

Refereed Publications
IUCF
FY2003

* experimental work done at IUCF

Azimuthal Anisotropy and Correlations in the Hard Scattering Regime at RHIC, C. Adler *et al.*, for the STAR collaboration, Phys. Rev. Lett. **90**, 032301 (2003).

Centrality Dependence of High- p_T Hadron Suppression in Au+Au Collisions at $\sqrt{s_{NN}} = 130$ GeV, C. Adler *et al.*, for the STAR Collaboration, Phys. Rev. Lett. **89**, 202301 (2002).

Coherent ρ^0 Production in Ultraperipheral Heavy-Ion Collisions, C. Adler *et al.*, for the STAR Collaboration, Phys. Rev. Lett. **89**, 272302 (2002).

A Cryogenic Neutron Radiometer for Absolute Neutron Flux Measurement, Z. Chowdhuri, G. Hansen, W.M. Snow, C.D. Keith, A.K. Thompson, M.S. Dewey, D.M. Gilliam, J.S. Nico, F.E. Weitfeldt, V. Jane, and G.L. Greene, Rev. Sci. Instrum. **74**, 4280 (2003).

Disappearance of Back-to-Back High- p_T Hadron Correlations in Central Au+Au Collisions at $\sqrt{s_{NN}} = 200$ GeV, C. Adler *et al.*, for the STAR Collaboration, Phys. Rev. Lett. **90**, 082302 (2003).

Estimation of Neutron Mean Wavelength from Rocking Curve Data, K.J. Coakley, A. Chowdhuri, W.M. Snow, J.M. Richardson, and M.S. Dewey, Meas. Sci. and Tech. **14**, 131 (2003).

Evidence from d+Au Measurements for Final State Suppression of High- p_T Hadrons in Au+Au Collisions at RHIC, J. Adams *et al.*, for the STAR Collaboration, Phys. Rev. Lett. **91**, 072304 (2003).

Measurement of the Neutron Lifetime Using a Proton Trap, M.S. Dewey, D.M. Gilliam, J.S. Nico, F.E. Weitfeldt, X. Fei, W.M. Snow, G.L. Greene, J. Pauwels, R. Eykens, A. Lamberty, and J. Van Gestel, Phys. Rev. Lett. **91**, 152302 (2003).

Narrowing of the Balance Function with Centrality in Au+Au Collisions at $\sqrt{s_{NN}} = 130$ GeV, J. Adams *et al.*, for the STAR Collaboration, Phys. Rev. Lett. **90**, 172301 (2003).

Polarized ^3He Analyzers for Neutron Reflectometry, W. Chen, C. Bailey, J.A. Borchers, R.F.C. Farrow, T. Gentile, D. Hussey, C.F. Makjrzak, K.A. O'Donovan, N. Remmes, W.M. Snow, and A.K. Thompson, Physica **B335**, 196 (2003).

Precision Neutron Interferometric Measurements and Updated Evaluations of the $n - p$ and $n - d$ Coherent Neutron Scattering Lengths, K. Schoen, D.L. Jacobson, M. Arif, P.R. Huffman, T.C. Black, W.M. Snow, S.K. Lamoreaux, H. Kaider, and S.A. Werner, Phys. Rev. C **67**, 044005 (2003).

Precision Neutron Interferometric Measurement of the nd Coherent Neutron Scattering Length and Consequences for Models of Three-Nucleon Forces, T.C. Black, P.R. Huffman, D.L. Jacobson, W.M. Snow, K. Schoen, M. Arif, H. Kaiser, S.K. Lamoreaux, and S.A. Werner, Phys. Rev. Lett. **90**, 192502 (2003).

Simultaneous Polarization Analysis of Zeeman Splitting of Surface Scattered Neutrons Using a Polarized ^3He Neutron Spin Analyzer, D. Hussey, C. Bailey, W.M. Snow, D. Rich, S. Fan, B. Neff, G.P. Felcher, and S. te Velthuis, App. Phys. A **74**, S234 (2003).

Strange Antiparticle-to-particle Ratios at Mid-rapidity in $\sqrt{s_{NN}} = 130$ GeV Au+Au Collisions, J. Adams *et al.*, for the STAR Collaboration, Phys. Lett. B **567**, 167 (2003).

The STAR Barrel Electromagnetic Calorimeter, M. Beddo *et al.*, for the STAR Collaboration, Nucl. Instrum. Methods A **499**, 725 (2003).

