Mark Wayne Paris

Theoretical Division
Los Alamos National Laboratory
MS B283
Los Alamos, New Mexico 87545

T (505) 665-0455
F (505) 667-1931
mparis@lanl.gov
http://public.lanl.gov/mparis

Education

Ph.D. Physics, University of Illinois at Urbana-Champaign (UIUC), September 2000
Dissertation: *Quantum Monte Carlo Calculations of Three- and Six-Quark States*
Adviser: Vijay R. Pandharipande
M.S. Physics, UIUC, 1994
B.A. Physics with High Honors, Rutgers, The State University of New Jersey, 1992

Honors

Most Valued Reviewer 2011, *Physics Letters B* (J.-P. Blaizot, Ed.)
Visiting Scholar, Institute for Nuclear Theory, University of Washington, 11/2009
GAANN Fellowship, Department of Physics, UIUC, 1996
Sigma Pi Sigma, since 1991

Grants

PI, *Toward a Unitary and Self-Consistent Treatment of Big Bang Nucleosynthesis*
University Collaborative Subcontract: LANL Institute for Geophysics, Planetary Physics and Signatures
PI, *Neutrino Transport and Big Bang Nucleosynthesis*
LANL Institutional Computing
Co-PI, *Data Analysis Center for Electromagnetic and Hadronic Scattering Processes*
U.S. Department of Energy Grant DE-FG02-99-ER41110

Experience

01/2012 – Present:	Staff Member, Theoretical Division, Los Alamos National Laboratory
06/2010 – 12/2011:	Assistant Research Professor, Center for Nuclear Studies, Department of Physics, George Washington University
08/2008 – 05/2010:	Research Scientist, Center for Nuclear Studies, Department of Physics, George Washington University
11/2006 – 08/2008:	Research Scientist, Excited Baryon Analysis Center, Theory Group, Jefferson Laboratory
11/2003 – 11/2006:	Postdoctoral Fellow, Theory Group, Jefferson Laboratory
10/2001 – 10/2003:	Postdoctoral Research Assistant, Theoretical Division, Los Alamos National Laboratory
07/2001 – 10/2001:	Postdoctoral Research Assistant, University of Basel
01/2001 – 07/2001:	Postdoctoral Research Assistant, UIUC
1995 – 2001:	Graduate Research Assistant, UIUC
1993 – 1997:	Graduate Teaching Assistant, UIUC

Research Interests

Nuclear and subnuclear structure and reactions; R-matrix theory of light nuclear reactions; Plasma effects on nuclear reactions; Fission dynamics; Computational physics; Quantum Monte Carlo methods; Many-body techniques; Quantum kinetic theory; Early universe cosmology; Big Bang nucleosynthesis; Dynamical coupled channel reaction theory; Parity violation in nucleon-nucleon interaction; Analytic S-matrix theory; Hadronic resonance theory and phenomenology; Effective field theory; Electron scattering from nuclear and hadronic systems; Exotic QCD phases in dense matter; Compact star structure

