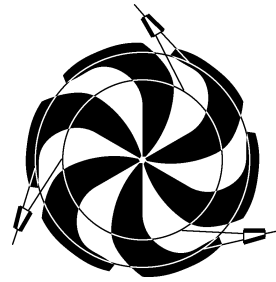


TRIUMF



ANNUAL REPORT SCIENTIFIC ACTIVITIES 1998

CANADA'S NATIONAL MESON FACILITY
OPERATED AS A JOINT VENTURE BY:

MEMBERS:

UNIVERSITY OF ALBERTA
SIMON FRASER UNIVERSITY
UNIVERSITY OF VICTORIA
UNIVERSITY OF BRITISH COLUMBIA

ASSOCIATE MEMBERS:

UNIVERSITY OF MANITOBA
UNIVERSITÉ DE MONTRÉAL
UNIVERSITY OF TORONTO
UNIVERSITY OF REGINA
CARLETON UNIVERSITY
QUEEN'S UNIVERSITY

UNDER A CONTRIBUTION FROM THE
NATIONAL RESEARCH COUNCIL OF CANADA

APRIL 1999

The contributions on individual experiments in this report are outlines intended to demonstrate the extent of scientific activity at TRIUMF during the past year. The outlines are not publications and often contain preliminary results not intended, or not yet ready, for publication. Material from these reports should not be reproduced or quoted without permission from the authors.

PUBLICATIONS

This appendix lists publications describing work performed at TRIUMF and also work conducted elsewhere by TRIUMF personnel and TRIUMF users.

Journal Publications

Particle, Nuclear and Atomic Physics

- E.G. Adelberger, L. Buchmann, T.D. Shoppa *et al.*, *Solar fusion cross sections*, Rev. Mod. Phys. **70**, 1265 (1998).
- S.L. Stephenson, L.Y. Lowie, G.E. Mitchell, J.D. Bowman, C.M. Frankle, J.N. Knudson, S.I. Penttilae, S.J. Seestrom, Y. Yen, V.W. Yuan, B.E. Crawford, N.R. Roberson, P.P. Delheij, M. Iinuma, A. MASAike, Y. Matsuda, H. Postma and E.I. Sharapov, *Parity nonconservation in neutron resonances in ^{232}Th* , Phys. Rev. **C58**, 1236 (1998).
- B.E. Crawford, N.R. Roberson, J.D. Bowman, G.M. Frankle, J.N. Knudson, S.I. Penttilae, S.J. Seestrom, Y. Yen, V.W. Yuan, P.P. Delheij, M. Iinuma, A. MASAike, Y. Matsuda, L.Y. Lowie, G.E. Mitchell, S.L. Stephenson, H. Postma and E.I. Sharapov, *Parity nonconservation in neutron resonances in ^{238}U* , Phys. Rev. **C58**, 1225 (1998).
- B.E. Crawford, N.R. Roberson, J.D. Bowman, J.N. Knudson, S.I. Penttilae, S.J. Seestrom, V.W. Yuan, P.P. Delheij, T. Haseyama, A. MASAike, Y. Matsuda, L.Y. Lowie, G.E. Mitchell, S.L. Stephenson, H. Postma and E.I. Sharapov, *Neutron resonance spectroscopy of ^{106}Pd and ^{108}Pd from 20 to 2000 eV*, Phys. Rev. **C58**, 729 (1998).
- G. White, N.J. Stone, J. Copnell, J. Rikovska, I.S. Towner, A.M. Oros, K. Heyde, B. Fogelberg, L. Jacobsson and F. Gustavsson, *Magnetic dipole moments near ^{132}Sn : measurement on isomeric $11/2^-$ states in odd- A ^{131}Te and ^{133}Te by NMR/ON*, Nucl. Phys. **A640**, 322 (1998).
- C. Bochna *et al.* (E89-012 collaboration), *Measurements of deuteron photodisintegration up to 4.0 GeV*, Phys. Rev. Lett. **81**, 4576 (1998) [NPL-98-1].
- E. Vogt, *The glorious history of nuclear physics at Chalk River*, Phys. in Canada, Jan/Feb (1998) [TRI-PP-98-6].
- K. Ackerstaff *et al.* (HERMES collaboration), *Determination of the deep inelastic contribution to the generalised Gerasimov-Drell-Hearn integral for the proton and the neutron*, Phys. Lett. **B444**, 531 (1998) [DESY-98-122].
- HERMES collaboration, *Measurement of the proton spin structure function g_1^p with a pure hydrogen target*, Phys. Lett. **B442**, 484 (1998) [hep-ex/9807015].
- HERMES collaboration, *Flavor asymmetry of the light quark sea from semi-inclusive deep inelastic scattering*, Phys. Rev. Lett. **81**, 5519 (1998) [hep-ex/9807013].
- HERMES collaboration, *The HERMES spectrometer*, Nucl. Instrum. Methods **A417**, 230 (1998) [hep-ex/9806008].
- F. Balestra *et al.* (DISTO collaboration), *Production of ϕ and ω mesons in near-threshold pp reactions*, Phys. Rev. Lett. **81**, 4572 (1998).
- T.M. Ito, R.S. Hayano, S.N. Nakamura, T.P. Terada, M. Iwasaki, D.R. Gill, L. Lee, A. Olin, M. Salomon, S. Yen, K. Bartlett, G.A. Beer, G. Mason, G. Trayling, H. Outa, T. Taniguchi, Y. Yamashita and R. Seki, *Observation of kaonic hydrogen atom x rays*, Phys. Rev. **C58**, 2366 (1998).
- S.N. Nakamura, M. Iwasaki, K. Bartlett, G.A. Beer, D.R. Gill, R.S. Hayano, T.M. Ito, M. Kuwata, L. Lee, G. Mason, H. Ohkubo, A. Olin, H. Outa, M. Salomon, R. Seki, K. Shibuya, T. Taniguchi, T.P. Terada, G. Trayling, T. Watanabe, Y. Yamashita and S. Yen, *A new approach to measure kaonic hydrogen x-rays*, Nucl. Instrum. Methods **A408**, 438 (1998).
- G. Suft, P. Amaudruz, E. Boschitz, B. van den Brandt, B. Brinkmoller, A. Glombik, J. Goetz, W. Gruebler, P. Hautle, J.A. Konter, W. Kretschmer, M. Lauterbach, S. Mango, R. Meier, C. Riedel, R. Tacik and R. Weidmann, *Polarization transfer observables in πd elastic scattering*, Phys. Lett. **B425**, 19 (1998).
- D.H. Wright, S. Ahmad, D.S. Armstrong, G. Azuelos, W. Bertl, M. Blecher, C.Q. Chen, P. Depommier, B.C. Doyle, T. von Egidy, T.P. Gorringer, P. Gumplinger, M.D. Hasi-noff, D. Healey, G. Jonkmans, A.J. Larabee, J.A. Macdonald, S.C. McDonald, M. Munro, J.M. Poutissou, R. Poutissou, B.C. Robertson, D.G. Sample, E. Saettler, C.N. Sigler, G.N. Taylor and N.S. Zhang, *Measurement of the induced pseudoscalar coupling using radiative muon capture on hydrogen*, Phys. Rev. **C57**, 373 (1998).
- R. Tacik, F. Farzanpay, E.L. Mathie, P. Amaudruz, J.T. Brack, L. Felawka, R. Meier, D. Ottewell, G.R. Smith, G. Hofman, M. Kermani, S. McFarland, K. Raywood, M. Sevier, F. Bonutti, P. Camerini, N. Grion, R. Rui and E.F. Gibson, *Pion absorption in ^{12}C* , Phys. Rev. **C57**, 1295 (1998).
- J.B. Lange, F. Duncan, A. Feltham, G. Hofman, R.R. Johnson, G. Jones, M. Pavan, K.J. Raywood, D. Vetterli, J.T. Brack, D. Ottewell, G.R. Smith and M.E. Sevier, *Determination of the $\pi^\pm p \rightarrow \pi^\pm \pi^+ n$ cross section near threshold*, Phys. Rev. Lett. **80**, 1597 (1998).
- M. Kermani, O. Patarakin, G.R. Smith, P.A. Amaudruz, F. Bonutti, J.T. Brack, P. Camerini, L. Felawka, E. Fragiacomio, E.F. Gibson, N. Grion, G.J. Hofman, E.L. Mathie, S. McFarland, R. Meier, D. Ottewell, K. Raywood, R. Rui, M.E. Sevier, R. Tacik, V. Mayorov and V. Tikhonov, *$\pi\pi \rightarrow \pi\pi$ cross sections near threshold*, Phys. Rev. **C58**, 3431 (1998).