STAR Detector Overview, K.H. Ackermann *et al.*, for the STAR Collaboration, Nucl. Instrum. Methods A **499** 624 (2003).

The STAR Endcap Electromagnetic Calorimeter, C.E. Allgower *et al.*, for the STAR Collaboration, Nucl. Instrum. Methods A **499**, 740 (2003).

$K^*(892)^0$ Production in Relativistic Heavy Ion Collisions at $\sqrt{s_{NN}} = 130$ GeV, C. Adler *et al.*, for the STAR Collaboration, Phys. Rev. C **66**, 061901 (2002).

Submitted

* Analyzing powers and spin correlation coefficients for p+d elastic scattering at 135 and 200 MeV, B. von Przewoski, H.O. Meyer, J.T. Balewski, W.W. Daehnick, J. Doskow, W. Haeberli, R. Ibald, B. Lorentz, R.E. Pollock, P.V. Pancella, F. Rathmann, T. Rinckel, Swapan K. Saha, B. Schwartz, P. Thörngren-Engblom, A. Wellinghausen, T.J. Whitaker, T. Wise, and H. Witala, submitted to Phys. Rev. C.

Event-by-Event (p_T) fluctuations in Au+Au collisions at $\sqrt{s_{NN}} = 130$ GeV, J. Adams *et al.*, for the STAR Collaboration, submitted to Phys. Rev. Lett.

Exclusive η production in proton proton reactions, F. Balestra, *et al.*, for the DISTO Collaboration, submitted to Phys. Rev. C.

Kaon production and kaon to pion ratio in Au+Au collisions at $\sqrt{s_{NN}} = 130$ GeV, C. Adler *et al.*, for the STAR Collaboration, submitted to Phys. Lett. B.

A Measurement of the Parity-Violating Gamma Asymmetries $\langle \vec{s}_n \cdot \vec{k}_\gamma \rangle$ and Search for Parity-Conserving Asymmetries $\langle \vec{s}_n \cdot \vec{k}_\gamma \times \vec{k}_n \rangle$ from Polarized Neutron Capture in ^{139}La , ^{113}Cd , and ^{35}Cl , G.S. Mitchell, C.S. Blessinger, J.D. Bowman, T.E. Chupp, K.P. Coulter, M. Gericke, G.L. Jones, M.B. Leuschner, H. Nann, S.A. Page, S.I. Penttilä, T.B. Smith, W.M. Snow, and W.S. Wilburn, submitted to Nucl. Instrum. Methods.

Measurement of the Parity Violating Asymmetry in $\bar{n} + p \rightarrow d + \gamma$, W.M. Snow, W.S. Wilburn, J.D. Bowman, M.B. Leuschner, S.I. Penttilä, V.R. Pomeroy, D.R. Rich, E.I. Sharapov, and V. Yuan, accepted for publication in Nucl. Instrum. Methods.

Multiplicity fluctuations in Au+Au collisions at $\sqrt{s_{NN}} = 130$ GeV, J. Adams *et al.*, for the STAR Collaboration, submitted to Phys. Rev. C.

Multi-Strange Baryon Production in Au+Au Collisions at $\sqrt{s_{NN}} = 130$ GeV, J. Adams *et al.*, for the STAR Collaboration, submitted to Phys. Rev. Lett.

Neutron Cross Section for ^3He at Epithermal Energies, C.D. Keith, Z. Chowdhuri, D.R. Rich, W.M. Snow, J.D. Bowman, S.I. Penttilä, E.I. Sharapov, D.A. Smith, M.B. Leuschner, V.R. Pomeroy, and G.L. Jones, submitted to Phys. Rev. C.

* Observation of the Charge Symmetry Breaking $d+d \rightarrow ^4\text{He}+\pi^0$ Reaction near Threshold, E.J. Stephenson, A.D. Bacher, C.E. Allgower, A. Gårdestig, C.M. Lavelle, G.A. Miller, H. Nann, J. Olmsted, P.V. Pancella, M.A. Pickar, J. Rapaport, T. Rinckel, A. Smith, H.M. Spinka, and U. van Kolck, Phys. Rev. Lett. **91**, 142302 (2003).

Rapidity and Centrality Dependence of Proton and Anti-Proton Production from Au+Au Collisions at $\sqrt{s_{NN}} = 130$ GeV, J. Adams *et al.*, for the STAR Collaboration, submitted to Phys. Rev. Lett.

