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RESEARCH INTERESTS

Theoretical description of nuclear reactions over all energy ranges
Nuclear data compilation and management
Two-particle correlations in heavy-ion reactions
Inverse problems and imaging
Non-equilibrium field theory and foundations of transport theory

EDUCATION:

Ph.D. **Michigan State University**, Physics (with high honors), December 1998.

Thesis: *Accessing the Space-Time Development of Heavy-Ion Collisions with Theory and Experiment.* **Adviser:** Paweł Danielewicz.

n/a **University of Delaware**, Graduate Student, Department of Physics, 1991–1992.

B.S. **Clarkson University**, Physics (with honors), June 1991.

B.S. **Clarkson University**, Mathematics (with honors), June 1991.

RESEARCH EXPERIENCE:

Staff Physicist (2003–Present). Computational Nuclear Physics Group/N Division, Lawrence Livermore National Laboratory, Livermore, CA.

- Developing object-oriented code scheme for analyzing one and three dimensional intensity interferometric data.
- Developing automated nuclear data evaluating code.
- Developed codes to translate between ENDFB/6 and LLNL's ENDL nuclear data formats.
- Developed improved versions of the LLNL's ENDL database with updated $U(n, f)$, $U(n, 2n)$, and $U(n, \gamma)$ evaluations for use in the Nuclear Event Attribution program.

Post-Doctoral Researcher (2000–2003). Theory and Modeling Group/N Division, Lawrence Livermore National Laboratory, Livermore, CA.

- Extracted the first ever $p-\Lambda$ source function, using the source imaging technique. This provides a key constraint on the Λ emission function (PRL 91: 162301 (2003)).
- Used the source imaging technique on two-proton correlations to constrain the *in-medium* nucleon-nucleon cross section (PRC 67: 034606 (2003)).
- Demonstrated the “equivalence” of our source imaging technique and the traditional analysis tools in the analysis of charged pion correlations (PRL 87: 112304 (2001)).
- Developing a modern object-oriented code scheme for modeling low energy nuclear reactions.
- Developed a parallel code for analyzing three-dimensional intensity interferometric data for use on world-class Livermore supercomputers.

- Developed improved versions of the LLNL's ENDL database with updated $U(n,f)$ and $U(n,\gamma)$ evaluations for use in the Nuclear Event Attribution program.
- Participated in $^{239}\text{Pu}(n,2n)$ and $^{235}\text{U}(n,2n)$ cross section re-evaluations.

Research Associate (1999–2000). Institute for Nuclear Theory, University of Washington, Seattle, WA.

- Demonstrated that the particle emitting source in a heavy-ion reaction need not have a simple Gaussian profile, using our source imaging technique.
- Studied effects of position-momentum correlations in sources on imaging analysis of intensity interferometric data.
- Demonstrated an improved method for extracting the space-averaged phase-space density – a crucial observable for constraining transport models – using our source imaging technique.

Research Assistant (1992–1998). Nuclear Theory Group, National Superconducting Cyclotron Laboratory. Michigan State University, East Lansing, MI.

- Developed a novel application of imaging to the analysis of intensity interferometric data from heavy-ion reactions, allowing us to actually *image* the particle emitting source in these reactions.
- Designed software to invert integral equations found in imaging analysis.
- Developed novel perturbation theory for describing elementary processes in phase-space.
- Studied foundations of transport theory for massless particles.
- Calculated small- x parton distributions.

Undergraduate Research Assistant (1991, 1992). Advanced Photon Source Engineering and Construction Group, Argonne National Laboratory, Argonne, IL.

- Calculated wiggler and undulator x-ray beam profile for 3rd generation synchrotron light source.

