

## 10.0 LIST OF PUBLICATIONS FROM 1997-1998

### Published papers:

“New results in high-energy  $\gamma$ -ray-studies from heavy-ion reactions at around 10 MeV,” M. Kicinska-Habior, Z. Trznadel, K.A. Snover, A. Maj and M.P. Kelly, *Acta Phys. Pol. B* **28**, 189 (1997).

“Alkali carbide fragmentation. A new path to doubly-charged negative ions,” R. Vandenbosch, D.I. Will, C. Cooper, B. Henry and J.F. Liang, *Chem. Phys. Lett.* **274**, 112 (1997).

“Effects of shape and transfer degrees of freedom on sub-barrier fusion,” R. Vandenbosch, A.A. Sonzogni and J.D. Bierman, *J. Phys. G: Nucl. Part. Phys.* **23**, 1303 (1997).

“Near- and sub-barrier fission fragment anisotropies and the failure of the statistical theory of fission decay rates,” J.P. Lestone, A.A. Sonzogni, M.P. Kelly and R. Vandenbosch, *J. Phys. G: Nucl. Part. Phys.* **23**, 1349 (1997).

“Difference in stopping power for protons and deuterons of a given speed,” H. Bichsel and M. Inokuti, *Nucl. Instrum. Methods in Phys. Res. B* **134**, 161 (1998).

“Study of the  $\beta$ -decay of  $^{37}\text{Ca}$  and  $^{36}\text{Ca}$ ,” W. Trinder, E.G. Adelberger, B.A. Brown, Z. Janas, H. Keller, K. Krumbholz, V. Kunze, P. Magnus, F. Meissner, A. Piechaczek, M. Pfützner, E. Roeckl, K. Rykaczewski, W.-D. Schmidt-Ott and M. Weber, *Nucl. Phys. A* **620**, 191 (1997).

“ $^{40}\text{Ti}$   $\beta$  decay and neutrino capture cross section of  $^{40}\text{Ar}$ ,” W. Trinder, R. Anne, M. Lewitowicz, M.G. Saint-Laurent, C. Donzaud, D. Guillemaud-Mueller, S. Leenardt, A.C. Mueller, F. Pougheon, O. Sorlin, M. Bhattacharya, A. Garcia, N.I. Kaloskamis, E.G. Adelberger and H.E. Swanson, *Phys. Lett. B* **415**, 211 (1997).

“Measurement of electron-impact ionization cross sections for hydrogenlike high-Z ions,” R.E. Marrs, S.R. Elliott and J.H. Scofield, *Phys. Rev. A* **56**, 1338 (1997).

“Measurement of L-shell electron-impact ionization cross sections for highly charged uranium ions,” Th. Stohlker, A. Kramer, S.R. Elliott, R.E. Marrs and J.H. Scofield, *Phys. Rev. A* **56**, 2819 (1997).

“Absence of a peak-like structure in  $^{12}\text{C} + ^{232}\text{Th}$  fission fragment anisotropies,” J.P. Lestone, A.A. Sonzogni, M.P. Kelly and D. Prindle, *Phys. Rev. C* **55**, R16 (1997).

“Dissipative effects in the formation of the  $^{156}\text{Er}$  compound nucleus,” J.F. Liang, J.D. Bierman, M.P. Kelly, A.A. Sonzogni, R. Vandenbosch and J.P.S. van Schagen, *Phys. Rev. C* **56**, 908 (1997).

“Influence of the ground state spin of target nuclei on the anomalous behavior of fission fragment anisotropies,” J.P. Lestone, A.A. Sonzogni, M.P. Kelly and R. Vandenbosch, *Phys. Rev. C* **56**, R2907 (1997).

“Preequilibrium particle emission and the giant-dipole resonance in Sn nuclei,” M.P. Kelly, J.F. Liang, A.A. Sonzogni, K.A. Snover, J.P.S. van Schagen and J.P. Lestone, *Phys. Rev. C* **56**, 3201 (1997).

“Measurement of the difference in the nuclear charge radii among uranium isotopes,” S.R. Elliott *et al.*, *Phys. Rev. C* **57**, 583 (1998).

“Transfer and surface barrier couplings in the fusion of  $^{40}\text{Ca} + ^{46,48,50}\text{Ti}$  at near-barrier energies,” A.A. Sonzogni, J.D. Bierman, M.P. Kelly, J.P. Lestone, J.F. Liang and R. Vandenbosch, *Phys. Rev. C* **57**, 722 (1998).