Selected Publications

(1) Dilute heavy atoms immersed in a weakly coupled degenerate background plasma
In preparation (with D. Preston and L. Brown)
(2) Neutrino energy transport in weak decoupling and big bang nucleosynthesis
Phys. Rev. D, *Accepted as Editors' Suggestion* (2016)
(3) R-matrix description of particle energy spectra produced by low-energy ^{3}H+^{3}H reactions
Phys. Rev. C **92**, 014003 (2015)
(4) Probing neutrino physics with a self-consistent treatment of the weak decoupling, nucleosynthesis, and photon decoupling epochs
Jour. Cosmo. Astrop. Phys. **05**, 017 (2015)
(5) Effect of neutrino rest mass on ionization equilibrium freeze-out
Phys. Rev. D **92**, 125027 (2015)
(6) R-matrix analysis of reactions in the ^{9}B compound system
Nucl. Data Sheets **120**, 184 (2014)
(7) Effective field theory as a limit of R-matrix theory for light nuclear reactions
Phys. Rev. C **89**, 014623 (2014)
(8) Parametrization dependence of T matrix poles and eigenphases from a fit to πN elastic scattering data
Phys. Rev. C **86**, 035202 (2012) (with R. Workman, R. Arndt, W. Briscoe, and I. Strakovsky)
(9) Unified Chew-Mandelstam SAID analysis of pion photoproduction data
Phys. Rev. C **86**, *Editor's suggestion*, 015202 (2012)
(with R. Workman, R. Arndt, W. Briscoe, and I. Strakovsky)
(10) Updated SAID analysis of pion photoproduction data
Phys. Rev. C **85**, 025201 (2012) (with R. Workman, W. Briscoe, and I. Strakovsky)
(11) Model dependence of single-energy fits to pion photoproduction data
Eur. Phys. J. A **47**, 143 (2011)
(with R. Workman, W. Briscoe, L. Tiator, S. Schumann, M. Ostrick, and S. Kamalov)
(12) Toward a unified determination of hadro- and photo-production amplitudes: the $S-$wave multipole for eta photoproduction
Phys. Rev. C **82**, 035202 (2010) (with R. Workman)
(13) Partial wave analysis of the reaction $\gamma p \to \omega p$ and the search for nucleon resonances
Phys. Rev. C **80**, 065209 (2009) (with M. Williams and the CLAS Collaboration)
(14) Differential cross sections and spin density matrix elements for the reaction $\gamma p \to \omega p$
Phys. Rev. C **80**, 065208 (2009) (with M. Williams and the CLAS Collaboration)
(15) Resonance parameters from K-matrix and T-matrix poles
Phys. Rev. C **79**, 038201 (2009) (with R. Workman and R. Arndt)
(16) Dynamical coupled channel theory of pion and omega meson production
Phys. Rev. C **79**, 025208 (2009)
(17) Variational Monte Carlo study of pentaquark states
Phys. Rev. Lett. **95**, 202002 (2005)
(18) Hybrid stars that masquerade as neutron stars
Astrophys. J. **629**, 969-978 (2005) (with M. Alford, M. Braby, and S. Reddy)
(19) Parity-violating interaction effects in the np system
Phys. Rev. C **70**, 044007 (2004) (with J. Carlson and R. Schiavilla)
(20) Parity violating interactions and and currents in the deuteron
Phys. Rev. C **67**, 032501 (2003) (with J. Carlson and R. Schiavilla)

Teaching

Instructor, Graduate *Communication in Physics*
The George Washington University, Fall 2010 – Spring 2011
Research adviser, Honors Research/Mentorship Program
Authored, *Quantum Mechanics and the Quark Model: An Introductory Course*
Thomas Jefferson National Accelerator Facility, 09/2005–05/2008
Guest lecturer, Graduate *Quantum Mechanics I*
The University of Illinois at Urbana-Champaign, 01/2001–07/2001
Grader, Graduate *Statistical Mechanics*
The University of Illinois at Urbana-Champaign, 09/1996–12/1996
Teaching assistant, Undergraduate *College* and *University Physics*
The University of Illinois at Urbana-Champaign, 09/1993–05/1996

Advising

Graduate thesis co-adviser, Evan Grohs
Self-Consistent Treatment of Neutrino Physics in Cosmology
Ph.D. June 2015, University of California San Diego
Graduate thesis co-adviser, Lucas Johns
Neutrino quantum kinetics and Big Bang nucleosynthesis
University of California San Diego
Graduate thesis co-adviser, Berhan Demissie
Theory and phenomenology of Compton scattering in the resonance region
George Washington University

Other Professional Activities

Co-chair *The 2016 R-matrix Workshop on Methods & Applications*
Santa Fe, New Mexico 27 June – July 1, 2016
Co-organizer *The 5^{th} International Workshop on Compound Nuclear Reactions and Related Topics*
Tokyo, Japan 19 – 23 October, 2015
Founding member *Light Hadron Spectrum Collaboration*
Limited member of the CLAS Collaboration
Member bi-annual Jefferson Lab Technical Advisory Committee, 2003-2008
Referee: Phys. Lett. B, Phys. Rev. C, Mod. Phys. Lett. A
Mentor in New Horizons Governor's School, Hampton, Virginia, 2004 – 2008
Invited lecturer at Hampton University Graduate School June, 2004
Tutor at Santa Clara Pueblo, Española, New Mexico, 10/02 – 10/04