COMPUTER SKILLS:

- Extensive scientific Fortran, C/C++ and Python programming experience. Some experience with Perl, Pascal, Basic and Java.
- Experience with the use of massively parallel computers and OpenMP programming.
- Experience in cross-platform program development.
- Extensive use of numerical subroutine libraries (NAG, CERNLIB).
- Extensive use of shell scripting to automate data processing.
- Working knowledge of RCS and CVS version control systems.
- Complete working knowledge of Unix (Tru64 Unix, Irix 6.4, Solaris), Linux, DOS, MS-Windows, Digital VMS, MacOS.
- Installation and administration of small Linux/MS-Windows based network.
- Working knowledge of HTML.
- Some experience with scientific visualization and the use of IRIS Explorer.
- User of \LaTeX , Mathematica, Maple, various word processors and plotting programs.

TEACHING EXPERIENCE:

Mentor (Summer 2004).

- Mentored B. Loyola, a junior at UC Davis, during his summer internship.

American College Testing (ACT) Item Writer (Spring 1997).

- Authored several questions for national college admission exam.

Recitation/Laboratory Instructor (1992–1994), Department of Physics and Astronomy, Michigan State University.

- Alternated leading laboratory sections (Physics 191 and 192) and recitations sections (Physics 183 and 184).
- Consistently received above average teaching evaluations from students.
- Concurrent enrollment as a full time graduate student.

Graduate Course Grader (Fall 1993), Department of Physics and Astronomy, Michigan State University.

- Graded homeworks, exams and final projects of students taking graduate classical mechanics (Physics 820).
- Sought out by faculty teaching Physics 820.

Laboratory Instructor (1991–1992), Department of Physics, University of Delaware.

- Led three sections per semester of an introduction to astronomy laboratory (Physics 133 and 134).

Grader (Fall 1990), Department of Mathematics and Computer Science, Clarkson University.

- Graded homeworks of students taking introductory analysis course (Math 211).
- Sought out by faculty teaching Math 211.

SERVICE:

Computer Liason (2004-Present), Computational Nuclear Physics Group, Lawrence Livermore National Laboratory.

- Procured machines and overseeing group transition to “CREMless” operation.

Proposal Referee (2003-Present).

- Two proposals to National Science Foundation for FY05-FY06.
- Two proposals to NNSA Academic Alliance Program for FY03-FY05.

Journal Referee (1999-Present).

- Physical Review Letters referee since 2002.
- Physical Review C referee since 2001.
- Physical Review D referee since 2001.
- Physical Letters B referee since 1999.

Foreign National Host (2001-Present), N Division, Lawrence Livermore National Laboratory.

- Hosted 6 Foreign National visitors at LLNL including one Sensitive Country Foreign National.

N Division Web Page Co-Coordinator (2002-Present), N Division, Lawrence Livermore National Laboratory.

- Co-spearheaded N Division's web page modernization project.

Brown-Bag Lunch Seminar Coordinator (1999-2001), Institute for Nuclear Theory, University of Washington.

- Organized combined Nuclear Theory and Institute for Nuclear Theory lunch discussions.

Student Seminar Coordinator (1994-1997), Physics and Astronomy Department, Michigan State University.

- Organized forum for graduate students to present research to group of peers.

HONORS:

- Herbert Graham Scholarship (1992, 1993).
- Clarkson Trustees Scholarship (1991).
- Retired Officers Association Leadership Award (1989).
- Air Force Reserve Officer Training Corps Full Scholarship (1988-1990).
- Clarkson University Honor Roll (1987-1991).
- Hibshman Scholarship (1987-1991).
- Wolf Scholarship (1987-1991).

PROFESSIONAL MEMBERSHIPS:

American Physical Society.

$\Sigma\Pi\Sigma$ Physics National Honor Society.

RESEARCH ACCOMPLISHMENTS:

Summary: Written 13 peer-reviewed publications, 8 laboratory reports, and 8 conference proceedings, submitted 2 research proposals and authored 3 software packages.

Ph.D. Thesis:

David Alan Brown, *Accessing the Space-Time Development of Heavy-Ion Collisions With Theory and Experiment*, Michigan State University, 1998.

