

Education

Ph.D. *EXPERIMENTAL NUCLEAR PHYSICS*

National Superconducting Cyclotron Laboratory / Michigan State University, East Lansing, MI.

B.S. *APPLIED PHYSICS, MATHEMATICS MINOR*, Michigan Technological University, Houghton, MI.

A.A. *PHYSICS*, Miami-Dade Community College, Miami, Florida.

Experience

Lecturer, Jan 1997 — Present.

University of Michigan Physics Department

Ann Arbor, Michigan.

- Responsible for teaching calculus-based introductory physics laboratory to ~160 students per semester. Job duties included 20 contact hours/week of lab instruction, development of course material, and grading of weekly quizzes, “research notebooks,” and formal reports required of the students. Four hours/week was devoted to office hours in a physics help room available to all undergraduate students with physics questions – ranging from non-calculus based laboratory analysis to theoretical astrophysics questions.
- Developed web-based interactive simulations of the introductory experiments performed during the laboratory courses. This enabled students to further explore the basic physics concepts at their own pace when in-class time became a constraint, and instructors are able to use the simulations during their own office hours when explaining concepts to their own students.
- Actively participated in educational training courses designed to introduce new graduate students to the many difficulties involved with teaching. Topics included having to deal with a wide diversity of students, plagiarism, ethical issues, grading, and time management skills. Many role-playing exercises were employed to simulate both individual student concerns and the classroom environment.

Educational Multimedia Development, June 1996 — Present.

Several scientific organizations including Princeton Plasma Physics Laboratory,

Oak Ridge National Laboratory, and COSI Toledo.

- Developed educational “modules” (K-12 level) for the IPPEX (Internet Plasma Physics Education eXperience) Site which are being implemented as outreach education. The material is accessible via the WWW and implements Macromedia’s Shockwave technology. IPPEX was funded through a NSF grant and is currently being “field-tested” at several high schools in New Jersey. The site has been highly recognized as an innovative method to integrate cutting edge research with basic K-12 education. Similar outreach educational material was created for the ORNL Mouse House which allowed students to breed “virtual mice” on the web and learn about genetics and statistics.
- Authored floppy-based interactive material for COSI Toledo (a science museum) that enabled science teachers (K-8) to introduce “small scale” simulations of science exhibits to students who would later explore the full scale exhibits at the museum. A wealth of pre-visit information was also available to the teachers including maps, answers to common questions, and instructions for many science demonstrations that could be done in their classrooms with common household supplies.
- Design and development of my own interactive science web site that is being extensively used by K-12 teachers, and has been featured at several teacher conferences as an example of how the web can be used for instructional purposes (located at <http://www.ExploreScience.com/>). The web site was recently featured as an Exploratorium Top Ten Site of the Month, and was used on Macromedia’s “Main Attraction” promotional CD which showcased the most innovative use of Shockwave technology available on the internet.

Graduate Research Assistant, Sept 1989 — June 1996.*National Superconducting Cyclotron Laboratory (NSCL)**Michigan State University, East Lansing, Michigan.*

- Proposed, coordinated and performed thesis experiments. Extended the body of knowledge pertaining to projectile fragmentation. Explored possible termination points of the rapid proton capture process, developed systematics to predict momentum transfer of fragmentation pick-up products, and obtained a new parameterization for the “memory” effect.
- Thorough knowledge of many devices used for experimental analysis. Those at the NSCL include the Reaction Product Mass Separator, A1200 Fragment Separator, and S320 spectrometer. I have also participated in experiments performed at Lawrence Berkeley Cyclotron Facility and the Indiana University Cyclotron Facility.
- Actively participated in collaborations with other institutions including: Notre Dame, Argonne National Laboratory, Berkeley National Laboratory, the University of California, and the University of Michigan. Several experiments were international collaborations comprised of scientists from Europe and Japan.
- Extensive experience in particle detector systems and analog/digital signal processing design. Familiar with many standard experimental procedures used in the field of secondary beam development, including spectrometry, Wien separation, and performing beam optics calculation. Experience with the practical use and testing of various detectors including: silicon detectors, BaF₂ and NaI crystals, parallel-plate avalanche counters, and a variety of scintillators.
- Knowledge of many skills necessary for experimentation including practical machining (milling, lathing, and drilling on a wide variety of metals and plastics), basic electronic skills (circuit design, construction, and testing), and high vacuum system implementation ($\sim 10^{-7}$ torr).