- M. Kermani, P.A. Amaudruz, F. Bonutti, J.T. Brack, P. Camerini, L. Felawka, E. Fragiaco, E.F. Gibson, N. Grion, G.J. Hofman, R.R. Johnson, E.L. Mathie, S. McFarland, R. Meier, D. Ottewell, K. Raywood, R. Rui, M.E. Seviar, G.R. Smith and R. Tacik, *Exclusive measurements of $\pi^\pm p \rightarrow \pi^\pm \pi^\pm n$ near threshold*, Phys. Rev. **C58**, 3419 (1998).
- G.J. Hofman, G.R. Smith, T. Ambardar, F. Bonutti, J.T. Brack, P. Camerini, J. Clark, P. Delheij, F. Farzanpay, L. Felawka, E. Fragiaco, E.F. Gibson, J. Graeter, N. Grion, M. Kermani, E.L. Mathie, R. Meier, D. Ottewell, R.J. Peterson, R.A. Ristinen, R. Rui, M.E. Seviar, H. Staudenmaier, R. Tacik and G. Wagner, *Analyzing powers for $\pi^\pm \bar{p}$ elastic scattering between 87 and 263 MeV*, Phys. Rev. **C58**, 3484 (1998).
- F. Bonutti, P. Camerini, E. Fragiaco, N. Grion, R. Rui, J.T. Brack, L. Felawka, E.F. Gibson, G.J. Hofman, M. Kermani, E.L. Mathie, S. McFarland, R. Meier, D. Ottewell, K. Raywood, M.E. Seviar, G.R. Smith, R. Tacik and M. Vicente-Vacas, $\pi^+ \rightarrow \pi^+ \pi^\pm$ on deuterium at $T_{\pi^+} = 283$ MeV, Nucl. Phys. **A638**, 729 (1998).
- J. Gräter, R. Bilger, H. Clement, R. Meier, G.J. Wagner, E. Friedman, M. Schepkin, P.A. Amaudruz, L. Felawka, D. Ottewell, G.R. Smith, A. Ambardar, G.J. Hofman, M. Kermani, G. Tagliente, F. Bonutti, P. Camerini, N. Grion, R. Rui, P. Hong, E.L. Mathie, R. Tacik, J. Clark, M.E. Seviar and O. Patarakin, *The ${}^4\text{He}(\pi^+, \pi^-)$ reaction at low energies*, Phys. Lett. **B420**, 37 (1998).
- J. Gräter, R. Bilger, H. Clement, R. Meier, G.J. Wagner, E. Friedman, M. Schepkin, P.A. Amaudruz, L. Felawka, D. Ottewell, G.R. Smith, A. Ambardar, G.J. Hofman, M. Kermani, G. Tagliente, F. Bonutti, P. Camerini, N. Grion, R. Rui, P. Hong, E.L. Mathie, R. Tacik, J. Clark, M.E. Seviar and O. Patarakin, *Energy dependence of the ${}^4\text{He}(\pi^+, \pi^-)$ total cross section*, Phys. Rev. **C58**, 1576 (1998).
- J.C. Chow, A.C. Morton, R.E. Azuma, N. Bateman, R.N. Boyd, L. Buchmann, J.M. D'Auria, T. Davinson, M. Domb-sky, W. Galster, E. Gete, U. Giesen, C. Iliadis, K.P. Jackson, J.D. King, G. Roy, T. Shoppa and A. Shotter, *Three-particle breakup of the isobaric analog state in ${}^{17}\text{F}$* , Phys. Rev. **C57**, R475 (1998).
- T.A. Swanson, J.A. Behr, A. Gorelov, D. Melconian, D. Asgeirsson, *Efficient transfer in a double magneto-optical trap system*, J. Optical Soc. of America **B** (1998).
- J. Goerres, J. Meissner, H. Schatz, E. Stech, P. Tischauser, M. Wiescher, D. Bazin, R. Harkewicz, M. Hellstroem, B. Sherrill, M. Steiner, R.N. Boyd, L. Buchmann, D.H. Hartmann and J.D. Hinnefeld, *Half-life of ${}^{44}\text{Ti}$ as a probe for supernova models*, Phys. Rev. Lett. **80**, 2554 (1998).
- S. Adler *et al.* (E787 collaboration), *Upper limit on the decay $K^+ \rightarrow e^+ \nu \mu^+ \mu^-$* , Phys. Rev. **D58**, 012003 (1998) [TRI-PP-98-1].
- N.C. Mukhopadhyay, Liu-Jun, M.J. Ramsey-Musolf, C.T. Storrs, S.J. Pollock and H.-W. Hammer, *Parity-violating excitation of the $\Delta(1232)$: hadron structure and new physics*, Nucl. Phys. **A633**, 481 (1998).
- F. Duncan, H. Hahn, C. Aclander, D. Ashery, E.G. Auld, D.R. Gill, D.A. Hutcheon, G. Jones, E. Korkmaz, S. Maytal-Beck, M.A. Moinester, J.A. Niskanen, D. Ottewell, A. Rahav, S. Ram, M. Seviar, P.L. Walden and R. Weiss, *Differential cross section of the $pn \rightarrow pp({}^1S_0)\pi^-$ reaction extracted from $pd \rightarrow \pi^- ppp$* , Phys. Rev. Lett. **80**, 4390 (1998) [TRI-PP-97-72].
- K. Ackerstaff *et al.* (OPAL collaboration), *Search for chargino and neutralino production at $\sqrt{s} = 170$ GeV and 172 GeV at LEP*, Eur. Phys. J. **C2**, 213 (1998) [CERN-PPE-97-083].
- K. Ackerstaff *et al.* (OPAL collaboration), *Measurement of the quark to photon fragmentation function through the inclusive production of prompt photons in hadronic Z^0 decays*, Eur. Phys. J. **C2**, 39 (1998) [CERN-PPE-97-086].
- K. Ackerstaff *et al.* (OPAL collaboration), *Measurement of $f(c \rightarrow D^{*+} X)$, $f(b \rightarrow D^{*+} X)$ and $\Gamma_{c\bar{c}}/\Gamma_{had}$, using $D^{*\pm}$ mesons*, Eur. Phys. J. **C1**, 439 (1998) [CERN-PPE-97-093].
- K. Ackerstaff *et al.* (OPAL collaboration), *A measurement of the B_s^0 lifetime using reconstructed D_s^- mesons*, Eur. Phys. J. **C2**, 407 (1998) [CERN-PPE-97-095].
- K. Ackerstaff *et al.* (OPAL collaboration), *Tests of the standard model and constraints on new physics from measurements of fermion pair production at 130 GeV to 172 GeV at LEP*, Eur. Phys. J. **C2**, 441 (1998) [CERN-PPE-97-101].
- K. Ackerstaff *et al.* (OPAL collaboration), *Polarization and forward-backward asymmetry of lambda baryons in hadronic Z^0 decays*, Eur. Phys. J. **C2**, 49 (1998) [CERN-PPE-97-104].
- K. Ackerstaff *et al.* (OPAL collaboration), *Multiplicity distributions of gluon and quark jets and tests of QCD analytic predictions*, Eur. Phys. J. **C1**, 479 (1998) [CERN-PPE-97-105].
- K. Ackerstaff *et al.* (OPAL collaboration), *Multiphoton final states in e^+e^- collisions at $\sqrt{s} = 130$ GeV – 172 GeV*, Eur. Phys. J. **C1**, 21 (1998) [CERN-PPE-97-109].
- K. Ackerstaff *et al.* (OPAL collaboration), *Search for the standard model Higgs boson in e^+e^- collisions at $\sqrt{s} = 161$ GeV – 172 GeV*, Eur. Phys. J. **C1**, 425 (1998) [CERN-PPE-97-115].
- K. Ackerstaff *et al.* (OPAL collaboration), *Measurement of the W boson mass and W^+W^- production and decay properties in e^+e^- collisions at $\sqrt{s} = 172$ GeV*, Eur. Phys. J. **C1**, 395 (1998) [CERN-PPE-97-116].
- K. Ackerstaff *et al.* (OPAL collaboration), *Search for a massive di-photon resonance at $\sqrt{s} = 91$ GeV – 172 GeV*, Eur. Phys. J. **C1**, 31 (1998) [CERN-PPE-97-121].
- K. Ackerstaff *et al.* (OPAL collaboration), *Search for unstable heavy and excited leptons in e^+e^- collisions at $\sqrt{s} =$*

- 170 GeV – 172 GeV, Eur. Phys. J. **C1**, 45 (1998) [CERN-PPE-97-123].
- K. Ackerstaff *et al.* (OPAL collaboration), *Search for anomalous production of dilepton events with missing transverse momentum in e^+e^- collisions at $\sqrt{s} = 161$ GeV and 172 GeV*, Eur. Phys. J. **C4**, 47 (1998) [CERN-PPE-97-124].
- K. Ackerstaff *et al.* (OPAL collaboration), *Measurement of triple gauge boson couplings from W^+W^- production at $\sqrt{s} = 172$ GeV*, Eur. Phys. J. **C2**, 597 (1998) [CERN-PPE-97-125].
- K. Ackerstaff *et al.* (OPAL collaboration), *Search for anomalous production of photonic events with missing energy in e^+e^- collisions at $\sqrt{s} = 130$ GeV to 172 GeV*, Eur. Phys. J. **C2**, 607 (1998) [CERN-PPE-97-132].
- K. Ackerstaff *et al.* (OPAL collaboration), *Search for the B/C meson in hadronic Z^0 decays*, Phys. Lett. **B420**, 157 (1998) [CERN-PPE-97-137].
- K. Ackerstaff *et al.* (OPAL collaboration), *Measurement of the one prong hadronic tau branching ratios at LEP*, Eur. Phys. J. **C4**, 193 (1998) [CERN-PPE-97-152].
- K. Ackerstaff *et al.* (OPAL collaboration), *Search for an excess in the production of four jet events from e^+e^- collisions at $S(1/2) = 130$ GeV – 184 GeV*, Phys. Lett. **B429**, 399 (1998) [CERN-EP-98-013].
- K. Ackerstaff *et al.* (OPAL collaboration), *A search for neutral Higgs bosons in the MSSM and models with two scalar field doublets*, Eur. Phys. J. **C5**, 19 (1998) [CERN-EP-98-029].
- K. Ackerstaff *et al.* (OPAL collaboration), *An upper limit on the anomalous magnetic moment of the τ lepton*, Phys. Lett. **B421**, 188 (1998) [CERN-EP-98-033].
- K. Ackerstaff *et al.* (OPAL collaboration), *Search for stable and longlived massive charged particles in e^+e^- collisions at $\sqrt{s} = 130$ GeV – 183 GeV*, Phys. Lett. **B433**, 195 (1998) [CERN-EP-98-039].
- K. Ackerstaff *et al.* (OPAL collaboration), *An upper limit for the τ neutrino mass from $\tau \rightarrow 5\pi^\pm\nu_\tau$ decays*, Eur. Phys. J. **C5**, 229 (1998) [CERN-EP-98-055].
- K. Ackerstaff *et al.* (OPAL collaboration), *Bose-Einstein correlations of three charged pions in hadronic Z^0 decays*, Eur. Phys. J. **C5**, 239 (1998) [CERN-EP-98-068].
- K. Ackerstaff *et al.* (OPAL collaboration), *Multiphoton production in e^+e^- collisions at $\sqrt{s} = 183$ GeV*, Phys. Lett. **B438**, 379 (1998) [CERN-EP-98-092].
- K. Ackerstaff *et al.* (OPAL collaboration), *Search for Higgs bosons and new particles decaying into two photons at $\sqrt{s} = 183$ GeV*, Phys. Lett. **B437**, 218 (1998) [CERN-EP-98-093].
- K. Ackerstaff *et al.* (OPAL collaboration), *Production of χ_{c2} mesons in photon-photon collisions at LEP*, Phys. Lett. **B439**, 197 (1998) [CERN-EP-98-106].
- G. Abbiendi *et al.* (OPAL collaboration), *Measurement of the average polarization of B baryons in hadronic Z^0 decays*, Phys. Lett. **B444**, 539 (1998) [CERN-EP-98-119].
- G. Abbiendi *et al.* (OPAL collaboration), *First measurement of Z/γ^* production in Compton scattering of quasi-real photons*, Phys. Lett. **B438**, 391 (1998) [CERN-EP-98-120].
- G. Abbiendi *et al.* (OPAL collaboration), *Measurement of the longitudinal cross-section using the direction of the thrust axis in hadronic events at LEP*, Phys. Lett. **B440**, 393 (1998) [CERN-EP-98-124].

Instrumentation/Accelerator Physics/Computing Sciences

O. Biebel, S. Braibant, S.J. deJong, R. Hammarstrom, R. Hilgers, A.K. Honma, P. Jovanovic, J.A. Lauber and H.A. Neal, *Radiation monitoring and beam dump system of the OPAL silicon microvertex detector*, Nucl. Instrum. Methods **A402**, 351 (1998) [CERN-PPE-97-091].

E.W. Blackmore, D.A. Bryman, Y. Kuno, C. Lim, T. Numao, P. Padley, G. Redlinger, R. Soluk and R.A. McPherson, *Central tracking chamber with inflated cathode-strip foils*, Nucl. Instrum. Methods **A404**, 295 (1998) [TRI-PP-96-39].

T.A. Shibata, Y. Sakemi, H. Kobayashi, S. Yoneyama, T. Harano, K. Shibatani, M. Kurisuno, H. Ogami and C.A. Miller, *A high precision laser alignment monitoring system for HERMES tracking detectors*, Nucl. Instrum. Methods **A411**, 75 (1998).

J.G. Rogers, C. Moisan, I.M. Thorson and M.S. Andreaco, *A 7–9 MeV isotopic gamma ray source for detector testing*, Nucl. Instrum. Methods **A413**, 249 (1998) [TRI-PP-96-7].

G. Sciolla *et al.*, *The BaBar drift chamber*, Nucl. Instrum. Methods **A419**, 310 (1998).

W.Z. Gelbart *et al.*, *In situ thickness measurements in molecular beam epitaxy using alpha particle energy loss*, Surface Coatings and Tech. **94–95**, 374 (1998).