“Impact parameter dependence of light charged particle production in 25A MeV  $^{16}\text{O}$  on Tb, Ta, and Au and 35A MeV  $^{14}\text{N}$  on Sm and Ta,” D. Prindle, A. Elmaani, C. Hyde-Wright, W. Jiang, A.A. Sonzogni, R. Vandenbosch *et al.*, Phys. Rev. C **57**, 1305 (1998).

“Translation of multipoles for a  $1/r$  potential,” C. D’Urso and E.G. Adelberger, Phys. Rev. D **55**, 7970 (1997).

“Anomalous peaklike structure in the fission fragment anisotropies at sub-barrier energies in  $^{11}\text{B}$ ,  $^{12}\text{C}$ ,  $^{16}\text{O}$ ,  $^{19}\text{F}$  +  $^{232}\text{Th}$  reactions,” J.P. Lestone, A.A. Sonzogni, M.P. Kelly and R. Vandenbosch, Comment, Phys. Rev. Lett .

“Short-range test of the Equivalence Principle,” J.H. Gundlach, G.L. Smith, E.G. Adelberger, B.R. Heckel and H.E. Swanson, Phys. Rev. Lett. **78**, 2523 (1997).

“Entrance channel dependent light charged particle emission from the  $^{156}\text{Er}$  compound nucleus,” J.F. Liang, J.D. Bierman, M.P. Kelly, A.A. Sonzogni, R. Vandenbosch and J.P.S. van Schagen, Phys. Rev. Lett. **78**, 3074 (1997).

“A new Coulomb correction method for Bose-Einstein correlations based on the  $\pi^+\pi^-$  correlation measurements,” D. Ferenc and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, T.A. Trainor and D. Weerasundara), Z. Phys. C (Particles and Fields) **73**, 443 (1997).

#### **Papers submitted or to be published:**

“The NA49 large acceptance hadron detector for an investigation of Pb-induced reactions at the CERN SPS,” S. Afanasiev and the NA 49 collaborators (including J.G. Cramer, D.J. Prindle, T.A. Trainor and D. Weerasundara), to be published, Nucl. Instrum. Methods.

“Measurement of the response of the Russian-American Gallium experiment to neutrinos from a  $^{51}\text{Cr}$  source,” J.N. Abdurashitov and the SAGE collaborators (including S.R. Elliott and J.F. Wilkerson), submitted to Phys. Rev. C.

“Why the standard methods of calculating fission rates are flawed at high spin,” J.P. Lestone, submitted to Phys. Rev. C.

“Scale-local topological measures,” T.A. Trainor, submitted to Phys. Rev. E.

“Scaling properties of the giant dipole resonance width in hot rotating nuclei,” D. Kusnezov, Y. Alhassid and K.A. Snover, submitted to Phys. Rev. Lett.

“Directed and elliptic flow in 158 GeV/nucleon Pb+Pb collisions,” H. Appelshaeuser and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, TA Trainor and D. Weerasundara), accepted for publication, Phys. Rev. Lett.

“Hadronic expansion dynamics in ultra-relativistic Pb+Pb collisions at 158 GeV/nucleon,” T. Alber and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, T.A. Trainor and D. Weerasundara), accepted for publication, Phys. Rev. Lett.

“Solar fusion cross sections,” 28 authors (including E.G. Adelberger, L. de Braekeleer, C.A. Duba., S.R. Elliott, W.C. Haxton, K.M. Heeger, E. Henley, R.G.H. Robertson, K.A. Snover, E. Swanson and J.F. Wilkerson), accepted for publication, Rev. Mod. Phys.

### Invited talks, abstracts and other conference presentations by NPL personnel:

“Event-by-event physics at the SPS and RHIC: measures and interpretation,” T.A. Trainor, Invited plenary talk, *3rd International Conference on Physics and Astrophysics of Quark-Gluon Plasma*, to be published in *Physics and Astrophysics of Quark-Gluon Plasma*, eds. B.C. Sinh *et al.*, Jaipur, India, Mar. 1997.

“The planned Seattle-TRIUMF  ${}^7\text{Be}(p,\gamma){}^8\text{B}$  experiment,” K.A. Snover, invited talk, *Proceedings of the Workshop on Experiments and Equipment at Isotope Separators*, Harrison Hot Springs, BC, Canada, April 1977 (TRIUMF publication).

“The Mass-8 experiment – measuring the  $\beta$ - $\alpha$  angular correlations,” J.F. Amsbaugh, M. Beck, L. De Braeckeleer, D.W. Storm, E. Swanson, K.B. Swartz, J.P.S. van Schagen, D.C. Wright and Z. Zhao, *Proceedings of the 6<sup>th</sup> Conference on the Intersections of Particle and Nuclear Physics*, Big Sky, MT, May 1997, ed. T.W. Donnelly, AIP Conference Proceedings 412, 416.