Peer-Reviewed Publications:

1. E895 Collaboration, **D.A. Brown**, S. Pratt, F. Wang, P. Danielewicz, "Comparison of source images for protons, pion and Λ^0 hyperons in 6 AGeV Au+Au collisions," Phys. Rev. Lett. 91: 162301 (2003).
2. G. Verde, P. Danielewicz, W.G. Lynch, **D.A. Brown**, C.K. Gelbke, M.B. Tsang, "Probing transport theories via two-proton source imaging," Phys. Rev. C 67, 034606 (2003).
3. G. Verde, **D.A. Brown**, P. Danielewicz, K.G. Gelbke, W.G. Lynch M.B. Tsang, "Imaging sources with fast and slow emission components," Phys. Rev. C 65, 054609 (2002).

4. E895 Collaboration, **D.A. Brown**, P. Danielewicz, "Model-independent source imaging using two-pion correlations in 2 to 8A GeV Au + Au collisions," Phys. Rev. Lett. 87, 112304 (2001).
5. **D.A. Brown**, P. Danielewicz, "Observing Non-Gaussian Sources in Heavy-Ion Reactions," Phys. Rev. C 64, 014902 (2001).
6. **D.A. Brown** "Is it possible to reconstruct the freeze-out duration of heavy-ion collisions using tomography?" E-print nucl-th/0003021, submitted to Phys. Rev. Lett.
7. **D.A. Brown**, S. Panitkin, and G. Bertsch, "Extracting Particle Freeze-out Densities And Entropies From Sources Imaged In Heavy-Ion Collisions," Phys. Rev. C 62, 014904 (2000).
8. S. Panitkin, **D.A. Brown** "Imaging Proton Sources and Space Momentum Correlations," Phys. Rev. C 61, 021901 (2000).
9. **D.A. Brown**, F. Wang, P. Danielewicz, "Implications of the Unusual Structure in the pp Correlation from Pb+Pb Collisions at 158-GeV/A," Phys. Lett. B 470, 33-38 (1999).
10. **D.A. Brown**, P. Danielewicz "Partons in Phase Space," Phys. Rev. D 58, 094003 (1998).
11. **D.A. Brown**, P. Danielewicz "Optimized Discretization of Sources Imaged in Heavy Ion Reactions," Phys. Rev. C 57, 2474-2483 (1998).
12. **D.A. Brown**, P. Danielewicz "Imaging of Sources in Heavy-Ion Collisions," Phys. Lett. B 398, 252-258 (1997).
13. R.J. Dejus, A.M. Khounsary, **D.A. Brown** and P.J. Viccaro "Calculation of Wiggler Spectrum and Its Absorption in Media." Nuclear Instruments and Methods in Physics Research A 319 (1992).

Laboratory Reports:

1. J. M. Hall, J. A. Pruet, **D. A. Brown**, M.-A. Descalle, G. W. Hedstrom, "Modeling the Production of Beta-Delayed Gamma Rays for the Detection of Special Nuclear Materials," UCRL-TR-209738, Feb. (2005).
2. **D.A. Brown**, B. Beck, "Updating the $^{238}\text{U}(n,2n)$, $^{238}\text{U}(n,3n)$, $^{238}\text{U}(n,4n)$, $^{238}\text{U}(n,\text{elastic})$ ENDL cross sections," UCRL-TR-209035, Jan. (2005).
3. **D.A. Brown**, J. Pruet, G. Hedstrom, J. Hall, M.-a. Descalle, "Proposal for ENDF formats that describe emission of post-fission β -delayed photons," UCRL-TR-206607, Sep. (2004).
4. **D.A. Brown**, D. McNabb, B. Beck, "Update of ENDL $U(n,2n)$, $U(n,\gamma)$, $U(n,f)$ Evaluations," UCRL-TR-202393, Feb. 18 (2004).
5. **D.A. Brown**, F.S. Dietrich, T. Hill, D. McNabb, "Updated ENDL99 Cross Sections for $U(n,\gamma)$ and $U(n,f)$," UCRL-ID-148410, May 3 (2002).
6. **D. A. Brown**, P. Danielewicz, "Partons in Phase Space," NSCL 1995, 1996 and 1997 Annual Reports.
7. **D. A. Brown**, P. Danielewicz, "Optimized Discretization of Sources Imaged in Heavy Ion Reactions," NSCL 1997 Annual Report.
8. **D. A. Brown**, P. Danielewicz, "Imaging of Sources in Heavy-Ion Collisions," NSCL 1996 Annual Report.