W.Z. Gelbart *et al.*, *Film thickness and composition monitoring during growth by molecular beam epitaxy using alpha particle energy loss*, App. Phys. Lett. **72**, 3288 (1998).

Chemistry and Solid-State Physics

D.C. Walker, *Kinetic isotope effects in solution: Reactions of muonium atoms as H isotopes*, J. Chem. Soc., Faraday Trans. **94**, 1 (1998).

G.M. Luke, Y. Fudamoto, K.M. Kojima, M.I. Larkin, J. Merin, B. Nachumi, Y.J. Uemura, Y. Maeno, Z.Q. Mao, Y. Mori, H. Nakamura and M. Sigrist, *Time reversal symmetry breaking superconductivity in Sr_2RuO_4* , Nature **394**, 558 (1998).

V. Storchak and N.V. Prokof'ev, *Muon/muonium quantum diffusion – review article*, Rev. Mod. Phys. **70**, 929 (1998).

V. Storchak, J.H. Brewer and S.F.J. Cox, *Quantum diffusion in cryocrystals studied by muon spin relaxation*, J. Low Temp. Phys. **111**, 303 (1998).

D.E. MacLaughlin, R.H. Heffner, G.J. Nieuwenhuys, G.M. Luke, Y. Fudamoto, Y.J. Uemura, R. Chau, M.B. Maple and B. Andraka, *Susceptibility inhomogeneity and non-Fermi-liquid behaviour in nominally ordered UCu_4Pd* , Phys. Rev. **B58** (Rapid Comm.), R11849 (1998).

D.R. Noakes, G.M. Kalvius, R. Wäppling, C.E. Stronach, M.F. White, H. Saito and K. Fukamichi, *Spin dynamics and freezing in magnetic rare-earth quasicrystals*, Phys. Lett. **A238**, 197 (1998).

W.J. Kossler, Y.X. Dai, K.G. Petzinger, A.J. Greer, D.Ll. Williams, E. Koster, D.R. Harshman and D. Mitzi, *Transparency of the ab planes of $Bi_2Sr_2CaCu_2O_{8+\delta}$ to magnetic fields*, Phys. Rev. Lett. **80**, 592, (1998).

Life Sciences

G.L-Y. Chan, J.E. Holden, J. Stoessl, D.J. Doudet, T. Dobko, K.S. Morrison, C.L. English, J.M. Huser, B. Legg, M. Schulzer and T.J. Ruth, *Reproducibility of [^{11}C]Sch23390 distribution, a dopamine D1 receptor tracer in normal human subjects*, J. Nucl. Med. **39**, 792 (1998).

D.J. Doudet, G.L.Y. Chan, J.E. Holden, E. McGeer, T.A. Aigner, R.J. Wyatt and T.J. Ruth, *6-Fluoro-L-Dopa PET studies of the turnover of dopamine in MPTP-induced Parkinsonism in monkeys*, Synapse **29**, 225 (1998).

N.M. Crawford and A.D.M. Glass, *Molecular and physiological aspects of nitrate uptake in plants*, Trends in Plant Science **3**, 381 (1998).

H.J. Kronzucker, R.D. Guy, K. Kirk, M.Y. Siddiqi and A.D.M. Glass, *Effects of hypoxia on $^{13}NH_4^+$ uptake in rice roots: kinetics and compartmental analysis*, Plant Physiol. **116**, 581 (1998).

Y. Wang, J.E. Holden, G.L-Y. Chan, T. Dobko, E. Mak, M. Schulzer, J.M. Huser, B.J. Snow, T.J. Ruth, D.B. Calne and A.J. Stoessl, *Age-dependent decline of dopamine D1 receptors in human brain: a PET study*, Synapse **30**, 56 (1998).

Setyawati, K.H. Thompson, Y. Sun, D.M. Lyster, C. Vo, V.G. Yuen, J.H. McNeill, T.J. Ruth, S. Zeisler and C. Orvig, *Vanadium uptake, distribution and excretion of ^{48}V -labeled compounds in rat. Comparison of bis(malto)oxovanadium(IV) (BMOV) and vanadyl sulfate trihydrate (VS) by conventional and compartmental analyses*, J. App. Physiol. **84**, 569 (1998).

T.R. Oakes, V. Sossi and T.J. Ruth, *Normalization for 3D PET with a low-scatter planar source and measured geometric factors*, Phys. Med. Biol. **43**, 961 (1998).

V. Sossi, T.R. Oakes and T.J. Ruth, *A comprehensive evaluation of quantitation for 3D PET brain imaging using phantom studies*, Physics Med. Biol. **43**, 2615 (1998).

A. Kishore, T.G. Nygaard, R. de la Fuente-Fernandez, A.B. Naini, M. Schulzer, E. Mak, T.J. Ruth, A.J. Stoessl, D.B. Calne and B.J. Snow, *Striatal D2 receptors in symptomatic and asymptomatic carriers of dopa-responsive dystonia measured with [^{11}C]raclopride and positron emission tomography*, Neurology **50**, 1028 (1998).

Theoretical Program

H.W. Fearing and S. Scherer, *Virtual Compton scattering off spin zero particles at low energies*, Few Body Systems **23**, 111 (1998) [TRI-PP-96-28].

H.W. Fearing, *Nucleon nucleon bremsstrahlung: an example of the impossibility of measuring off-shell amplitudes*, Phys. Rev. Lett. **81**, 758 (1998).

C.P. Burgess, A. de la Macorra, I. Maksymyk and F. Quevedo, *Supersymmetric models with product groups and field dependent gauge couplings*, JHEP **9809**, 007 (1998).

L.L. Barz, H. Forkel, H.-W. Hammer, F.S. Navarra, M. Nielsen and M.J. Ramsey-Musolf, *K^* mesons and nucleon strangeness*, Nucl. Phys. **A640**, 259 (1998) [DOE-ER-40561-345].

P.F. Bedaque, H.-W. Hammer and U. van Kolck, *Effective theory for neutron deuteron scattering: energy dependence*, Phys. Rev. **C58**, R641 (1998) [TRI-PP-98-2, DOE-ER-40561-356, KRL MAP-219].

R. Lewis and R.M. Woloshyn, *$\mathcal{O}(1/M^3)$ effects for heavy-light mesons in lattice NRQCD*, Phys. Rev. **D58**, 074506 (1998) [TRI-PP-98-3, JLAB-THY-98-05, hep-lat/9803004].

B.K. Jennings and S. Karataglidis, *$S_{\text{eff}}(E)$ and the $^7\text{Be}(p, \gamma)^8\text{B}$ reaction*, Phys. Rev. **C58**, 3002 (1998).

B.K. Jennings, S. Karataglidis and T.D. Shoppa, *Extrapolation of the astrophysical S factor for $^7\text{Be}(p, \gamma)^8\text{B}$ to solar energies*, Phys. Rev. **C58**, 3711 (1998).

B.K. Jennings, S. Karataglidis and T.D. Shoppa, *Direct capture astrophysical S factors at low energy*, Phys. Rev. **C58**, 579 (1998).

H. Müller and B.K. Jennings, *Critical analysis of quark-meson coupling models for nuclear matter and finite nuclei*, Nucl. Phys. **A640**, 55 (1998).

H. Müller, *Properties of finite nuclei in the modified quark-meson coupling model*, Phys. Rev. **C57**, 1974 (1998).

V.E. Shapiro, *The gyro force of high frequency fields lost by the concept of effective potential*, Phys. Lett. **A238**, 147 (1998) [TRI-PP-97-70].

A.M. Rakhimov, F.C. Khanna, U.T. Yakhshev and M.M. Musakhanov, *Density dependence of meson nucleon vertices in nuclear matter*, Nucl. Phys. **A643**, 383 (1998).

A. Rakhimov, M.M. Musakhanov, F.C. Khanna and U. Yakhshev, *Medium modification of nucleon properties in*

Skyrme model, Phys. Rev. **C58**, 1738 (1998) [NUCLTH-9609049].

A.E. Santana, F.C. Khanna and Y. Takahashi, *Galilei covariance and (4, 1) de Sitter space*, Prog. Theor. Phys. **99**, 327 (1998).

T.R. Hemmert, B.R. Holstein, J. Kambor and G. Knochlein, *Compton scattering and the spin structure of the nucleon at low-energies*, Phys. Rev. **D57**, 5746 (1998) [TRI-PP-97-20, ZU-TH-18/97, MKPH-T-97-21].

V. Bernard, H.W. Fearing, T.R. Hemmert and U.-G. Meissner, *The form factors of the nucleon at small momentum transfer*, Nucl. Phys. **A635**, 121 (1998); Nucl. Phys. **A642**, 563 (1998) [KFA-IKP(TH)-1998-01, LPT-98-01, TRI-PP-97-73].

D.H. Wilkinson *Phase space for neutron beta-decay: an update*, Nucl. Instrum. Methods **A404**, 305 (1998).

D.H. Wilkinson, *Evaluation of beta-decay. Pt. VII. The Z-independent outer radiative correction for unique-forbidden decay*, Nucl. Instrum. Methods **A406**, 89 (1998).

D.H. Wilkinson, *The rate of semi-leptonic hyperon decay in recoil order*, Nucl. Instrum. Methods **A413**, 457 (1998).

V.G.J. Stoks, *Can the magnetic moment contribution explain the A(Y) puzzle?*, Phys. Rev. **C57**, 445 (1998) [NUCLTH-9710068].

C. Alexandrou, R. Rosenfelder and A.W. Schreiber, *Variational field theoretical approach to relativistic scattering*, Nucl. Phys. **A628**, 427 (1998) [UCY-PHY-96-7].

Journal Publications In Press or Submitted

Particle, Nuclear and Atomic Physics

B.A. Mofteh, E. Gete, D.F. Measday, D.S. Armstrong, J. Bauer, T.P. Gorringer, B.L. Johnson, B. Siebels and S. Stanislaus, *Muon capture in ^{28}Si and g_p/g_a* (Phys. Lett. B, in press) [TRI-PP-97-3].

G.M. Marshall, T.A. Porcelli, A. Adamczak, J.M. Bailey, G.A. Beer, M.P. Faifman, M.C. Fujiwara, T.M. Huber, R. Jacot-Guillarmod, P. Kammel, S.K. Kim, P.E. Knowles, A.R. Kunselman, M. Maier, V.E. Markushin, G.R. Mason, F. Mulhauser, A. Olin, C. Petitjean and J. Zmeskal, *Resonant formation measurements of $d\tau$ via time of flight*, (Hyp. Int., in press).

T.M. Huber, A. Adamczak, J.M. Bailey, G.A. Beer, J.L. Beveridge, B.P. Ellerbusch, M.C. Fujiwara, R. Jacot-Guillarmod, P. Kammel, S.K. Kim, P.E. Knowles, A.R. Kunselman, G.J. Lindquist, M. Maier, V.E. Markushin, G.M. Marshall, C.J. Martoff, G.R. Mason, F. Mulhauser, A. Olin, C. Petitjean, T.A. Porcelli, J. Woźniak and J. Zmeskal, *Time-of-flight studies of emission of $\mu\tau$ from frozen hydrogen films*, (Hyp. Int., in press).

M.C. Fujiwara, A. Adamczak, J.M. Bailey, G.A. Beer, J.L. Beveridge, M.P. Faifman, T.M. Huber, R. Jacot-

Guillarmod, P. Kammel, S.K. Kim, P.E. Knowles, A.R. Kunselman, M. Maier, V.E. Markushin, G.M. Marshall, C.J. Martoff, G.R. Mason, F. Mulhauser, A. Olin, C. Petitjean, T.A. Porcelli, J. Woźniak and J. Zmeskal, *Time-of-flight spectroscopy of muonic tritium*, (Hyp. Int., in press).

