chemicals in Water* for the U.S. Dept. of Transportation; wrote the solution manual for Louis Thibodeaux's textbook *Chemodynamics* published the year of my graduation

Industrial Experience:

Dow Chemical (May 1979 - Jan. 1982); promoted to Research Engineer (Aug. 1980)

Research experience: Investigated structure-property relationships for brominated epoxide polymers with applications in the electronics and printed circuit board industries

Masters Degree:

M.S. Chemical Engineering, Texas A&M University (Dec. 1983)

Thesis research: Investigated the influence of zeolite structure on catalytic deactivation kinetics and mechanisms; research experience included computer simulation models of chemical reaction kinetics with surface catalysis along with experimentally extracting zeolite internal pore and surface bound molecules with gas chromatographic/mass spectral instrumentation development for identification

Communications/Awards: Two refereed publications and four conference presentations; taught sophomore course in thermodynamics; *Distinguished Graduate Student Award for Teaching and Service* awarded by Alumni Association of Texas A&M University (April 1984)

Industrial Experience:

Dow Chemical (Dec. 1983 - Aug. 1991); promoted to Sr. Research Engineer (Mar. 1985), promoted to Project Leader (Jan. 1988)

Research experience: Investigated structure-property relationships for multiphase polymers; gas and liquid chromatography, *UV* and *FTIR* spectroscopy, photoelectron spectroscopy for chemical analysis, along with optical and electron microscopy were major aspects of this material science research

Communications: Refereed and trade journal publications along with *two international conference presentations*; nominated for *best paper presentation* at the Society of Automotive Engineers' International Congress and Exposition (Detroit, Mar. 1988)

Doctoral Education:

Ph.D. Physics, University of Nebraska (Aug. 1995)

Dissertation research: Laser spectroscopy involving photoionization and reactive-collision studies on laser-excited atomic beams; research experience included solid state and organic dye lasers, optics, atomic spectroscopy, vacuum and electronics instrumentation, computer interfacing, positive and labile negative ion detection along with photoelectron energy analysis by time-of-flight

Communications/Awards: Four refereed publications (one *Physical Review Letter*); *Distinguished Graduate-Teaching Award* (May 1990) and *Recognition for Contributions to Students* awarded by The Parents Association & the Teaching Council of the University of Nebraska (Feb. 1995)

Fellowship Awards: Bukey Memorial Fellowship (1990-91, 1991-92); Henry F. and Jean D. Holtzclaw Fellowship (1992-93); Presidential Graduate Fellowship (1993-94)

Post-Doctoral Experience:

Research Associate, University of Nebraska (Aug. 1995 - Aug. 1998); promoted to Research Assistant Professor (Mar. 1998)

Research experience: Synchrotron-based photoionization studies investigating the energy and angular momentum partitioning between the constituents in many-body quantum systems; instrumentation included fluorescent polarimetry spectroscopy, photoelectron energy analysis by time-of-flight and two-particle coincidence measurements

Communications: Two refereed publications in 1997 (one *Physical Review Letter*) with another *Physical Review Letter* in 1998; taught two-semester introductory physics sequence in the summers of 1996 and 1998; Buildings & Facilities Committee member (1995-1998)

Professorship Experience:

Assistant Professor of Physics and Engineering, Loras College (Aug. 1998 - Feb. 2002); tenured and promoted to Associate Professor (Feb. 2002); promoted to full Professor (Feb. 2008); Director, Heitkamp Planetarium (Aug. 1998 - present); Chair of Faculty (2007 - 2012)

Teaching experience: Algebra- and calculus-based physics survey courses, electric circuits, modern physics, fluid mechanics as well as the development of an active-learning general education astronomy course

Research interests: *Atomic and Molecular Physics*: laser and synchrotron-based photoionization studies on atomic and molecular beams investigating how an input of energy and angular momentum, brought by a well-defined ionizing photon, is partitioned between the constituents of a many-body quantum system; *Astrophysics*: (1) spectroscopic-binaries, which are stars with varying luminosity that due to a chance alignment with the direction to Earth experience an eclipsing non-resolvable stellar or planetary companion; (2) the construction of a radio telescope that is sensitive to the 21-cm line of hydrogen with the ability to resolve the Doppler-shift due to relative motion of the spiral arms of the Milky Way

Communications: One refereed publication in 2001 and another in 2002 (both *Physical Review Letters*) with another in the *Rapid Communications* section of *Physical Review A* in 2004; an additional publication in 2006 in the *Journal of Physics B* was later highlighted in *EuroPhysicsNews* in 2007; a refereed publication in 2009 in a special volume of *Journal of Physics B* highlighting current research into the photoionization process; a refereed publication in 2011 in the *Journal of Physics B*; a refereed publication in the *Rapid Communications* section of *Physical Review A* in 2012

Most Significant Publications:

J.E. Furst, T.J. Gay, J.R. Machacek, A.L.D. Kilcoyne and K. W. McLaughlin, "Orientation of Doubly-Excited States in N_2", Rapid Communications section of Physical Review A **86**, 041401 (2012)

J.R. Machacek, V.M. Andrianarijaona, J.E. Furst, A.L.D. Kilcoyne, A.L. Landers, E.T. Litaker, K. W. McLaughlin, and T.J. Gay, "Production of Excited Atomic Hydrogen and Deuterium from H_2, HD and D_2 Photo-dissociation" Journal of Physics B **44**, 045201 (2011) http://iopscience.iop.org/0953-4075/44/4

T.J. Gay, C.H. Greene, J.R. Machacek, K. W. McLaughlin, H.W. van der Hart, O. Yenen and D.H. Jaecks, "Use of partial-wave decomposition to identify resonant interference effects in the photoionization-excitation of argon", accepted for publication in Journal of Physics B **42**, 044008 (2009)

J. D. Bozek, J.E. Furst, T.J. Gay, H. Gould, A.L.D. Kilcoyne, J.R. Machacek, F. Martin, K. W. McLaughlin, and J.L. Sanz-Vicario, "UV photodissociation of H_2 and D_2: not so simple!", EuroPhysicsNews **38**, 16 (2007)

J. D. Bozek, J.E. Furst, T.J. Gay, H. Gould, A.L.D. Kilcoyne, J.R. Machacek, F. Martin, K. W. McLaughlin, and J.L. Sanz-Vicario, "Production of excited atomic hydrogen and deuterium from H2 and D2 photodissociation", Journal of Physics B **39**, 4871 (2006)

T.J. Gay, J.D. Bozek, J.E. Furst, G.A. Gallup, A.S. Greene, A.L.D. Kilcoyne, J.R. Machacek, J.W. Maseberg, K.W. McLaughlin, and M.A. Rosenberry, "Angular Momentum Partitioning in the Dissociation of Diatomic Molecules," in Correlations, Polarization, and Ionization in Atomic Systems, (AIP Conference Proceedings, no. 811), A. Lahmam-Bennani and B. Lohman eds. (AIP, New York, 2006)

D. H. Jaecks, O. Yenen, K. W. McLaughlin, S. Canton, J. D. Bozek and M. Downsbrough, "Giant spin-orbit interactions in argon photoionization", Rapid Communications section of Physical Review A **70**, 040703 (2004)

K. W. McLaughlin, O. Yenen, D. H. Jaecks, M.M. Sant'Anna, T.J. Gay, D. Calabrese and B.J. Thadden, "The Effect of Relativistic Many-Electron Interactions on Photoelectron Partial Wave Probabilities", Physical Review Letters **88**, 123003 (2002).

O. Yenen, K. W. McLaughlin, D. H. Jaecks, M. M. Sant'Anna, and E. A. Seddon, "Quantifying Relativistic Interactions from Angular Momentum Partitioning Measurements during Photoionization", Physical Review Letters **86**, 979-982 (2001)

K. W. McLaughlin, O. Yenen, and D. H. Jaecks, "Production of Purely Spin-Aligned Autoionizing States which Decay into Orbital-Aligned Ionic States", Physical Review Letters **81**, 289 (1998)

O. Yenen, K. W. McLaughlin, and D. H. Jaecks, "High Resolution Polarization Analysis of the Fluorescence from Ar+ [3P] 4p 2P3/2 formed in Photoionization", Physical Review Letters **79**, 5222 (1997)

K. W. McLaughlin, K. Aflatooni, and D. W. Duquette, "Near-Threshold Spectrum of Photoelectron Angular Distributions from Maximally Oriented Ca 4s5p 1P", Physical Review A **55**, 3615 (1997)

K. W. McLaughlin, D. S. Eschliman, O. P. Francis, and D. W. Duquette, "Near-Threshold Photoionization Spectrum of Aligned Ca 4s5p 1P", Physical Review A **49**, 240 (1994)

K. W. McLaughlin and D. W. Duquette, "Evidence for Resonant Formation of Ca- in Collisions of Rydberg and Ground-State Ca Atoms", Physical Review Letters **72**, 1176 (1994)

K. W. McLaughlin and D. W. Duquette, "Absolute Photoionization Cross Section of Excited Titanium", Journal of the Optical Society of America **B 9**, 1953 (1992)

K. W. McLaughlin, "The Influence of Microstructure on the Dynamic Mechanical Behavior of Polycarbonate/ Poly(Styrene-co-Acrylonitrile) Blends", Polymer Engineering and Science **29**, 1560 (1989)

K. W. McLaughlin and R. G. Anthony, "The Role of Zeolite Pore Structure during Deactivation by Carboneous Deposits", American Institute of Chemical Engineers' Journal **31**, 927 (1985)