Proceedings:

1. **D.A. Brown**, R. Vogt, "Proposal for a High Energy Nuclear Database," 21st Winter Workshop on Nuclear Dynamics, Breckenridge, CO, 5-12 Feb., 2005, to be published in Acta Physica Hungarica, LLNL preprint number UCRL-PROC-210982 and LBNL preprint number LBNL-57381, e-Print Archive: nucl-th/0504009.

2. **D.A. Brown**, B. Loyola, "Actinide Cross Section Evaluations," International Conference on Nuclear Data for Science and Technology (ND2004), Sante Fe, NM, 26 Sep. - 1 Oct., 2004, to be published by the American Institute of Physics, LLNL preprint number UCRL-PROC-206702.
3. P. Danielewicz, **D.A. Brown**, M. Heffner, R. Soltz, S. Pratt, "Towards the 3D-Imaging of Sources," International Workshop On Hot And Dense Matter In Relativistic Heavy Ion Collisions (BP 2004), Budapest, Hungary, 24 -27 Mar., 2004, to be published in Acta Physica Hungarica A, A) Heavy-Ion Physics, LLNL preprint number UCRL-PROC-204983, e-Print Archive: nucl-th/0407022.
4. **D.A. Brown**, P. Danielewicz, M. Heffner, R. Soltz, "3D Imaging in Heavy-Ion Reactions," Proc. 20th Winter Workshop on Nuclear Dynamics, Trelawny Beach, Jamaica, March 15-20, 2004, to be published in Acta Physica Hungarica A, A) Heavy-Ion Physics, LLNL preprint number UCRL-PROC-203714.
5. **D.A. Brown**, G.Hedstrom, "Possible Problems in ENDF/B-VI.r8," Cross Section Evaluation Working Group Annual Meeting, Upton NY, UCRL-CONF-200686, November 4-6 (2003).
6. G. Verde, **D.A. Brown**, P. Danielewicz, G.K. Gelbke, W.G. Lynch, M.B. Tsang, "New Approach to Imaging of Two-Proton Source Functions," Proc. 17th Winter Workshop on Nuclear Dynamics, Park City UT, March 10-17, 2001, Published in Acta Physica Hungarica A, A) Heavy-Ion Physics **15**, 407-416 (2002), LLNL preprint number UCRL-PROC-203670.
7. **D.A. Brown**, "Imaging the Three-Dimensional Relative Sources from Nuclear Reactions," Proc. APS Centennial Meeting Heavy-Ion Minisymposium, Atlanta, GA, March 19-27, 1999, ed. R. Seto (World Scientific, Singapore, 1999), p. 48.
8. P. Danielewicz and **D.A. Brown** "Imaging of Sources in Heavy-Ion Reactions," Proc. Int. Workshop on Collective Excitations in Fermi and Bose Systems, Serra Negra, Brazil, September 14-17, 1998, ed. C. A. Bertulani (World Scientific, Singapore, 1999), p. 382.

Proposals:

1. **D. Brown**, R. Vogt, R. Soltz, N. Xu, J. Pruet, S. McKinley, "Proposal for a High Energy Nuclear Database," UCRL-PROP-207799, Submitted to DOE Office of Science (2004).
2. **D. Brown**, "Probing the Reaction Dynamics of High-Energy Nuclear Collisions With Two-Proton Correlations," LLNL LDRD Proposal (2002).

Software Packages:

1. **D.A. Brown**, "Imaging with CorAL version 0.3," presented to PHENIX Global Hadron Working Group, UCRL-PRES-210053, 7 Mar (2005).
2. **D.A. Brown**, G. Hedstrom, T. Hill, "User's guide to fete: From ENDF/B-VI To ENDL," UCRL-SM-206606, Sep. (2004).
3. **D.A. Brown**, P. Danielewicz, "HBTprogs Version 1.01" UCRL-CODE-2002-032, UCRL-MA-147919, May 3 (2002).