HERMES collaboration, *Beam induced nuclear depolarization in a gaseous polarized hydrogen target* (Phys. Rev. Lett., in press) [DESY-98-058, hep-ex/9896006].

J. Graeter, P.A. Amaudruz, R. Bilger, P. Camerini, J. Clark, H. Clement, E. Friedman, L. Felawka, S.N. Filippov, E. Fragiaco, Yu. K. Gavrilov, E. Gibson, N. Grion, G.J. Hofman, B. Jamieson, T.L. Karavicheva, M. Kermani, E.L. Mathie, R. Meier, G. Maloney, D. Ottewell, J. Paetzold, O. Patarakin, K. Raywood, R. Rui, M. Schepkin, M.E. Sevier, G.R. Smith, H. Staudenmaier, R. Tacik, G. Tagliente, G.J. Wagner and M. Yoemans, *Search for a bound trineutron with the $^3\text{He}(\pi^-, \pi^+)nnn$ reaction* (Eur. Phys. J. A, in press).

A.J.T. Jull, S. Cloudt, D.J. Donahue, J.M. Sisterson, R.C. Reedy and J. Masarik, *^{14}C depth profiles in Apollo 15 and 17 cores and lunar rock 68815* (Geochim. et Cosmochim. Acta., in press).

R. Tacik, E.L. Mathie, P. Amaudruz, J.T. Brack, L. Felawka, R. Meier, D. Ottewell, G.R. Smith, G. Hofman, M. Kermani, S. McFarland, K. Raywood, M. Sevier, F. Bonutti, P. Camerini, N. Grion, R. Rui and E.F. Gibson, *Simultaneous study of the $^{12}\text{C}(\pi^+, pd)$ and $^{12}\text{C}(\pi^+, ppd)$ reactions* (submitted to Phys. Rev. C).

J. Zhao, R. Abegg, A.R. Berdoz, J. Birchall, J.R. Campbell, C.A. Davis, P.P.J. Delheij, L. Gan, P.W. Green, L.G. Greeniaus, D.C. Healey, R. Helmer, N. Kolb, E. Korkmaz, L. Lee, C.D.P. Levy, J. Li, C.A. Miller, A.K. Opper, S.A. Page, H. Postma, W.D. Ramsay, J. Soukup, G.M. Stinson, W.T.H. van Oers and A.N. Zelenski, *Precision measurement of charge symmetry breaking in np elastic scattering at 347 MeV* (submitted to Phys. Rev. C) [TRI-PP-97-4].

M. Benjamintz, W.R. Falk, J.R. Campbell, A. Green, P.G. Roos, P.L. Walden, S. Yen, A.G. Ling, E.G. Auld, E. Korkmaz and M.A. Punyasena, *Investigation of the $^{12}\text{C}(\bar{p}, d\pi^+)^{11}\text{B}$ reaction in the quasifree region* (submitted to Phys. Rev. C).

K. Ackerstaff *et al.* (OPAL collaboration), *Production of K_S^0 and Λ in quark and gluon jets from Z^0 decay* (submitted to Eur. Phys. J.) [CERN-EP-98-058].

K. Ackerstaff *et al.* (OPAL collaboration), *Measurements of flavor dependent fragmentation functions in $Z^0 \rightarrow q\bar{q}$ events* (submitted to Eur. Phys. J.) [CERN-EP-98-089].

K. Ackerstaff *et al.* (OPAL collaboration), *Measurement of τ branching ratios to five charged hadrons* (submitted to Eur. Phys. J.) [CERN-EP-98-090].

K. Ackerstaff *et al.* (OPAL collaboration), *Inclusive production of charged hadrons and K_S^0 mesons in photon-photon collisions* (Eur. Phys. J., in press) [CERN-EP-98-091].

K. Akerstaff *et al.* (OPAL collaboration), *Measurement of the strong coupling constant α_s and the vector and axial vector spectral functions in hadronic tau decays* (submitted to Eur. Phys. J.) [CERN-EP-98-102].

K. Akerstaff *et al.* (OPAL collaboration), *Measurement of the Michel parameters in leptonic tau decays* (submitted to Eur. Phys. J.) [CERN-EP-98-104].

K. Akerstaff *et al.* (OPAL collaboration), *Search for scalar top and scalar bottom quarks at $\sqrt{s} = 183$ GeV at LEP* (submitted to Eur. Phys. J.) [CERN-EP-98-107].

G. Abbiendi *et al.* (OPAL collaboration), *Tests of the standard model and constraints on new physics from measurements of fermion pair production at 183 GeV at LEP* (submitted to Eur. Phys. J.) [CERN-EP-98-108].

G. Abbiendi *et al.* (OPAL collaboration), *Dijet production in photon-photon collisions at $\sqrt{s}_{ee} = 161$ GeV and 172 GeV* (submitted to Eur. Phys. J.) [CERN-EP-98-113].

G. Abbiendi *et al.* (OPAL collaboration), *A study of parton fragmentation in hadronic Z^0 decays using $\Lambda\bar{\Lambda}$ correlations* (submitted to Phys. Lett. B) [CERN-EP-98-114].

G. Abbiendi *et al.* (OPAL collaboration), *Search for acoplanar lepton pair events in e^+e^- collisions at $\sqrt{s} = 161$ GeV, 172 GeV and 183 GeV* (submitted to Eur. Phys. J.) [CERN-EP-98-122].

G. Abbiendi *et al.* (OPAL collaboration), *A measurement of R_b using a double tagging method* (submitted to Eur. Phys. J.) [CERN-EP-98-137].

G. Abbiendi *et al.* (OPAL collaboration), *Search for chargino and neutralino production at $\sqrt{s} = 181$ GeV – 184 GeV at LEP* (submitted to Eur. Phys. J.) [CERN-EP-98-136].

G. Abbiendi *et al.* (OPAL collaboration), *Search for anomalous photonic events with missing energy in e^+e^- collisions at $\sqrt{s} = 130$ GeV, 136 GeV and 183 GeV* (submitted to Eur. Phys. J.) [CERN-EP-98-139, CERN-EP-98-143].

G. Abbiendi *et al.* (OPAL collaboration), *Measurement of the semileptonic branching ratio of charm hadrons produced in $Z^0 \rightarrow c\bar{c}$ decays* (submitted to Eur. Phys. J.) [CERN-EP-98-146].

G. Abbiendi *et al.* (OPAL collaboration), *W^+W^- production and triple gauge boson couplings at LEP energies up to 183 GeV* (submitted to Eur. Phys. J.) [CERN-EP-98-167].

G. Abbiendi *et al.* (OPAL collaboration), *Bose-Einstein correlations in $e^+e^- \rightarrow W^+W^-$ at 172 GeV and 183 GeV* (submitted to Eur. Phys. J.) [CERN-EP-98-174].

G. Abbiendi *et al.* (OPAL collaboration), *A measurement of the $\tau \rightarrow e^-\bar{\nu}_e\nu_\tau$ branching ratio* (submitted to Phys. Lett. B) [CERN-EP-98-175].

G. Abbiendi *et al.* (OPAL collaboration), *A measurement*

of the product branching ratio $f(b \rightarrow \Lambda_b) \cdot BR(\Lambda_b \rightarrow \Lambda X)$ in Z^0 decays (submitted to Eur. Phys. J.) [CERN-EP-98-186].

G. Abbiendi *et al.* (OPAL collaboration), *Search for baryon and lepton number violating Z^0 decays* (submitted to Phys. Lett. B) [CERN-EP-98-194].

G. Abbiendi *et al.* (OPAL collaboration), *Measurement of the B^+ and B^0 lifetimes and search for $CP(T)$ violation using reconstructed secondary vertices* (submitted to Eur. Phys. J.) [CERN-EP-98-195].

G. Abbiendi *et al.* (OPAL collaboration), *Color reconnection studies in $e^+e^- \rightarrow W^+W^-$ at $\sqrt{s} = 183$ GeV* (submitted to J. Phys. B) [CERN-PPE-98-196].

G. Abbiendi *et al.* (OPAL collaboration), *Measurement of the W mass and width in e^+e^- collisions at 183 GeV* (submitted to Phys. Lett. B) [CERN-EP-98-197].

G. Abbiendi *et al.* (OPAL collaboration), *Searches for R parity violating decays of gauginos at 183 GeV at LEP* (submitted to Eur. Phys. J.) [CERN-EP-98-203].

K. Akerstaff *et al.* (HERMES collaboration), *Observation of a coherence length effect in exclusive ρ^0 electroproduction* (submitted to Phys. Rev. Lett.) [DESY-98-178].

Instrumentation/Accelerator Physics/Computing Sciences

M. Landry, J. Birchall, C.A. Davis, W. Faszer, L. Gan, L. Lee, S.A. Page, W.D. Ramsay, M. Salomon and W.T.H. van Oers, *Performance of micro strip gas chambers in BNL-E885: a search for $\Lambda\Lambda$ -hypernuclei* (Nucl. Instrum. Methods A, in press) [TRI-PP-98-4].

P. Botton *et al.*, *Mass discrimination using double-sided silicon microstrip detectors for pions and protons at intermediate energies* (Nucl. Instrum. Methods A, in press).

R. Lange, J.S. Vincent, J.M. D’Auria, U. Geisen and T.J. Ruth, *Production of ^{44}Ti for astrophysical studies* (submitted to Nucl. Instrum. Methods B).

R. Helmer, *The Sudbury Neutrino Observatory* (submitted to IEEE Trans. Nucl. Sci.).

S. Koscielniak, *Longitudinal single bunch coherent instability theory with narrow-band impedances part 1: harmonic oscillator* (submitted to Part. Accel.).

S. Koscielniak, *Longitudinal single bunch coherent instability theory with narrow-band impedances part 2: pendulum oscillator* (submitted to Part. Accel.).

ATLAS collaboration, *ATLAS first-level trigger: technical design report* [CERN-LHCC-98-14].

ATLAS collaboration, *ATLAS trigger performance: status report* [CERN-LHCC-98-15].

ATLAS collaboration, *ATLAS DAQ, EF, LVL2 and DCS: technical progress report* [CERN-LHCC-98-16].

Chemistry and Solid-State Physics

D.R. Noakes, *A correlation length measured by zero-field muon spin relaxation in disordered magnets* (J. Phys. Cond. Matter, in press).

X. Wan, W.J. Kossler, C.E. Stronach and D.R. Noakes, *Cauchy magnetic field component and magnitude distributions studied by the zero-field muon spin relaxation technique* (Hyp. Int., in press).

P.W. Percival, B. Addison-Jones, J.C. Brodovitch, K. Ghandi and J. Schüth, *Free radicals formed by H(Mu) addition to pyrene* (Can. J. Chem., in press).

J.E. Sonier, R.F. Kiefl, J.H. Brewer, D.A. Bonn, S.R. Dunsiger, W.N. Hardy, R. Liang, R.I. Miller, D.R. Noakes and C.E. Stronach, *Expansion of the vortex cores in $YBa_2Cu_3O_{6.95}$ at low magnetic fields* (Phys. Rev. B, in press).