Particle dependence of azimuthal anisotropy and nuclear modification of particle production at moderate p_T in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV, J. Adams *et al.*, for the STAR Collaboration, submitted to Phys. Rev. Lett.

Pion-Kaon correlations in Au+Au collisions at $\sqrt{s_{NN}} = 130$ GeV, J. Adams *et al.*, for the STAR Collaboration, submitted to Phys. Rev. Lett.

Pion, kaon, proton, and anti-proton transverse momentum distributions from p+p and d+Au collisions at $\sqrt{s_{NN}} = 200$ GeV, J. Adams *et al.*, for the STAR Collaboration, submitted to Phys. Rev. Lett.

Progress toward a new measurement of the parity violating asymmetry in $\bar{n} + p \rightarrow d + \gamma$, W.M. Snow, W.S. Wilburn, J.D. Bowman, M.B. Leuschner, S.I. Penttilä, V.R. Pomeroy, D.R. Rich, E.I. Sharapov, and V. Yuan, accepted for publication in Nucl. Instrum. and Methods.

* Spin exchange in polarized deuterium, B. von Przewoski, H.O. Meyer, J. Balewski, W.W. Daehnick, J. Doskow, W. Haeberli, R. Ibald, B. Lorentz, P.V. Pancella, R.E. Pollock, F. Rathmann, T. Rinckel, Swapan K. Saha, B. Schwartz, P. Thörngren-Engblom, A. Wellinghausen, T.J. Whitaker, and T. Wise, Phys. Rev. A **68**, 042705 (2003).

* Spin Flipping and Polarization Lifetimes of a 270 MeV Deuteron Beam, V.S. Morozov, M.Q. Crawford, Z.B. Etienne, M.C. Kandes, A.D. Krisch, M.A. Leonova, D.W. Sivers, V.K. Wong, K. Yonehara, V.A. Anferov, H.O. Meyer, P. Schwandt, E.J. Stephenson, and B. von Przewoski, accepted for publication in Phys. Rev.

Lett.

Three-Pion HBT Correlations in Relativistic Heavy-Ion Collisions from the STAR Experiment, J. Adams *et al.*, for the STAR Collaboration, submitted to Phys. Rev. Lett.

Transverse momentum and collision energy dependence of high p_T hadron suppression in Au+Au collisions at ultrarelativistic energies, J. Adams *et al.*, for the STAR Collaboration, submitted to Phys. Rev. Lett.

* Vector- and Tensor-Polarization Lifetimes for a Stored Deuteron Beam, B.v. Przewoski, V.A. Anferov, H.O. Meyer, P. Schwandt, E.J. Stephenson, V.S. Morozov, Z.B. Etienne, M.C. Kandes, A.D. Krisch, M.A. Leonova, D.W. Sivers, V.K. Wong, and K. Yonehara, accepted for publication in Phys. Rev. E.

ρ^0 Production and Possible Modification in Au+Au and p+p Collisions at $\sqrt{s_{NN}} = 200$ GeV, J. Adams *et al.*, for the STAR Collaboration, submitted to Phys. Rev. Lett.

Conference Proceedings

- invited, ◦ contributed

Proceedings on prior conferences published in FY2003

IEEE 2001 Nuclear Science Symposium and Medical Imaging Conference, San Diego, CA, November 4–10, 2001, IEEE Trans. Nucl. Sci. **49** (2002).

- Mineral Oil Tests for the MiniBooNE Detector, J.L. Raaf, A.O. Bazarko, G.T. Garvey, E.A. Hawker, R.A. Johnson, G.B. Mills, A. Pladalmay, and R. Tayloe, p. 957.

11th International Symposium on Capture Gamma-Ray Spectroscopy and Related Topics, Prague, Czech Republic, September 2-6, 2002, eds. J. Kvasil, P. Cejnar, and M. Krticka (World Scientific, Singapore, 2003).

- A Measurement of the Parity-Violating Gamma-Ray Asymmetry in Neutron-Proton Capture, S.I. Penttila, J.D. Bowman, R.D. Carlini, T. Case, W.C. Chen, T.E. Chupp, K.P. Coulter, S.J. Freedman, T.R. Gentile, M. Gericke, G.L. Greene, B. Hersman, S. Ishimoto, G.L. Jones, M.B. Leuschner, Y. Masuda, G.S. Mitchell, K. Morimoto, H. Nann, S.A. Page, W.D. Ramsey, E.I. Sharapov, T.B. Smith, W.M. Snow, S.W. Wilburn, and Y.W. Yuan, p. 604.