CONFERENCE AND SEMINAR ACTIVITIES:

Summary: Attended 24 international conferences and workshops and 1 summer school. Delivered 7 invited and 11 contributed conference talks, 6 posters, 16 invited seminars and 1 colloquium.

Invited Conference Talks:

1. 21st Winter Workshop on Nuclear Dynamics, "Proposal for a High Energy Nuclear Database," Breckenridge, CO, 9 Feb., 2005, UCRL-PRES-209545

2. 20th Winter Workshop on Nuclear Dynamics, “Three-Dimensional Imaging Analysis of Two-particle Correlations in Heavy-Ion Reactions,” Trelawny Beach, Jamaica, 15-20 March, 2004.
3. INT Workshop on Reaction Theory for Nuclei Far from Stability, “Imaging Nuclear Reactions With Interferometry,” Seattle, WA, 17 September 2002.
4. Workshop on Two-Particle Correlations and Elliptic Flow at RHIC, “Imaging the source in heavy-ion collisions,” Upton, NY, June 2002.
5. INT/RHIC Winter Workshop 2002 on Correlations and Fluctuations in Heavy-Ion Collisions at RHIC, “Imaging the source in heavy-ion collisions,” Seattle, WA, January 2002.
6. 5th RHIC-INT Workshop and 16th Winter Workshop on Nuclear Dynamics, “The Unusual pp Correlation from Pb+Pb Reactions at 158 AGeV,” Park City, UT, March 2000.
7. 1997 ACS Meeting, “Imaging of Sources in Heavy Ion Reactions,” Las Vegas, NV.

Contributed Conference Talks:

1. Several talks at the Cross Section Evaluation Working Group Meeting, Upton, NY, November 2004: UCRL-PRES-313221, UCRL-PRES-313658, UCRL-PRES-313659, UCRL-PRES-313660.
2. Cross Section Evaluation Working Group Meeting, “Update on ENDF/B-VI Translation,” UCRL-PRES-200892, Upton, NY, November 2003.
3. ICTP Workshop on Nuclear Reaction Data and Nuclear Reactors: Physics, Design, and Safety, “Activities of the Theory and Modeling Group,” Trieste, Italy, March 2002.
4. DNP/APS Meeting, “Full Three-Dimensional Imaging Analysis of Un-Coulomb Corrected Two-Pion Correlations,” Maui, HI, 17 Oct. 2001.
5. INPC2001 “Full Three-Dimensional Imaging Analysis of Un-Coulomb Corrected Two-Pion Correlations,” Berkeley, CA, June 2001.
6. DNP/APS Meeting, “Estimates of freeze-out densities from sources imaged in heavy-ion reactions,” Asilomar, CA, 20-23 Oct. 1999.
7. APS Centennial Meeting Heavy-Ion Minisymposium, “Imaging the Three-Dimensional Relative Sources from Nuclear Reactions,” Atlanta, GA, Mar. 19-27, 1999.
8. Spring 1997 APS Meeting, “Imaging of Sources in Heavy Ion Reactions,” Washington, DC.
9. Spring 1996 APS Meeting, “Partons in Phase Space,” Indianapolis, IN.
10. 1995 Midwest Nuclear Theory Get Together “Shape of a Parton Cloud,” Argonne, IL.
11. Institute for Nuclear Theory Summer School 1996 “Partons in Phase Space,” Pack Forest, WA.