Teaching Assistant, Sept 1987—Sept 1989, Jan 1994 — June 1994.*Michigan State University Physics Department**East Lansing, Michigan.*

- Laboratory instructor for the introductory physics laboratory aimed at pre-medical students. Duties included developing quizzes and questions for use by all teaching assistants, grading, and setting up laboratory equipment for classroom use. I rewrote several of the lab procedures which helped provide clarity for the students, and are now being used in the present laboratory manual.
- Held the position of “Person-in-Charge” for the Competency Based Instruction course. Responsibilities included supervision of 12 undergraduate assistants, grading supervision for ~200 exams/day, regularly updating course material, and dealing with students who had complaints concerning grading.
- Routinely attended national educational conferences to stay informed of the current concepts/ideas being developed across the country at both the college and K-12 levels.

Professional Skills

- Expertise in making cogent presentations in both formal and casual settings.
- Vast experience with a wide variety of software including FrameMaker, Photoshop, Canvas, Mathematica, Adobe Illustrator, QuarkXPress, DeBabelizer, and all components of Microsoft Office. Practical experience with multimedia software including Strata StudioPro, all components of Macromedia Multimedia Studio, Infini-D, and Adobe Premiere.
- Practical experience programming in FORTRAN and the VAX/VMS operating system and extensive work with LINGO (the OOP associated with Macromedia Director). Working knowledge of programming in C/C++, the UNIX operating system, and the practical application of computer networking within the Macintosh operating environment.
- Extensive knowledge of HTML Web Page design. Have experience with HTML 3.0, forms, graphical mapping, CGI scripts, and recent web tools including RealAudio, Shockwave multimedia, and a vast array of “plug-in” technology.

Extracurricular Activities

- Design/consulting of WWW pages for many groups ranging from local theater interests to my research group at the NSCL. My own interactive science web site is being extensively used by K-12 teachers and has been recognized for its innovation by a variety of organizations. Authored the COSI Toledo WWW site, consulted on the early development of the MSU Wharton site, and have constructed sites for many small businesses.
- Participation in both the Michigan Science Olympiad and Science Theater Outreach Program.
- Participation/management of several intramural sports teams composed of faculty, staff, and students.
- Served as the physics department representative on the Council of Graduate Students. I was responsible for voicing concerns of the Physics Department graduate student to graduate students in other fields along with the higher levels of the University bureaucracy. Major concerns at the time included union formation, author rights on scientific publications, obtaining health insurance for graduate students, and legal issues pertaining to graduate student contracts.
- As an undergraduate I was the president of several student organizations including the Society of Physics Students at Michigan Technological University. Duties included organizing tutor sessions which were available for first-year physics students, design of SPS t-shirts, and developing fund raising efforts to enable physics students to attend regional conferences.
- Years of experience in private tutoring for students at many levels - elementary school through college in the fields of mathematics, physics, and astronomy.

Professional Affiliations

American Association of Physics Teachers (AAPT).

American Physical Society, Division of Nuclear Physics (APS).