B. Hitti, S.R. Kreitzman, T.L. Estle, E.S. Bates, M.R. Dawdy, T.L. Head and R.L. Lichti, *Dynamics of negative muonium in n-type silicon* (Phys. Rev. B, in press).

V. Storchak, J.H. Brewer, G.D. Morris, D.J. Arseneau and M. Senba, *Muonium formation via electron transport in solid nitrogen* (submitted to Phys. Rev. B).

V. Storchak, J.H. Brewer, D.G. Eshchenko, S.P. Cottrell and S.F.J. Cox, *Destruction of bandlike propagation in orientationally ordered crystals* (submitted to Phys. Rev. Lett.).

Y. Fudamoto, K.M. Kojima, M.I. Larkin, G.M. Luke, J. Merrin, B. Nachumi, Y.J. Uemura, Y. Ueda and M. Isobe, *Static spin freezing in NaV_2O_5 detected by muon spin relaxation* (submitted to Phys. Rev. Lett.).

D.E. MacLaughlin, R.H. Heffner, G.J. Nieuwenhuys, P.C. Canfield, A. Amato, C. Baines, A. Schenck, G.M. Luke, Y. Fudamoto and Y.J. Uemura, *Muon spin relaxation and nonmagnetic Kondo state in $PrInAg_2$* (submitted to Phys. Rev. B).

J.S. Gardner, S.R. Dunsiger, B.D. Gaulin, M.J.P. Gingras, J.E. Greedan, R.F. Kiefl, M.D. Lumsden, W.A. MacFarlane, N.P. Raju, J.E. Sonier, I. Swainson and Z. Tun, *Cooperative paramagnetism in the geometrically frustrated pyrochlore antiferromagnet $Tb_2Ti_2O_7$* (submitted to Phys. Rev. Lett.).

Life Sciences

X. Min, M.Y. Siddiqi, R.D. Guy, A.D.M. Glass and H.J. Kronzucker, *Induction of nitrate uptake and nitrate reductase in trembling aspen and lodgepole pine* (Plant Cell and Environ., in press).

A.D.M. Glass *et al.*, *Inorganic nitrogen absorption by plant roots* (Plant & Soil, in press).

H.J. Kronzucker, A.D.M. Glass and M.Y. Siddiqi, *Inhibition of nitrate uptake by ammonium in barley: analysis of*

component fluxes (Plant Physiol., in press).

X. Min, M.Y. Siddiqi, R.D. Guy, A.D.M. Glass and H.J. Kronzucker, *A comparative study of fluxes and compartmentation of nitrate and ammonium in early successional tree species* (Plant Cell and Environ., in press).

D. Zhou *et al.*, *Differential expression of two putative high affinity NO_3^- transporter genes (Nrt) in arabidopsis* (Plant Journal, in press).

D.J. Doudet, J. Holden, G.L.Y. Chan, S. Jivan, O. DeJesus, T.A. Aigner and T. Ruth, *Investigation of the DA presynaptic function by PET $6\text{-}^{18}\text{Fluoro-L-dopa}$ vs. $6\text{-}^{18}\text{Fluoro-L-m-tyrosine}$* (J. Cereb. Blood Flow Metab., in press).

G.L-Y. Chan, J.E. Holden, A.J. Stoessl, A. Samii, D.J. Doudet, T. Dobko, K.S. Morrison, M.J. Adam, M. Schulzer, D.B. Calne and T. Ruth, *Reproducibility studies with a monoamine vesicular transporter inhibitor in normal human subjects* (J. Nucl. Med., in press).

G.L-Y. Chan, J.E. Holden, J. Stoessl, A. Sammi, D.J. Doudet, T. Dobko, K.S. Morrison, M.J. Adam, M. Schulzer and T.J. Ruth, *Reproducibility of [^{11}C]dihydrotrabenazine positron emission tomography in normal human subjects* (J. Nuc. Med. **39**, in press).

A.J. Stoessl and T.J. Ruth, *Neuroreceptor imaging* (Current Opinion in Neurology, in press).

R. de la Fuente-Fernandez, A. Kishore, B.J. Snow, M. Schulzer, C.S. Lee, T.J. Ruth, A.J. Stoessl and D.B. Calne, *Effect of aging on the dopaminergic function of caudate nuclei in idiopathic Parkinsonism* (Parkinson's and Related Disorders, in press).

V. Sossi, T.R. Oakes, G.L-Y. Chan and T.J. Ruth, *Quantitative comparison of 3D and 2D PET with human brain studies* (J. Nucl. Med., in press).

H. Dougan, J. Hobbs, D.M. Lyster and J.I. Weitz, *High specific activity radiolabeling of organotin DNA* (J. Lab. Cmpds. and Radiopharmaceuticals, in press).

G.L-Y. Chan, J.E. Holden, H-T. Chan, A.J. Stoessl, Y. Wang, D.J. Doudet, T. Dobko, K.S. Morrison, M.J. Adam, M. Schulzer and T.J. Ruth, *Reproducibility of [^{11}C]d-threo-methylphenidate by positron emission tomography and the effect of normal aging on the dopamine transporter availability in normal human subjects* (submitted to J. Cereb. Blood Flow and Anal.).

G.L-Y. Chan, D.J. Doudet, J.E. Holden, C.L. English, J.M. Huser and T.J. Ruth, *Comparison of binding of [^{11}C]SCH 23390 and [^{11}C]SCH 39166 to dopamine D1 receptors using PET in non-human primates* (submitted to J. Cereb. Blood Flow and Anal.).

V. Sossi, T.R. Oakes and T.J. Ruth, *A phantom study evaluating the quantitative aspect of 3D PET imaging of the brain* (submitted to Phys. Med. Biol.).

R. de la Fuente-Fernandez, F.J.G. Vingerhoets, A. Kishore, M. Schulzer, E.K. Mak, T.J. Ruth, B.J. Snow, A.J. Stoessl and D.B. Calne, *Motor fluctuations in idiopathic Parkinsonism are not directly related to the dopaminergic deficit* (submitted to Brain).

L.N. Yatham, P.F. Liddle, J. Dennie, I-S. Shiah, M.J. Adam, C.J. Lane, R.W. Lam and T.J. Ruth, *Effects of desipramine treatment on brain 5-HT₂ receptors in patients with major depression: a positron emission tomography study with [¹⁸F]-setoperone* (submitted to Archives of General Psychiatry).

Theoretical Program

H. Müller, *Effective field theory for $\Lambda - \Sigma^0$ mixing in nuclear matter* (Phys. Rev. C, in press).

A. Plastino, A.R. Plastino, H.G. Miller and F.C. Khanna, *A lower bound for Fisher's information theory* (Phys. Lett. A, in press).

F.X. Lee and D.B. Leinweber, *Light hadron spectroscopy on coarse lattices with $\mathcal{O}(\alpha^2)$ mean field improved actions* (Phys. Rev. D, in press) [CU-NPL-1154].

K.F. Liu, S.J. Dong, T. Draper, D. Leinweber, J. Sloan, W. Wilcox and R.M. Woloshyn, *Valence QCD: connecting QCD to the quark model* (Phys. Rev. D, in press) [UK-98-03].

B.D. Jones and R.M. Woloshyn, *Mesonic decay constants in lattice NRQCD* (Phys. Rev. D, in press) [TRI-PP-98-39].

L.N. Chang, O. Lebedev and J.N. Ng, *On the invisible decays of the Υ and J/Ψ resonances* (submitted to Phys. Rev.) [TRI-PP-98-08].

P.F. Bedaque, H.-W. Hammer and U. van Kolck, *Renormalization of the three-body system with short-range interactions* (submitted to Phys. Rev. Lett.) [TRI-PP-98-17, DOE/ER/40561-28-INT98, KRL MAP-235, NTUW-98-24].

H.-W. Hammer and M.J. Ramsey-Musolf, *Spectral content of isoscalar nucleon form factors* (submitted to Nucl. Phys. A) [DOE/ER/40561-18-INT98, TRI-PP-98-26].

P.F. Bedaque, H.-W. Hammer and U. van Kolck, *The three-boson system with short-range interactions* (submitted to Nucl. Phys. A) [TRI-PP-98-27].

A.S. Rinat and B.K. Jennings, *On the equivalence of the impulse approximation and the Gersch-Rodriguez-Smith series for structure functions* (submitted to Phys. Rev. C) [TRI-PP-98-29, WIS-98/28 Oct-DPP].

H.W. Fearing, *Comment on 'Induced pseudoscalar coupling constant' by Il-Tong Cheon and Myung Ki Cheoun (nucl-th/9811009)* (submitted to Phys. Rev.) [TRI-PP-98-37].

H.-W. Hammer and M.J. Ramsey-Musolf, *$K\bar{K}$ -continuum and isoscalar nucleon form factors* (submitted to Phys. Lett. B) [TRI-PP-98-41].

M. Welsh and H.W. Fearing, *Reply to the comment on 'Validity of certain soft photon amplitudes'* (submitted to Phys. Rev. C) [TRI-PP-98-42].

A.E. Santana, A. Matos Neto, J.D.M. Vianna and F.C. Khanna, *W^* -algebra, Poincare group and the quantum kinetic theory*, (Int. J. Math Phys., in press).

J. Smejkal, E. Truhlik and F.C. Khanna, *Chiral Lagrangians and the transition amplitude for radiative muon capture* (submitted to Few Body Syst.).

H.W. Fearing, *Off-shell effects in nucleon-nucleon bremsstrahlung* (submitted to Phys. Rev. Lett.) [TRI-PP-97-31].

D.H. Wilkinson, *Analysis of super-allowed Fermi beta-decay* (submitted to Nucl. Phys. A) [TRI-PP-97-74].

S. Karataglidis, P.J. Dortmans, K. Amos and C. Bennhold, *Alternative evaluations of halos in nuclei* (submitted to Phys. Rev. Lett.).

Conference Presentations

Particle, Nuclear and Atomic Physics

G.M. Marshall, J.M. Bailey, G.A. Beer, J.L. Beveridge, M.C. Fujiwara, T.M. Huber, R. Jacot-Guillarmod, P. Kammel, S.K. Kim, P.E. Knowles, A.R. Kunselman, M. Maier, G.R. Mason, F. Mulhauser, A. Olin, C. Petitjean, T.A. Porcelli, L.A. Schaller and J. Zmeskal, *Muonic processes in solid hydrogen*, Proc. **Workshop on Physics at the First Muon Collider and at the Front End of the Muon Collider**, eds. S.H. Geer, R. Raja (AIP Conf. Proc. **432**, Woodbury, NY, 1998).

A. Olin, A. Adamczak, G.A. Beer, V.M. Bystritsky, M. Filipowicz, M.C. Fujiwara, T.M. Huber, R. Jacot-Guillarmod, P. Kammel, S.K. Kim, P.E. Knowles, A.R. Kunselman, M. Maier, V.E. Markushin, G.M. Marshall, F. Mulhauser, C. Petitjean, T.A. Porcelli, V.A. Stolupin, J. Woźniak and J. Zmeskal, *Study of μ -catalyzed fusion in H-D mixtures*, Proc. **EXAT'98, Ascona, Switzerland** (Hyp. Int., in press).