“Overview of neutrino mass experiments,” J.F. Wilkerson, Invited talk, *Proceedings of the 6<sup>th</sup> Conference on the Intersections of Particle and Nuclear Physics*, Big Sky, MT, May 1997, ed. T.W. Donnelly, AIP Conference Proceedings 412, 416.

“Neutrinos – now what?” R.G.H. Robertson, Invited review, *Nuclear Chemistry Gordon Conference*, Colby-Sawyer College, NH, June 1997.

“Solar Neutrinos,” R.G.H. Robertson, Invited talk to HEPAP Subpanel on Nonaccelerator Physics, SLAC, Stanford, CA, June 1997.

“The Sudbury Neutrino Observatory (SNO) data acquisition system – an object oriented approach,” J.F. Wilkerson, Invited talk, LIGO, Caltech, Pasadena, CA June 1998.

“Fragment-fragment correlations in near-binary fragmentation of  $\text{C}_{60}$ ,” R. Vandenbosch, B. Henry, C.H. Cooper, J.F. Liang and D.I. Will, *Similarities and Differences between Atomic Nuclei and Clusters*, Tsukuba, Japan, July 1997, eds. Y. Abe, I. Arai, S.M. Lee and K. Yabana, AIP Conference Proceedings 416.

“The Sudbury Neutrino Observatory data acquisition system,” R. Ahmad, J. Beck, R. Meijer Drees, M. Howe, J.F. Wilkerson, F. McGirt and Y.-D. Chan, *PC '97*, San Diego, CA, Aug. 1997.

“Methods for detection of neutral current neutrino interactions in the Sudbury Neutrino Observatory,” R.G.H. Robertson, invited seminar, *Internat. Conf. TAUP 97*, Gran Sasso, Italy, Sept. 1997.

“The Sudbury Neutrino Observatory,” R.G.H. Robertson, invited talk, *Internat. Sch. Of Nuclear Physics*, Erice, Italy, Sept. 1997.

“Progress in the search for time reversal invariance violation in neutron decay,” L.J. Lising and the emiT collaborators (including S.R. Elliott, R.G.H. Robertson, T.D. Steiger, J.F. Wilkerson), American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1071 (1997).

“Time reversal in polarized neutron decay—a progress report on the emiT experiment,” T.D. Steiger and the emiT collaborators (including M.C. Browne, S.R. Elliott, R.G.H. Robertson and J.F. Wilkerson), American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1627 (1997).

“Time reversal in polarized neutron decay--theory and analysis for the emiT experiment,” M.C. Browne and the emiT collaborators (including S.R. Elliott, R.G.H. Robertson, T.D. Steiger and J.F. Wilkerson), American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1627 (1997).

“Preliminary results of the mass-8 beta-decay experiment,” M. Beck, J.F. Amsbaugh, D.W. Storm, E. Swanson, J.P.S. van Schagen, D.C. Wright, L. De Braeckelee, K.B. Swartz and Z. Zhao, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1628 (1997).

“Precision measurement of the  ${}^4\text{He}(\alpha\text{-}\gamma){}^8\text{Be}$  reaction,” J.P.S. van Schagen, J.H. Gundlach, M.P. Kelly, K.A. Snover, D.W. Storm and D.C. Wright, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1628 (1997).

“The neutral current detector project of the Sudbury Neutrino Observatory,” S.R. Elliott and the SNO collaborators (including M.C. Browne, P.J. Doe, C. Duba, J.V. Germani, K.M. Heeger, A.W.P. Poon, R.G.H. Robertson, M. Smith, T.D. Steiger and J.F. Wilkerson), American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1631 (1997).

“Neutral-current detector contaminant self-detection in the Sudbury Neutrino Observatory by use of a gamma-gamma coincidences,” C.A. Duba, S.R. Elliott and R.G.H. Robertson, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1631 (1997).

“Deployment preparation for the neutral current detectors in the Sudbury Neutrino Observatory (SNO),” M.C. Browne, S.R. Elliott, T.G. Harper, K.M. Heeger, A. Myers, R.G.H. Robertson, T. Van Wechel, J.F. Wilkerson and A. Hime, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1632 (1997).

“A compact  ${}^3\text{H}(p,\gamma){}^4\text{He}$  20 MeV gamma-ray source for energy calibration at the Sudbury Neutrino Observatory,” A.W.P. Poon, M.C. Browne, R.G.H. Robertson, R.J. Komar, C.E. Waltham and N.P. Kherani, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1632 (1997).