Publications in Peer Reviewed Scientific Journals

- First Author**
- 1) R. Pfaff, D.J. Morrissey, W. Benenson, M. Fauerbach, M. Hellström, C.F. Powell, B.M. Sherrill, M. Steiner, J.A. Winger, "Fragmentation of ^{78}Kr Projectiles", *Phys. Rev. C* **53**, 1753 (1996).
 - 2) R. Pfaff, D.J. Morrissey, M. Fauerbach, M. Hellström, J.H. Kelley, R.A. Kryger, B.M. Sherrill, M. Steiner, B.M. Young, J.S. Winfield, J.A. Winger, "Projectilelike Fragment Momentum Distributions from $^{86}\text{Kr} + \text{Al}$ at 70 MeV/nucleon", *Phys. Rev. C* **51**, 1348 (1995).
 - 3) R. Pfaff, B.M. Young, W. Benenson, J. Clayton, D.J. Morrissey, N.A. Orr, T. Reposeur, M. Thoennessen, J.A. Winger, "Target Isotope Effect in High Energy Photon Production at $E/A = 10$ MeV", *Z. Phys. A* **347**, 67 (1993).
- 1997**
- 4) A.P. Post-Zwicker, D. Barnes, D. Carroll, W. Davis, R. Pfaff, D.P. Stotler, M. Williams, J. Baron, M. McKay, E.A. Friedman, "Using the Internet for Plasma Physics Education", submitted to *Journal of Science Education and Technology*.
- 1996**
- 5) M. Fauerbach, D.J. Morrissey, W. Benenson, B.A. Brown, M. Hellström, J.H. Kelley, R.A. Kryger, R. Pfaff, C.F. Powell, B.M. Sherrill, "A New Search for ^{26}O ", *Phys. Rev. C* **53**, 647 (1996).
 - 6) J.L. Romero, H.K. Tang, D.J. Morrissey, M. Fauerbach, R. Pfaff, C.F. Powell, B.M. Sherrill, F.P. Brady, D.A. Cebra, J. Chance, J.C. Kintner, J.H. Osborne, "Nucleon-Induced Secondaries: A Review and Future Experimental Developments", *Fourteenth Int. Conf. on the Appl. of Accel. in Research and Industry*, 1996.
 - 7) M. Steiner, S. M. Austin, D. Bazin, W. Benenson, C.A. Bertulani, J.A. Brown, M. Fauerbach, M. Hellström, E. Kashy, J.H. Kelley, R.A. Kryger, T. Kubo, N.A. Orr, R. Pfaff, B.M. Sherrill, M. Thoennessen, S.J. Yennello, B.M. Young, P.D. Zecher, D.J. Morrissey, C.F. Powell, "First Study of Heavy-Ion Mirror Charge Exchange", *Phys. Rev. Lett.* **76**, 26 (1996).
 - 8) E. Ramakrishnan, T. Baumann, A. Azhari, R.A. Kryger, R. Pfaff, M. Thoennessen, S. Yokoyama, "Giant Dipole Resonance Built on Highly Excited States of ^{120}Sn Nuclei Populated by Inelastic α Scattering", *Phys. Rev. Lett.* **76**, 2025 (1996).