F. Mulhauser, A. Adamczak, G.A. Beer, V.M. Bystritsky, M. Filipowicz, M.C. Fujiwara, T.M. Huber, R. Jacot-Guillarmod, P. Kammel, S.K. Kim, P.E. Knowles, A.R. Kunselman, V.E. Markushin, G.M. Marshall, A. Olin, C. Petitjean, T.A. Porcelli, V.A. Stolupin, J. Woźniak and J. Zmeskal, *Scattering of muonic hydrogen atoms, *ibid.**

J. Woźniak, A. Adamczak, G.A. Beer, V.M. Bystritsky, M. Filipowicz, M.C. Fujiwara, T.M. Huber, R. Jacot-Guillarmod, P. Kammel, S.K. Kim, P.E. Knowles, A.R. Kunselman, V.E. Markushin, G.M. Marshall, F. Mulhauser, A. Olin, C. Petitjean, T.A. Porcelli, V.A. Stolupin and J. Zmeskal, *New effects in the low energy scattering of μp atoms, *ibid.**

- S.D. Reitzner, A.K. Opper, R.W. Finlay, K. Hicks, E. Korkmaz, G.V. O’Rielly, D.A. Hutcheon, R. Abegg, P.W. Green, L.G. Greeniaus, D.V. Jordan, P.L. Walden, C.A. Davis, S. Yen, R. Churchman and J.A. Niskanen, *A study of systematic effects in a $np \rightarrow d\pi^0$ charge symmetry breaking experiment*, Proc. **American Physical Society Meeting, Columbus**.
- J. D’Auria *et al.* (DRAGON collaboration), *Studies of the rates of nuclear reactions using the DRAGON separator at the radioactive beam facility, ISAC*, Proc. **5th Nuclei in the Cosmos Conf., Volos, Greece**.
- J. Goerres, J. Meissner, H. Schatz, E. Stech, P. Tischhauser, M. Wiescher, D. Bazin, R. Harkewicz, M. Hellstroem, B. Sherrill, M. Steiner, R.N. Boyd, L. Buchmann, D.H. Hartmann and J.D. Hinnefeld, *Lifetime of ^{44}Ti as a probe for supernova models*, Proc. **Int. Workshop XXVI on Gross Properties of Nuclei and Nuclear Excitations, Hirschegg, Austria, Jan 11-17** (Darmstadt, 1998) p.182.
- A. Astbury, B.A. Campbell, F.C. Khanna, J.L. Pinfold and M.C. Vetterli, eds. Proc. **1998 Lake Louise Winter Institute, February 15–21** (World Scientific, Singapore, in press).
- R.A. Ritchie, F.C. Khanna and H.G. Miller, *Nuclear matter and Landau Ginzberg theory*, *ibid.*
- M.C. Vetterli, *The spin structure of the nucleon*, *ibid.*
- M.G. Vincter, *Flavor asymmetry of the light quark sea from semi-inclusive deep inelastic scattering*, *ibid.*
- R. Kiefl, *Spin polarized radioactive beams for condensed matter physics*, Proc. **Int. Workshop on JHF Science, JHF’98, Tsukuba, March 3–7**, ed. J. Chiba *et al.* (KEK 98-5, 1998) vol. I, 118.
- J.-M. Poutissou, *The status of TRIUMF*, *ibid.*, vol. I, 131.
- K.P. Jackson, *Summary: fundamental and nuclear physics at the JHF E-arena*, *ibid.*, vol. I, 224.
- J. Doornbos, *DC and rf separated kaon beams*, *ibid.*, vol. II, 33.
- P. Schmor, *ISAC project facility status*, *ibid.*, vol. II, 229.
- J.M. D’Auria, *The DRAGON facility at ISAC — a progress report*, *ibid.*, vol. II, 288.
- N. Bateman, *Nuclear spectroscopy needs for astrophysics experiments with radioactive beams*, *ibid.*, vol. II, 304.
- J. Behr, *Neutral atom traps for fundamental studies of beta decays*, *ibid.*, vol. II, 325.
- G.C. Ball, *Gamma-ray spectroscopy with radioactive beams*, *ibid.*, vol. II, 350.
- R.E. Laxdal, *Status of the ISAC post accelerator*, *ibid.*, vol. II, 415.
- M. Dombisky, *High power RIB target issues*, *ibid.*, vol. II, 419.
- P. Bricault, *Design of the target/ion source system at ISAC-TRIUMF*, *ibid.*, vol. II, 422.
- J.E. Sonier, *Measuring the characteristic length scales of superconductivity with μSR* , *ibid.*, vol. III, 294.
- D. Bryman, *Rare decays of kaons and muons*, Proc. **Lepton-Baryon’98, Trento, April 20–25** [TRI-PP-98-32].
- D. Bryman, *Rare and exotic decays*, Proc. **NATO Advanced Study Inst., St. Croix, April 20–25** [TRI-PP-98-33].
- T.J. Stocki and D.F. Measday, *Protecting the world from nuclear fallout through detection*, Proc. **Canadian Radiation Protection Assn. Conf., Ottawa, May** (Bulletin of CRPA **19**, 1998) p.8.
- L. Moritz and J.R. Johnson, *Bioassay requirements for the TRIUMF ISAC facility*, *ibid.*
- R. Bilger *et al.* (LEPS, CHAOS, WASA/PROMICE collaboration), *Hunting the dibaryon $D'(2065)$* , Proc. **Workshop on the Structure of Mesons, Baryons, and Nuclei, Cracow, May 26–30** (Acta Phys. Polon. **B29**, 1998) p.2415.
- D. Bryman, *Rare decays of kaons and muons*, Proc. **Fifth Int. Symp. on Physics Beyond the Standard Model, WEIN’98, Los Alamos, June 14–19**, eds. C. Hoffman, P. Herczeg (World Scientific, Singapore, in press) [TRI-PP-98-31].
- A. Astbury, D. Axen and J. Robinson, eds. Proc. **XXIX Int. Conf. on High Energy Physics, ICHEP’98, Vancouver, July 23–29** (World Scientific, Singapore, in press).
- C.A. Miller, *Polarized quark distributions from deep inelastic scattering*, *ibid.*
- M. Vincter, *Determination of the flavor asymmetry of the light quark sea from unpolarized deep-inelastic scattering at HERMES*, *ibid.*
- D. Bryman, *CP violation, rare decays and lepton flavour violation*, *ibid.* [TRI-PP-98-34].
- A.N. Zelenski, *High-intensity optically pumped polarized H^- ion source development for RHIC and HERA*, Proc. **13th Int. Symp. on High-Energy Spin Physics, SPIN’98, Protvino, September 8–12** [TRI-PP-98-35].
- A.N. Zelenski, N.A. Titov, Y. Kuznetsov, J. Birchall, J.B. Bland, A.A. Hamian, L. Lee, S.A. Page, W.D. Ramsay, W.T.H. van Oers, R.J. Woo, C.A. Davis, R. Laxdal, C.D.P. Levy, P.W. Green, G. Roy, G.M. Stinson, J.D. Bowman and R.E. Mischke, *The TRIUMF parity violation experiment in $p-p$ scattering at 221 MeV*, *ibid.* [TRI-PP-98-36].
- A. Konaka *et al.* (E926 collaboration), *$K_L \rightarrow \pi^0 \nu \bar{\nu}$ at the AGS (E926)*, Proc. **Int. Workshop on CP Violation in K, Tokyo, December 18–19**.

R.L. Poirier, P. Bricault, G. Dutto, K. Fong, R. Laxdal, A.K. Mitra and B. Uzat, *RF tests on the initial 2.8 m section of the 8 m long ISAC RFQ at TRIUMF*, Proc. **Linear Accelerator Conf., Chicago**.

F.W. Jones, *A hybrid fast-multipole technique for space-charge tracking with halos*, Proc. **Workshop on Space Charge Physics in High Intensity Hadron Rings, Shelter Island, NY, May 4–7** (AIP Conf. Proc. 448) [TRI-PP-98-21].

N.R. Stevenson, *A new encapsulated target system for isotope production*, Proc. **6th Canadian Symp. on Isotope Production and Applications, Ottawa, May**.

K.R. Buckley, E.T. Hurtado and T.J. Ruth, *TR-13 cyclotron/PET programme*, **2nd Workshop on Accelerator Operations, WAO'98, Vancouver, May 18–22**.

R. van den Elzen, *Challenges facing TRIUMF-ATG operations*, *ibid.*

J. Orzechowski, *Application of the industrial PM to the cyclotron operation*, *ibid.*

P. Bloemhard, *How the TRIUMF-ATG does business*, *ibid.*

W.Z. Gelbart, N.R. Stevenson *et al.*, *Solid target systems: a brief history*, Proc. **XV Int. Conf. on Cyclotrons and their Applications, Cyclotrons'98, Caen, France, June 14–19** (in press).

G. Dutto, R. Baartman, E. Blackmore, P. Bricault, A. Hurst, T. Kuo, R. Laxdal, B. Milton, R. Poirier, G. Mackenzie, K. Reiniger, P. Schmor, G. Stanford, G. Stinson, J. Welz, L. Root and F. Mammarella, *Recent progress at TRIUMF*, *ibid.* [TRI-PP-98-10].

B.F. Milton, R.J. Dawson, M.P. Dehnel, T. Kuo, R. Ruegg and R. Risler, *Design of an axial injection system for the Seattle MC50 cyclotron*, *ibid.* [TRI-PP-98-14].

M.K. Craddock, *Critical beam-intensity issues in cyclotrons – overview of the Santa Fe workshop*, *ibid.* [TRI-PP-98-18].

M.K. Craddock and D.J. Clark, *John Reginald Richardson*, *ibid.* [TRI-PP-98-19].

T. Kuo, W.Z. Gelbart, N.R. Stevenson *et al.*, *Injection study for high current H^- cyclotrons*, *ibid.* [TRI-PP-98-22].

M.V. Lachinov and B.F. Milton, *Optimized bunching in the spiral inflector of the CYCLONE-44 injection system*, *ibid.* [TRI-PP-98-25].

L. Moritz, *Radiation protection considerations in the design of accelerated radioactive beam facilities*, *ibid.*

A.N. Zelenski, G. Dutto, A.A. Hamian, R. Laxdal, C.D.P. Levy, G.H. Mackenzie, D.W. Ramsay, P. Schmor, N.A. Titov and W.T.H. van Oers, *A high quality polarized cyclotron beam for the TRIUMF parity violation experiment*, *ibid.*

M.J. Barnes, M. Jheeta, G.D. Wait, L. Ducimetière, G.H. Schroeder and E.B. Vossenberg, *Kick sensitivity analysis for the LHC inflectors*, Proc. **22nd Int. Power Modulator Symp., Rancho Mirage, CA, June 22–25** [TRI-PP-98-12].

G. Dutto, C.D.P. Levy, G.W. Wight, A.N. Zelenski, V. Klenov, V.I. Davydenko, J. Alessi, M. Okamura, Y. Mori and T. Takeuchi, *Development of high-current polarized H^- ion sources at TRIUMF*, Proc. **6th European Particle Accelerator Conf. (EPAC'98), Stockholm, June 22–26**, eds. S. Myers, L. Liljeby, Ch. Petit-Jean-Genaz, J. Poole, K.-G. Rensfelt (IOP Publishing, Bristol, 1998) p.290 [TRI-PP-98-09].

D. Kaltchev, M.K. Craddock, R. Servranckx and T. Riselada, *Momentum cleaning in the CERN LHC*, *ibid.* 353 [TRI-PP-98-20].

R. Laxdal, R. Baartman, P. Bricault, G. Dutto, K. Fong, K. Jayamanna, M. McDonald, A. Mitra, R. Poirier, W. Rawnsley, L. Root, P. Schmor, B. Uzat and J. Welz, *Testing the ISAC LEBT and 35 MHz RFQ in an intermediate configuration*, *ibid.* 737 [TRI-PP-98-15].