16th International Conference on Particles and Nuclei, Osaka, Japan, September 30–October 4, 2002, eds. K. Toki, K. Imai, and T. Kishimoto, Nucl. Phys. A **721**, 485 (2003).

- Parity-violating Gamma-ray Asymmetry in the Neutron-proton Capture, Y. Masuda, J.D. Bowman, R.D. Carlini, T. Case, T.E. Chupp, K.P. Coulter, S.J. Freedman, T.R. Gentile, M. Gericke, G.L. Greene, B. Hersman, T. Ino, S. Ishimoto, G.L. Jones, M.B. Leuschner, G.S. Mitchell, K. Morimoto, S. Muto, H. Nann, S.A. Page, W.D. Ramsey, E.I. Sharapov, T.B. Smith, W.M. Snow, W.S. Wilburn, and V.W. Yuan, p. 485.

Conferences held in FY2003

2002 Fall Meeting of the Division of Nuclear Physics, East Lansing, MI, October 9–12, 2002, Bull. Am. Phys. Soc. **47**, No. 6.

- Measurement of the PNC spin-rotation of transversely polarized neutrons travelling through liquid ^4He , C. Bass, D. Luo, H. Nann, M. Snow, J. Tasson, B. Heckel, E. Adelberger, E. Swanson, D. Markoff, C. Gould, D. Hasse, and P. Huffman, p. 85.
- Near-threshold search for the isospin-forbidden $d + d \rightarrow ^4\text{He} + \pi^0$ reaction, E.J. Stephenson, C. Allgower, A.D. Bacher, J. Doskow, C. Lavelle, H. Nann, J. Olmsted, T. Rinckel, M.A. Pickar, P.V. Pancella, A. Smith, H.M. Spinka, and J. Rapaport, p. 91.
- Polarization observables in pd-breakup, T.J. Whitaker, H.O. Meyer, J. Doskow, R. Ibal, T. Rinckel, B. von Przewoski, P.V. Pancella, P. Thörngren-Engblom, T. Wise, F. Rathmann, and B. Lorentz, p. 90.

- Tracking the time scale for multifragmentation, V.E. Viola, L. Beaulieu, S. Turbide, P. Danielewicz, A. Ruangma, and S.J. Yennello, p. 46.

The XXth CFIF Fall Workshop – Nuclear Dynamics: From Quarks to Nuclei, Lisbon, Portugal, October 31–November 2, 2002, eds. M.T. Peña, A. Stadler, A.M. Eiró, and J. Adam, Few-Body Systems, Suppl. 15.

- Recent Results and Prospects from the STAR Detector and RHIC, W.W. Jacobs, for the STAR Collaboration, p. 105.

17th International Conference on the Applications of Accelerators in Research and Industry, Denton, Texas, November 12–16, 2002.

- Facilities for the Study of Nuclear, Particle, and Astrophysics with Low-Energy Neutrons at the Spallation Neutron Source, W.M. Snow.
- A University-Based Cold Neutron Source, D.V. Baxter, J.M. Cameron, D.L. Friesel, H. Nann, T.C. Rinckel, W.M. Snow, and J.W. Zwanziger.

Pulsed Polarized Neutron Workshop, Gaithersburg, Maryland, February 10, 2003.

- Precision Polarimetry and Spin Manipulation of Polarized Low Energy Neutron Beams, W.M. Snow.

American Physical Society April Meeting 2003, Philadelphia, Pennsylvania, April 5–8, 2003, Bull. Am. Phys. Soc. 48.

- Energy and projectile-mass dependence of light-ion potentials, A. Nadasen, K.A.G. Rao, J. Brace, S. Balaji, P. Schwandt, and J.T. Ndefru, p. 180.
- Observation of the isospin-forbidden $d + d \rightarrow {}^4\text{He} + \pi^0$ reaction near threshold, Edward Stephenson, p. 52.

XI International Workshop on Deep Inelastic Scattering, St. Petersburg, Russia, April 23-27, 2003

- Transverse Spin Asymmetries at STAR, G. Rakness *et al.*, for the STAR Collaboration.

16th Meeting of the International Collaboration on Advance Neutron Sources, Dusseldorf, Germany, May 12–15, 2003.

- LENS – A University-based, Pulsed Neutron Source for Education and Research, D.V. Baxter, J.M. Cameron, M.B. Leuschner, H. Nann, W.M. Snow, and J. Zwanziger.