- 9) E. Ramakrishnan, A. Azhari, J.R. Beene, R.J. Charity, M.L. Halbert, P.-F. Hua, R.A. Kryger, P.E. Mueller, R. Pfaff, D.G. Sarantites, L.G. Sobotka, M. Thoennessen, G. Van Buren, R.L. Varner, S. Yokoyama, "Temperature Dependence of the Giant Dipole Resonance Width in ^{208}Pb ", *Phys. Lett.* **383B**, 252 (1996).
- 1995 10) R.A. Kryger, A. Azhari, M. Hellström, J.H. Kelley, T. Kubo, R. Pfaff, E. Ramakrishnan, B.M. Sherrill, M. Thoennessen, S. Yokoyama, R.J. Charity, J. Dempsey, A. Kirov, N. Robertson, D.G. Sarantites, L.G. Sobotka, J.A. Winger, "Studies of Light Nuclei Beyond the Particle Driplines: the Two-proton Emitter ^{12}O ", *Nucl. Instrum. Methods B* **99**, 312 (1995).
- 11) R.A. Kryger, A. Azhari, M. Hellström, J.H. Kelley, T. Kubo, R. Pfaff, E. Ramakrishnan, B.M. Sherrill, M. Thoennessen, S. Yokoyama, R.J. Charity, J. Dempsey, A. Kirov, N. Robertson, D.G. Sarantites, L.G. Sobotka, J.A. Winger, "Two-proton Emission from the Ground State of ^{12}O ", *Phys. Rev. Lett* **74**, 6 (1995).
- 12) D. Bazin, B.A. Brown, J. Brown, M. Fauerbach, M. Hellström, S.E. Hirzebruch, J.H. Kelley, R.A. Kryger, D.J. Morrissey, R. Pfaff, C.F. Powell, B.M. Sherrill, M. Thoennessen, "One-Neutron Halo of ^{19}C ", *Phys. Rev. Lett.* **74**, 3569 (1995).
- 1994 13) M. Hencheck, R.N. Boyd, M. Hellström, D.J. Morrissey, M.J. Balbes, F.R. Chloupek, M. Fauerbach, C.A. Mitchell, R. Pfaff, C.F. Powell, G. Raimann, B.M. Sherrill, M. Steiner, J. Vandegriff, S. Yennello, "Identification of New Nuclei Near the Proton Drip Line", *Phys. Rev. C* **50**, 2219 (1994).
- 14) B.M. Young, W. Benenson, J.H. Kelley, N.A. Orr, R. Pfaff, B.M. Sherrill, M. Steiner, M. Thoennessen, J.S. Winfield, J.A. Winger, S.J. Yennello, A. Zeller, "Low-Lying Structure of ^{10}Li in the Reaction $^{11}\text{B}(^{7}\text{Li}, ^{8}\text{B})^{10}\text{Li}$ ", *Phys. Rev. C* **49**, 279 (1994).
- 1993 15) B.M. Young, W. Benenson, M. Fauerbach, J.H. Kelley, R. Pfaff, B.M. Sherrill, M. Steiner, J.S. Winfield, T. Kubo, M. Hellström, N.A. Orr, J. Stetson, J.A. Winger, S.J. Yennello, "Mass of ^{11}Li from the $^{14}\text{C}(^{11}\text{B}, ^{11}\text{Li})^{14}\text{O}$ Reaction", *Phys. Rev. Lett.* **71**, 4124 (1993).
- 16) R.A. Kryger, A. Azhari, A. Galonsky, J.H. Kelley, R. Pfaff, E. Ramakrishnan, D. Sackett, B.M. Sherrill, M. Thoennessen, J.A. Winger, S. Yokoyama, "Neutron Decay of ^{10}Li Produced by Fragmentation", *Phys. Rev. C* **47**, R2439 (1993).
- 17) J. Miller, G.F. Krebs, J. Panetta, L.S. Schroeder, P.N. Kirk, Z.-F. Wang, W. Bauer, W. Benenson, D. Cebra, M. Cronqvist, B.-A. Li, R. Pfaff, T. Reposeur, J. Stevenson, A. Vander Molen, G. Westfall, J.S. Winfield, B.M. Young, T. Murakami, T. Suzuki, I. Tanihata, "Mass Dependence of Pion Production in Heavy Ion Collisions Near, But Below Threshold", *Phys. Lett.* **314B**, 7 (1993).
- 18) J.A. Winger, D.P. Bazin, W. Benenson, G.M. Crawley, D.J. Morrissey, N.A. Orr, R. Pfaff, B.M. Sherrill, M. Steiner, M. Thoennessen, S.J. Yennello, B.M. Young, "Half-life Measurements of the *rp*-Process Nuclei ^{61}Ga , ^{63}Ge , and ^{65}As ", *Phys. Lett.* **299B**, 214 (1993).
- 19) J.A. Winger, D.P. Bazin, W. Benenson, G.M. Crawley, D.J. Morrissey, N.A. Orr, R. Pfaff, B.M. Sherrill, M. Thoennessen, S.J. Yennello, B.M. Young, "Half-Life Measurements for ^{61}Ga , ^{63}Ge , and ^{65}As and Their Importance in the *rp* Process", *Phys. Rev. C* **48**, 3097 (1993).
- 1992 20) T. Reposeur, J. Clayton, W. Benenson, M. Cronqvist, S. Hannuschke, S. Howden, J. Karn, D. Krofcheck, A. Nadasen, C. Ogilvie, R. Pfaff, J.D. Stevenson, A. Vander Molen, G.D. Westfall, K. Wilson, J.S. Winfield, B.M. Young, M.F. Mohar, D.J. Morrissey, "Impact Parameter Dependence of High Energy Gamma Ray Production in Heavy-Ion Collisions", *Phys. Lett.* **276B**, 418 (1992).
- 21) J. Clayton, W. Benenson, M. Cronqvist, R. Fox, D. Krofcheck, R. Pfaff, T. Reposeur, J.D. Stevenson, J.S. Winfield, B.M. Young, M.F. Mohar, C. Bloch, D.E. Fields, "High Energy Gamma Ray Production in Proton-Induced Reactions at 104, 145, and 195 MeV", *Phys. Rev. C* **45**, 1815 (1992).
- 22) J. Clayton, W. Benenson, M. Cronqvist, R. Fox, D. Krofcheck, R. Pfaff, T. Reposeur, J.D. Stevenson, J.S. Winfield, B.M. Young, M.F. Mohar, C. Bloch, D.E. Fields, "Proton-Deuteron Bremsstrahlung at 145 and 195 MeV", *Phys. Rev. C* **45**, 1810 (1992).