S. Koscielniak, A. Blas, F. Pedersen, *Explanation of sextupole instability in CERN PS booster*, *ibid.* 969.

A. Boudzko, S. Koscielniak, L. Jensen, R. Jones and H. Schmickler, *SPS and LHC tune control studies using the 'fast map' tool*, *ibid.* 1168.

D. Grier, E. Jensen, R. Losito and A.K. Mitra, *The PS 80 MHz cavities*, *ibid.* 1773.

J. Corlett, D. Li and A. Mitra, *35 MHz re-buncher rf cavity for ISAC at TRIUMF*, *ibid.* 1790.

M.J. Barnes, G.D. Wait, E. Carlier, L. Ducimetière, G.H. Schröder and E.B. Vossenberg, *Measurements on a fast 66 kV resonant charging power supply for the LHC inflectors*, *ibid.* 2278 [TRI-PP-98-11].

P. Schmor, R. Baartman, P. Bricault, M. Dombisky, G. Dutto, R. Laxdal, F. Mammarella, M. McDonald, G. Mackenzie, L. Moritz, R. Poirier, J.-M. Poutissou, G. Stanford, G. Stinson, I. Thorson and J. Welz, *The high intensity radioactive beam facility at TRIUMF*, *ibid.* 2386 [TRI-PP-98-16].

P.L. Gardner and F. Douglass, *A technology transfer framework for global sustainable development*, Proc. **2nd Int. Conf. on Technology Policy and Innovation, Lisbon, August 3–5** [TRI-PP-98-13].

T.J. Ruth, *TRIPL: TRIUMF radioisotope production laboratory*, **15th Int. Conf. on the Application of Accelerators in Research and Industry, Denton, TX, November**.

D.A. Hutcheon (DRAGON collaboration), *A program in nuclear astrophysics using DRAGON at ISAC*, *ibid.* [TRI-PP-98-43].

R.L. Helmer, *The Sudbury Neutrino Observatory*, Proc. **Nuclear Science Symp. and Medical Imaging Conf., NSS/MIC'98, Toronto, November 8–14** (IEEE Trans. Nucl. Sci., in press).

J.G. Rogers and C.J. Batty, *Afterglow in LSO and its effect on energy resolution*, *ibid.* [TRI-PP-98-30].

Chemistry and Solid-State Physics

Y. Fudamoto, K.M. Kojima, M. Larkin, G.M. Luke, J. Mermin, B. Nachumi, Y.J. Uemura, Y. Ueda and M. Isobe, μ SR study of the spin-peierls compound $Na_x V_2 O_5$, Proc. **APS March Meeting (O33 2)**.

Life Sciences

D.J. Doudet, G.L.Y. Chan, T.J. Ruth and A.P. Zis, *In vivo positron emission tomography studies of the effects of ECT on the dopamine receptors*, **Society of Biological Psychiatry**.

A.P. Zis, G.L.Y. Chan, T.J. Ruth and D.J. Doudet, *Effects of ECT on dopamine receptors: An in vivo PET study*, **1998 ACT Scientific Program**.

C.S. Lee, A. Sammi, M. Schulzer, V. Sossi, T.J. Dobko, G.L.Y. Chan, J. Huser, J.-M. Lu, T.J. Ruth, D.B. Calne and A.J. Stoessl, *Heterogeneous severity of lesions in the striatum of patients with Parkinson's disease: in vivo PET studies using dihydrotetrabenazine, methylphenidate and F-DOPA*, **American Academy of Neurology**.

A.J. Stoessl, P. Pal, V. Sossi, J. Wudel, T. Dobko, C.S. Lee, S. Jivan, T.J. Ruth and D.B. Calne, *Dopamine agonist therapy affects uptake of ^{18}F -6-fluorodopa as measured by PET*, *ibid.*

V. Sossi, A.J. Stoessl, A. Samii, C.S. Lee, J.-M. Lu and T.J. Ruth, *Comparison between the B_{max}/K_d plasma-input and tissue-input derived estimates of in DTBZ studies of Parkinson's*, **Neuroimage 7**.

T.J. Ruth, D.J. Doudet, A.J. Stoessl and J.E. Holden, *Monitoring the manipulation of the dopaminergic system through the measurement of the effective turnover with fluorodopa*, **American Chemical Society, Dallas, March**.

T.J. Ruth, *Accelerator production of high specific activity therapeutic radionuclides*, *ibid.*

T.J. Ruth, *Opening remarks*, **Workshop on Medical Imaging with Positron Emitting Isotopes, Pacific Northwest Chapter, Society of Nuclear Medicine, Vancouver, March**.

K.R. Buckley and T.J. Ruth, *In-target chemistry: A review of the production of precursors for PET radiopharmaceuticals*, **Int. Isotope Society, Ottawa, May**.

V. Sossi, M. Krzywinski, P. Cohen, K. Knitzek, K. Hudkins, J. DeRosario, K.S. Morrison, S. Jivan, R.R. Johnson and

T.J. Ruth, *Performance of the ADAC MCD dual head coincidence camera*, **Society of Nuclear Medicine, Toronto, June** (J. Nucl. Med. **39**, 1998) p.173P.

M.J. Adam, *Synthesis of F-18 labelled 2,2-difluoroglucose as a potential imaging agent for PET*, *ibid.*, 231P.

T.R. Oakes, T. Hurtado, S. Jivan and T.J. Ruth, *A positron plane source which approaches the limit of "low scatter"*, *ibid.*

D.J. Doudet, J. Holden, J. Huser, S. Jivan, C. English, G. Chan and T. Ruth, *Density and affinity of D1 and D2-dopamine receptors in monkey: in vivo PET studies with [^{11}C]Sch23390 and [^{11}C]raclopride*, **Neuroreceptor Mapping '98, Ann Arbor, MI, June**.

D.J. Doudet, G.L.Y. Chan, T. Ruth and A. Zis *Studies of the effects of ECT on the dopamine receptors*, **4th Int. Conf. on Functional Mapping of the Human Brain, Montreal, June**.

V. Sossi, M. Krzywinski, P. Cohen, D.A. Mankoff, J. DeRosario and T.J. Ruth, *Effect of count rate on contrast in the ADAC MCD camera*, Proc. **Nuclear Science Symp. and Medical Imaging Conf., NSS/MIC'98, Toronto, November 8–14** (IEEE Trans. Nucl. Sci., in press).

M. Krzywinski, V. Sossi and T.J. Ruth, *Comparison of 3DFBP and FORE, 2DFBP, OSEM, and SAGE with phantom and dynamic human scans in PET*, *ibid.*

Y.N. Yatham, J. Dennie, I-S. Shian, C. Lane, R. Lam, T.J. Ruth and P.F. Liddle, *A positron emission tomography study of the effects of desipramine on brain 5-HT₂ receptors*, **48th Annual Meeting, Canadian Psychiatric Assoc., Halifax, September**.

D.J. Doudet, G. Chan, J. Huser, S. Jivan, C. English and T. Ruth, *In vivo PET studies of the density and affinity of dopamine D1 and D2 receptors in the striatum of normal and MPTP-treated monkeys*, **Int. Basal Ganglia Society, Brewster, MA, October**.

A.J. Stoessl, C.S. Lee, V. Sossi and D.B. Calne, *Imaging studies of the dopamine system in Parkinson's disease*, **iN-ABis'98, December**.

Theoretical Program

S.J. Pollock, N.C. Mukhopadhyay, M. Ramsey-Musolf, H.-W. Hammer and J. Liu, *Parity violating $\Delta(1232)$ electroweak production: axial structure and new physics*, Proc. **Joint ECT*/TJNAF Workshop on N* Physics and Non-perturbative QCD, Trento, Italy, May 18–29**.

R. Lewis and R.M. Woloshyn, *S-wave charmed mesons in lattice NRQCD*, Proc. **16th Int. Symp. on Lattice Field Theory, Lattice'98, Boulder, July 13–18** (North Holland, in press) [TRI-PP-98-23, JLAB-THY-98-34].

B.D. Jones and R.M. Woloshyn, *Vector decay constants in quarkonia*, *ibid.* [TRI-PP-98-24].

H.-W. Hammer, *Effective theory for the non-relativistic three-body system*, Proc. **8th Int. Conf. on the Structure of Baryons, Baryons'98, Bonn, September 22–26** (World Scientific, Singapore, in press) [TRI-PP-98-28].

Past Conference Papers Published In 1998

Particle, Nuclear and Atomic Physics

M. Agnello, P.A. Amaudruz, G. Beer *et al.*, *Hypernuclear physics with stopped K^- at DAΦNE*, Proc. **5th Int. Conf. on Advanced Technology and Particle Physics, Como, Italy, October 7–11, 1996** (Nucl. Phys. B Proc. Suppl. **61B**, 1998), p.601.

D. Axen, H.P. Wellisch and A. Cellers, *Use of application software in the intermediate energy regime at TRIUMF – medical applications*, *ibid.* 678.

M.G. Vincter *et al.* (HERMES collaboration), *HERMES measurement of the spin structure of the nucleon*, Proc. **Conf. on Perspectives in Hadronic Physics, Trieste, 1997** (World Scientific, Singapore, 1998) p.27.

C. Hearty, *CP violation physics with BaBar*, Proc. **1997 Lake Louise Winter Institute: Particles and the Universe (LLWI'97), February 12–16, 1997**, eds. A. Astbury *et al.* (World Scientific, Singapore, 1998) p.305.

A.R. Berdoz, J. Birchall, J.D. Bowman, J.R. Campbell, C.A. Davis, A.A. Green, P.W. Green, A.A. Hamian, D.C. Healey, R. Helmer, S. Kadantsev, Y. Kuznetsov, R. Laxdal, L. Lee, C.D.P. Levy, R.E. Mischke, S.A. Page, W.D. Ramsay, S.D. Reitzner, G. Roy, P. Schmor, A.M. Sekulovich, J. Soukup, G.M. Stinson, T.J. Stocki, V. Sum, N. Titov, W.T.H. van Oers, R.J. Woo and A. Zelenski, *Parity violation in proton-proton scattering*, Proc. **Int. Conf. on Quark Lepton Nuclear Physics: Nonperturbative QCD Hadron Physics and Electroweak Nuclear Processes (QULEN'97), Osaka, May 20–23, 1997**, eds. H. Ejiri, T. Kishimoto, Y. Mizuno, T. Nakano, H. Toki (Nucl. Phys. **A629**, 1998) p.433c [TRI-PP-97-22].

V.G.J. Stoks, *Meson-baryon coupling constants and baryon-baryon interactions*, *ibid.* 205c.

J.D. King, J.C. Chow, A.C. Morton, R.E. Azuma, N. Bate-man, R.N. Boyd, L. Buchmann, J.M. D'Auria, T. Davinson, M. Dombisky, W. Galster, E. Gete, U. Giesen, C. Iliadis, K.P. Jackson, G. Roy, T. Shoppa and A. Shotter, *Information about the $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$ reaction from the β -delayed proton decay of ^{17}F* , Proc. **Tours Symp. on Nuclear Physics III, Tours, September 2–5, 1997** (AIP Conf. Proc. 425, Woodbury, N.Y. 1998).