17th Int. IUPAP Conf. on Few-Body Problems in Physics, Durham, North Carolina, June 5–10, 2003.

- Measurement of the absolute differential cross section for np elastic scattering near 190 MeV, M. Sarsour, T. Peterson, M. Planinic, S.E. Vigdor, C. Allgower, B. Bergenwall, J. Blomgren, T. Hossbach, W.W. Jacobs, C. Johansson, J. Klug, A.V. Klyachko, P. Nadel-Turonski, L. Nilsson, N. Olsson, S. Pomp, J. Rapaport, T. Rinckel, E.J. Stephenson, U. Tippawan, S.W. Wissink, and Y. Zhou.
- Neutron Interferometry and Optics Facility for Precision Scattering Length Measurements, D.L. Jacobson, P.R. Huffman, M. Arif, K. Schoen, S.A. Werner, T.C. Black, and W.M. Snow.
- Observation of the $d + d \rightarrow {}^4\text{He} + \pi^0$ reaction near threshold, E.J. Stephenson, C. Allgower, A.D. Bacher, C. Lavelle, H. Nann, G.A. Miller, J. Olmsted, P.V. Pancella, M.A. Pickar, J. Rapaport, T. Rinckel, A. Smith, H.M. Spinka, and U. van Kolck.

4th International Workshop on Cold and Ultracold Neutrons: Physics and Sources, St. Petersburg, Russia, June 17–19, 2003.

- Nuclear/Particle/Astrophysics Beamline at the Spallation Neutron Source: Physics Program, W.M. Snow.
- Neutron-antineutron Oscillations using Ultracold Neutrons, W.M. Snow.
- Parity Violation in $n + p \rightarrow d + \gamma$, W.M. Snow.
- Proposed Measurement of Neutron Decay Correlation Coefficients a , A , b , and B Using Pulsed Neutrons, W.M. Snow.

Workshop on Hadron Physics at COSY, Bad Honnef, Germany, July 7–10, 2003.

- The Reaction $d + d \rightarrow {}^4\text{He} + \pi^0$, E.J. Stephenson.

4th Circum-Pan-Pacific Symposium on High Energy SPIN Physics, Seattle, WA, August 4–7, 2003.

- The Measurement of ΔG at STAR, J. Sowinski.
- Spin Physics from STAR, S.E. Vigdor.

4th International Workshop on Chiral Dynamics 2003, Bonn, Germany, September 8–13, 2003.

- CSB Experiment at IUCF, E.J. Stephenson.

Colloquia

W. Mike Snow

Neutrons, Grinnell College Physics Department, December 3, 2003.

Fundamental Physics with Low Energy Neutrons, Syracuse University Physics Department, February 13, 2003.

Neutrons, Hamilton College Physics Department, February 14, 2003.

Slow Neutrons, Indiana University Physics Department, March 24, 2003.

Neutrons, Wittenburg University, April 9, 2003.

LENS, A University-Based Pulsed Cold Neutron Source for Education and Research, Brookhaven National Laboratory, July 21, 2003.

Nuclear and Particle Physics with Cold and Ultracold Neutrons, Purdue University, October 2, 2003.

Neutrons, Ball State University, October 16, 2003.

Edward J. Stephenson

First Observation of the Charge Symmetry Breaking $d + d \rightarrow {}^4\text{He} + \pi^0$ Reaction Near Threshold, Indiana University, September 24, 2003.

Seminars

William W. Jacobs

Recent Results from the STAR Detector and RHIC, IUCF, October 25, 2002.

Hans-Otto Meyer

CoolerFest lecture, IUCF, May 2, 2003.

Robert Pollock

CoolerFest lecture, IUCF, May 2, 2003.

Greg Rakness

First results from polarized proton collisions at STAR, Univ. of Wisconsin, November 18, 2002.

W. Mike Snow

NN Parity Violation with Low Energy Neutrons, Institute for Nuclear Theory, Seattle, Washington, November 11, 2002.

The LENS Neutron Source, Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali di Legnaro, Padova, Italy, January 10, 2003.

The LENS Neutron Source, California Institute of Technology, May 23, 2003.

Edward J. Stephenson

Observation of the Isospin-forbidden $d + d \rightarrow {}^4\text{He} + \pi^0$ Reaction near Threshold, Argonne National Laboratory, March 31, 2003, and IUCF, April 11, 2003.