Posters:

1. Nuclear Data 2004, “Actinide Cross Section Evaluations,” UCRL-POST-206766, Sante Fe, NM, September 2004.
2. Quark Matter 2004, “Three-Dimensional Imaging Analysis of Two-particle Correlations in Heavy-Ion Reactions,” UCRL-POST-201638, Oakland, CA, Jan. 2004.
3. INPC2001 “Full Three-Dimensional Imaging Analysis of Un-Coulomb Corrected Two-Pion Correlations,” Berkeley, CA, July 2001.
4. Quark Matter 2001, “Observing Non-Gaussian Sources in Heavy-Ion Collisions,” Stony Brook, NY, Jan. 2001.
5. APS/DNP Meeting 2000, “Imaging of emitting sources in heavy ion collisions by p-p and d- α correlation functions,” Williamsburg, VA, 4-7 Oct. 2000.
6. Gordon Research Conference on Nuclear Reactions, “Observing Non-Gaussian Sources in Heavy-Ion Collisions,” Colby-Sawyer College, NH, July 2000.

Invited Seminars:

1. LANL T-16 Seminar, "Updating ENDL actinide cross sections for the NA program," UCRL-PRES-209033, 7 Jan. 2005.
2. NSCL Seminar, "Three-dimensional imaging in heavy-ion reactions," East Lansing, MI, June, 2004.
3. N Division WIP, "Source imaging in heavy-ion reactions," Livermore, CA, April 16, 2003.
4. LANL T-16 Seminar, "Source imaging in heavy-ion reactions," Los Alamos, NM, May 20, 2003.
5. Lawrence Berkeley National Laboratory, December 2001 "Full Three-dimensional Imaging Analysis of Un-Coulomb Corrected Two-pion Correlations," Berkeley, CA.
6. Lawrence Livermore National Laboratory, May 2000 "Imaging sources from heavy-ion collisions or Getting the most from a correlation measurement," Livermore, CA.
7. Nuclear Physics Laboratory, University of Washington, May 2000 "Imaging sources from heavy-ion collisions or Getting the most from a correlation measurement," Seattle, WA.
8. Institute for Nuclear Theory Spring 2000 Program, "Extracting Particle Freeze-out Phase-Space Densities from Sources Imaged in Heavy-Ion Reactions," Seattle, WA.
9. Institute for Nuclear Theory Fall 1999 Program, "Transport Theory Without the Gradient Approximation," Seattle, WA.
10. Lawrence Berkeley National Laboratory, June 1999 "The Influence of Space-Momentum Correlations on the Proton Source Functions Imaged from Heavy-Ion Collisions," Berkeley, CA.
11. Ohio State University, April 1998 "Optimized Discretization of Sources Imaged in Heavy Ion Reactions," Columbus, OH.
12. Institute for Nuclear Theory Spring 1998 Program, "Partons in Phase Space," Seattle, WA.
13. Columbia University, March 1998 "Partons in Phase-Space," New York, NY.
14. Argonne National Laboratory, March 1998 "Partons in Phase-Space," Argonne, IL.
15. NA49 Spring Collaboration Meeting 1997, "Imaging of Sources in Heavy Ion Reactions," CERN, Geneva, Switzerland.
16. Institute for Nuclear Theory Fall 1996 Program, "Partons in Phase Space," Seattle, WA.

Colloquia:

Linfield University, 11 November 1999 "Imaging and Intensity Interferometry in Relativistic Heavy-Ion Reactions," McMinnville, OR.

REFERENCES:

- Prof. Paweł Danielewicz**, National Superconducting Cyclotron Laboratory, Michigan State University, East Lansing, MI 48824; phone: (517) 333-6330; email: danielewicz@nscl.msu.edu.
- Dr. Frank S. Dietrich**, Nuclear Theory and Modeling Group, L-050, Lawrence Livermore National Laboratory, Livermore, CA 94550; phone: (925) 422-4521; email: dietrich2@llnl.gov.
- Dr. Ron Soltz**, High Energy Physics Group, L-050, Lawrence Livermore National Laboratory, Livermore, CA 94550; phone: (925) 423-2647; email: soltz1@llnl.gov.
- Dr. Roger White**, B Division, L-095, Lawrence Livermore National Laboratory, Livermore, CA 94550; phone: (925) 422-9668; email: white19@llnl.gov.
- Prof. Wick Haxton**, Institute for Nuclear Theory, Box 351550, University of Washington, Seattle WA, 98195-1550; phone: (206) 685-2397; email: haxton@phys.washington.edu.

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