Conference Presentations

R. Pfaff, M. Fauerbach, M. Hellström, J.H. Kelley, R.A. Kryger, D.J. Morrissey, B.M. Sherrill, M. Steiner, B.M. Young, J.A. Winger, "Fragmentation of ^{78}Kr ", Bull. Am. Phys. Soc. 41, No. 2, K809 (1996).

R. Pfaff, M. Fauerbach, M. Hellström, J.H. Kelley, R.A. Kryger, D.J. Morrissey, B.M. Sherrill, M. Steiner, B.M. Young, J.A. Winger, "Particle Instability of ^{69}Br ", Bull. Am. Phys. Soc. 40, No. 2, 1398, E10 1 (1995).

R. Pfaff, M. Fauerbach, M. Hellström, J.H. Kelley, R.A. Kryger, D.J. Morrissey, B.M. Sherrill, M. Steiner, B.M. Young, J.S. Winfield, J.A. Winger, "Fragmentation of ^{86}Kr at E/A=70 MeV", Bull. Am. Phys. Soc. 39, No. 2, 1151, J10 11 (1994).

R. Pfaff, M. Fauerbach, M. Hellström, J.H. Kelley, R.A. Kryger, D.J. Morrissey, B.M. Sherrill, M. Steiner, B.M. Young, J.S. Winfield, J.A. Winger, "Fragmentation of ^{86}Kr at E/A=70 MeV", Invited talk, NSCL, (1994).

R. Pfaff, M. Fauerbach, M. Hellström, J.H. Kelley, R.A. Kryger, D.J. Morrissey, B.M. Sherrill, M. Steiner, J.S. Winfield, J.A. Winger, B.M. Young, *Proceedings of the 3rd International Conference on Radioactive Nuclear Beams*, East Lansing, 1993, edited by D.J. Morrissey (Edition Frontieres, Gif-sur-Yvette, France, 1993), p. 407.

References

Dr. David J. Morrissey, Professor of Chemistry
Associate Director, National Superconducting Cyclotron Laboratory
Michigan State University, East Lansing, MI 48824.
Phone: (517) 333-6321 e-mail: morrissey@nscl.msu.edu

Dr. Walter Benenson, Professor of Physics
National Superconducting Cyclotron Laboratory
Michigan State University, East Lansing, MI 48824.
Phone: (517) 333-6312 e-mail: benenson@nscl.msu.edu

Mr. Dennis Allen
Science Laboratory Supervisor
University of Michigan, Physics Department
Ann Arbor, MI 48105
Phone: (313) 764-3468 e-mail: bapple@umich.edu

Ms. Mercedes McKay
Internet Curriculum and Training Specialist
New Jersey Intercampus Network
Stevens Institute of Technology, Hoboken, NJ 07030.
Phone: (201) 216-8063 e-mail: mckaym@email.njin.net

(further references available on request)