“The Sudbury Neutrino Observatory data acquisition system,” Q.R. Ahmad, J. Beck, R. Meijer Drees, M. Howe, J.F. Wilkerson, F. McGirt and Y-D Chan, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1633 (1997).

“The energy spectrum of  ${}^8\text{B}$  neutrinos and the solar neutrino problem,” K.M. Heeger and R.G.H. Robertson, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1639 (1997).

“Measurement of the  ${}^8\text{B}$   $\beta$ -delayed  $\alpha$  spectrum,” K.B. Swartz, A.A. Chen, E.G. Adelberger, L.D. Carr, J.M. Casandjian and H.E. Swanson, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1639 (1997).

“A planned  ${}^7\text{Be}(p,\gamma){}^8\text{B}$  experiment,” K.A. Snover, E.G. Adelberger, J.M. Casandjian, T.D. Steiger, H.E. Swanson, A. Zyuzin, N. Bateman, .L. Buchmann, K. Buckley, T. Ruth and J. Vincent, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1639 (1997).

“Preliminary measurement of the PNC neutron spin-rotation through a liquid helium target,” D.M. Markoff, E.G. Adelberger, B.R. Heckel, S.D. Penn, H.E. Swanson, J.S. Nico, F.E. Wietfeldt, G.L. Green and S.K. Lamoreaux, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1666 (1997).

“A model independent analysis of the solar neutrino anomaly,” R.G.H. Robertson, C.A. Duba and K.M. Heeger, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1679 (1997).

“Preequilibrium particle emission and the giant dipole resonances in Sn nuclei,” M.P. Kelly, J.F. Liang, A.A. Sonzogni, K.A. Snover, J.P.S. van Schagen and J.P. Lestone, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1681 (1997).

“Transfer and surface vibration couplings in the fusion of  $^{40}\text{Ca} + ^{46,48,50}\text{Ti}$  at near-barrier energies,” A.A. Sonzogni, J.D. Bierman, M.P. Kelly, J.P. Lestone, J.F. Liang and R. Vandenbosch, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1682 (1997).

“Influence of the ground state spin of target nuclei on the anomalous behavior of fission fragment anisotropies,” J.P. Lestone, A. Sonzogni, M. Kelly and R. Vandenbosch, American Physical Society, Whistler, BC, Canada, Bull. Am. Phys. Soc. **42**, 1682 (1997).

“University of Washington lab report,” G.C. Harper and D.W. Storm, *The Eighth Workshop on RF Superconductivity*, Abano Terme (Padova), Italy, Oct. 1997.

“Nuclear Physics Laboratory status report,” J.F. Amsbaugh, G.C. Harper, C.E. Linder, A.W. Myers, D.W. Storm, T.D. Van Wechel and D.I. Will, *31<sup>st</sup> Symposium of Northeastern Accelerator Personnel*, Jülich, Germany, Oct. 1997.

“NA49 preliminary event-by-event analysis of Pb-Pb collisions at the CERN SPS,” poster presentation, D. Weerasundara and the NA49 collaborators (including J.G. Cramer, D.J. Prindle and T.A. Trainor), *Quark Matter '97 Conference*, Tsukuba, Japan, Nov. 97.

“The Sudbury Neutrino Observatory,” R.G.H. Robertson, invited talk, *ITP Conf. On Solar Neutrinos: News about SNUs*, Santa Barbara, CA, Dec. 1997.

“Event-by-event analysis of NA49 central Pb-Pb data,” T.A. Trainor, *14<sup>th</sup> Winter Workshop on Nuclear Dynamics*, contributed talk, to be published in *14<sup>th</sup> Winter Workshop on Nuclear Dynamics*, eds. W. Bauer and H.G. Ritter. Snowbird, UT, Feb. 1998.

#### **Conference presentations by collaborators of NPL personnel:**

“Progress in particle correlation studies at NA49,” B. Lasiuk and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, TA Trainor and D. Weerasundara), *Heavy Ion Workshop on Particle Physics*, Bratislava, Slovakia, Sept. 1996, Acta Phys. Slovaca **47**, 15 (1997).

“Hadronic observables at NA49,” B. Lasiuk and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, TA Trainor and D. Weerasundara), *Heavy Ion Workshop on Particle Physics*, Bratislava, Slovakia, Sept. 1996, Acta Phys. Slovaca **47**, 27 (1997).

“Solar neutrino results from SAGE,” T.J. Bowles and the SAGE collaborators (including S.R. Elliott and J.F. Wilkerson), *The Proceedings of the Fourth International Solar Neutrino Conference*, Heidelberg, Germany, April 1997, ed. W. Hampel, published by Max Planck-Institut für Kernphysik, printed by Neumann Druck, Heidelberg, p.109, presented by T.J. Bowles.

“Final results of the SAGE  $^{51}\text{Cr}$  experiment,” E.P. Verentenkin and the SAGE collaborators (including S.R. Elliott and J.F. Wilkerson), *The Proceedings of the Fourth International Solar Neutrino Conference*, Heidelberg, Germany, April 1997, ed. W. Hampel, published by Max Planck-Institut für Kernphysik, printed by Neumann Druck, Heidelberg, p. 126, presented by E. P. Verentenkin.

"Solar neutrino results from SAGE," V.M.Vermul and the SAGE collaborators (including S.R. Elliott and J.F. Wilkerson), *The Proceedings of the 9<sup>th</sup> International School on Particles and Cosmology*, Baksan Valley, Kabardino-Balkaria, Russia, April 1997, to be published by World Scientific Publishing Co. Pte. Ltd., presented by V.M. Vermul.

"Final results of the SAGE <sup>51</sup>Cr experiment," E.P. Veretenkin and the SAGE collaborators (including S.R. Elliott and J.F. Wilkerson), *Proceedings of the 9<sup>th</sup> International School on Particles and Cosmology*, Baksan Valley, Kabardino-Blakaria, Russia, April 1997, to be published by World Scientific Publishing Co. Pte. Ltd., presented by E.P. Veretenkin.

"Cascade and omega production in Pb+Pb collisions at 158 GeV/c," G. Odyniec and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, TA Trainor and D. Weerasundara), *International Symposium on Strangeness in Quark Matter*, Apr. 1997, Thera, Greece, J. Phys. G **23**, (1997).

"Lambda and anti-lambda reconstruction in central PB-Pb collisions using a time projection chamber," T. Yates and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, TA Trainor and D. Weerasundara), *International Symposium on Strangeness in Quark Matter*, Apr. 1997, Thera, Greece, J. Phys. G **23**, 1889 (1997).

"Phi production in 158-GeV/u Pb + Pb collisions," by V. Friese and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, TA Trainor and D. Weerasundara), *International Symposium on Strangeness in Quark Matter*, Apr. 1997, Thera, Greece, J. Phys. G **23**, 1837 (1997).

"Kaon, lambda and antilambda production in Pb + Pb collisions at 158-GeV per Nucleon," C. Bormann and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, TA Trainor and D. Weerasundara), *International Symposium on Strangeness in Quark Matter*, Apr. 1997, Thera, Greece, J. Phys. G **23**, 1817 (1997).

"Xi and Omega production in Pb+Pb collisions at 158 GeV/nucleon," G. Odyniec and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, TA Trainor and D. Weerasundara), *International Symposium on Strangeness in Quark Matter*, Apr. 1997, Santorini, Greece, J. Phys. G **23**, 1827 (1997).

"Xi hyperon production in sulphur-gold interactions at 200 GeV/nucleon," W. Retyk and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, TA Trainor and D. Weerasundara), *International Symposium on Strangeness in Quark Matter*, Apr. 1997, Santorini, Greece, J. Phys. G **23**, 1845 (1997).

"Particle correlations in Pb+Pb collisions at the CERN-SPS," K. Kadija and the NA49 collaborators (including J.G. Cramer, D.J. Prindle, TA Trainor and D. Weerasundara), ICHEP '96, *Proceedings of the 28th International Conference on High Energy Physics, Warsaw, Poland*. 947-50 vol. 1. Published by: World Scientific. Singapore, 1997.

"Searching for Time Reversal Invariance Violation in Polarized Neutron Decay," L.J. Lising and the emiT the collaborators (including S.R. Elliott, R.G.H. Robertson, T.D. Steiger, J.F. Wilkerson), *Proceedings of the 6<sup>th</sup> on the Intersections between Particle and Nuclear Physics*, Big Sky, MT, May, 1997, ed. T. W. Donnelly, p. 399, (American Institute of Physics, New York, 1997), presented by L.J. Lising.

"The absorption edge technique at the super-EBIT," A. Kramer, S.R. Elliott, R.E. Marrs, J.H. Scofield, and Th. Stohlker, *Hyperfine Interactions*.

"Measurements of electric dipole-forbidden  $2p_{1/2}$ - $2p_{3/2}$  M1 and E2 transitions in Fluorinelike  $U^{81+}$  through Berylliumlike  $U^{88+}$ ," P. Beiersdorfer, A. Osterheld, and S.R. Elliott, submitted for the *DAMOP98 Meeting of the American Physical Society*, Sante Fe, NM, to be published, presented by P. Beiersdorfer.