K. Yamamoto, D. Alburger, B. Bassalleck, A.R. Berdoz, T. Burger, M. Burger, D. Carman, R.E. Chrien, C.A. Davis, H. Fischer, G.B. Franklin, J. Franz, L. Gan, A. Ichikawa, T. Iijima, K. Imai, P. Khaustov, P. Koran, Y. Kondo, M. Landry, L. Lee, J. Lowe, R. Magahiz, M. May, R. McCrady, F. Merrill, C.A. Meyer, S.A. Page, K. Paschke, P.H. Pile, B.P. Quinn, W.D. Ramsay, A. Rusek, R. Sawafta,

R.A. Schumacher, H. Schumit, R.W. Stotzer, R. Sutter, F. Takeuchi, W.T.H. van Oers, M. Yosoi and V. Zeps, *H-dibaryon search via the (K^-, K^+) reaction using a diamond target*, Proc. **6th Int. Conf. on Hypernuclear and Strange Particle Physics, HYP'97, Upton, NY, October 13–18, 1997** (Nucl. Phys. **A639**, 1998) p.371.

M. Iwasaki, K. Bartlett, G.A. Beer, D.R. Gill, R.S. Hayano, T.M. Ito, L. Lee, G. Mason, S.N. Nakamura, A. Olin, H. Outa, M. Salomon, R. Seki, T. Taniguchi, T.P. Terada, G. Trayling, Y. Yamashita and S. Yen, *Discovery of the repulsive energy shift of the kaonic hydrogen 1S state*, *ibid.* 501.

M. Agnello *et al.* (FINUDA collaboration), *FINUDA, the physics program*, *ibid.* 537.

J. Macdonald, *Future stopped $K^+ \rightarrow \pi^+\nu\bar{\nu}$ experiment*, Proc. **Int. KEK Workshop on Kaon, Muon, Neutrino Physics and Future, Tsukuba, October 31–November 1, 1997**, eds. Y. Kuno, T. Shinkawa (KEK Proc. 97-24, JHF-97-8, Tsukuba, 1998) p.93 [TRI-PP-97-71].

D. Bryman, *KEK workshop on kaon, muon and neutrino physics: summary*, *ibid.* 329.

Instrumentation/Accelerator Physics/Computing Sciences

A.N. Zelenski, V.I. Davydenko, V. Klenov, I.I. Morozov, G. Dutto, C.D. Levy, P.W. Schmor, G.W. Wight, A.A. Hamian and W.T. van Oers, *OPPIS development for precision experiments and high energy colliders*, Proc. **7th Int. Workshop on Polarized Gas Targets and Polarized Beams, Urbana, 1997** (AIP Conf. Proc. **421**, 1998) p.372.

A.N. Zelenski, C.D.P. Levy, P.W. Schmor, W.T.H. van Oers, G.W. Wight and G. Dutto, *OPPIS development at TRIUMF*, Proc. **7th RCNP Int. Workshop on Polarized ^3He Beams and Gas Targets and Their Application (HELION'97), Kobe, 1997**, ed. M. Tanaka (Nucl. Instrum. Methods **A402**, 1998), p.185.

T. Sakae, T. Yamamoto, A.N. Zelenski and C.D.P. Levy, *Optical pumping of thick alkali vapor for high-intensity polarized ion source*, *ibid.*, 191.

M. Comyn, M.K. Craddock, M. Reiser and J. Thomson, eds. Proc. **1997 Particle Accelerator Conference (PAC'97), Vancouver, May 12–16, 1997** (IEEE, Piscataway, NJ, 1998).

B.F. Milton, *A high current tandem accelerator for gamma-resonance contraband detection*, *ibid.* 3775 [TRI-PP-97-34].

P.G. Bricault, *Review of radioactive ion beam accelerators*, *ibid.* 925 [TRI-PP-97-35].

F.W. Jones, *Development of the ACCSIM tracking and simulation code*, *ibid.* 2597 [TRI-PP-97-36].

F.W. Jones, *A graphical user interface for RELAX3D*, *ibid.* 2600 [TRI-PP-97-37].

- A.K. Mitra, R.L. Poirier and E. Jensen, *Coarse and fine tuners for the CERN PS 40 MHz bunching cavity*, *ibid.* 3060 [TRI-PP-97-38].
- A.K. Mitra, R.L. Poirier and R. Losito, *Measurements at TRIUMF on an 80 MHz cavity model for the CERN PS upgrade for LHC*, *ibid.* 3063 [TRI-PP-97-39].
- M. D'yachkov and F. Ruggiero, *Broad-band impedance of LHC shielded bellows*, *ibid.* 2648 [TRI-PP-97-40].
- S. Bakhtiari, W.Z. Gelbart, W. Ho and N.R. Stevenson, *Encapsulated target for isotope production cyclotrons*, *ibid.* 3842 [TRI-PP-97-41].
- W. Ho, S. Bakhtiari, W.Z. Gelbart and N.R. Stevenson, *High current encapsulated target system for radioisotope production*, *ibid.* 3845 [TRI-PP-97-42].
- W.R. Rawnsley, K. Fong, S. Fang and J.-P. Papis, *An rf signal processing module for the SPS orbit observation system upgrade*, *ibid.* 2049 [TRI-PP-97-43].
- V.E. Shapiro, *Method of strong focusing*, *ibid.* 1368 [TRI-PP-97-44].
- P.W. Schmor, R. Baartman, P. Bricault, M. Dombisky, G. Dutto, S. Koscielniak, R.E. Laxdal, F. Mammarella, G.H. Mackenzie, R. Poirier, L. Root, G. Stanford, G. Stinson, I. Thorson and J. Welz, *Status of the TRIUMF-ISAC facility for accelerating radioactive beams*, *ibid.* 956 [TRI-PP-97-45].
- G.S. Clark, A.J. Otter and P. Reeve, *Magnets for the CERN PS booster transfer line*, *ibid.* 3336 [TRI-PP-97-46].
- S. Koscielniak, *Robinson-type criteria for beam and rf cavity with delayed, voltage-proportional feedback*, *ibid.* 2389 [TRI-PP-97-47].
- H.J. Tran and S.R. Koscielniak, *Landau damping of the weak head-tail instability for beams with quadratic amplitude-dependent betatron tunes and binomial amplitude distributions*, *ibid.* 1647 [TRI-PP-97-48].
- R. Baartman and J. Welz, *60 keV beam transport line and switch-yard for ISAC*, *ibid.* 2778 [TRI-PP-97-49].
- R. Baartman, *Intrinsic third order aberrations in electrostatic and magnetic quadrupoles*, *ibid.* 1415 [TRI-PP-97-50].
- T. Kuo, D. Yuan, K. Jayamanna, M. McDonald, R. Baartman, G. Mackenzie, P. Bricault, M. Dombisky, P. Schmor, K.-N. Leung, D. Williams and R. Gough, *Initial test results from a multicusp source for TRIUMF's radioactive beams facility*, *ibid.* 2675 [TRI-PP-97-51].
- D.I. Kaltchev, M.K. Craddock, R.V. Servranckx and J.B. Jeanneret, *Numerical optimization of collimator jaw orientations and locations in the LHC*, *ibid.* 153 [TRI-PP-97-52].
- R.E. Laxdal, P.G. Bricault, T. Ries and D.V. Gorelov, *A separated function drift-tube linac for the ISAC project at TRIUMF*, *ibid.* 1194 [TRI-PP-97-53].
- E.W. Blackmore, B. Evans, M. Mouat, C. Duzenli, R. Ma, T. Pickles and K. Paton, *Operation of the TRIUMF proton therapy facility*, *ibid.* 3831 [TRI-PP-97-54].
- R.L. Poirier, P. Bricault, G. Dutto, K. Fong, K. Jensen, R. Laxdal, A.K. Mitra and G. Stanford, *Construction criteria and prototyping for the ISAC RFQ accelerator at TRIUMF*, *ibid.* 1105 [TRI-PP-97-55].
- S. Koscielniak, R.E. Laxdal, R. Lee and L. Root, *Beam dynamics studies on the ISAC RFQ at TRIUMF*, *ibid.* 1102 [TRI-PP-97-56].
- K. Fong, M. Laverty, S. Fang and W. Uzat, *Sawtooth wave generation for pre-buncher cavity in ISAC*, *ibid.* 3057 [TRI-PP-97-57].
- M.J. Barnes, G.D. Wait, K. Metzmacher and L. Sermeus, *The application of saturating inductors for improving the performance of the CERN PS kicker systems*, *ibid.* 1328 [TRI-PP-97-58].
- A.N. Zelenski, C.D.P. Levy, P.W. Schmor, W.T.H. van Oers, G.W. Wight and G. Dutto, *OPPIS development at TRIUMF*, *ibid.* 2781 [TRI-PP-97-59].
- M.J. Barnes, G.D. Wait, L. Ducimetière, U. Jansson, G.H. Schröder and E.B. Vossenberg, *A fast 60 kV resonant charging power supply for the LHC deflectors*, *ibid.* 1325 [TRI-PP-97-60].
- F. Ruggiero, J.S. Berg, O. Brüning, F. Caspers, M. Morvillo and M. D'yachkov, *Summary of the single beam collective effects in the LHC*, *ibid.* 107.
- J.W. Glenn, M. Brennan, L. Littenberg, J. Rose, C. Woody, A. Zoltzman, P. Bergbusch and D. Mjka, *Micro-bunching the AGS slow external beam*, *ibid.* 967.
- Y. Bylinsky, V. Kukhtiev, P.N. Ostroumov, V. Paramonov and R.E. Laxdal, *A triple gap resonator design for the separated function DTL at TRIUMF*, *ibid.* 1135.
- F. Caspers, M. Chanel, H. Schönauer, L. Soby and M. D'yachkov, *Longitudinal coupled-bunch instability around 1 GHz at the CERN PS booster*, *ibid.* 1587.
- A.U. Luccio, J. Beebe-Wang, D. Maletic and F.W. Jones, *Proton injection and rf capture in the National Spallation Neutron Source*, *ibid.* 1882.
- D.V. Gorelov, P.N. Ostroumov and R.E. Laxdal, *Use of the LANA code for the design of a heavy ion linac*, *ibid.* 2621.
- R. Garoby, D. Grier, E. Jensen, A. Mitra and R.L. Poirier, *The PS 40 MHz bunching cavity*, *ibid.* 2953.
- G. Cojocar, D. Martin, M. Dragusin, R. Moraru, M. Radou, C. Oproiu, S. Marghitu, I. Indreias, V. Bestea, R. Camariuc and A. Margaritescu, *Electron beam applications in chemical processing*, *ibid.* 3854.
- A. Boucham *et al.*, *The BaBar drift chamber project*, Proc. 7th Pisa Meeting on Advanced Detectors: Frontier Detectors for Frontier Physics, La Biodola, Isola d'Elba,

Italy, May 25–31, 1997 (Nucl. Instrum. Methods **A409**, 1998) p.46.

M.J. Barnes, G.D. Wait, E. Carlier, L. Ducimetière, U. Jansson, G.H. Schroder and E.B. Vossenber, *Operation modes of the fast 60 kV resonant charging power supply for the LHC deflectors*, Proc. **11th IEEE Int. Pulsed Power Conf., Baltimore, June 29–July 2** (IEEE, 1998) p.1309.

C.D.P. Levy and A.N. Zelenski, *Polarized ion sources for high-energy accelerators*, Proc. **7th Int. Conf. on Ion Sources, ICIS'97, Taormina, Italy, September 7–13, 1997** (Rev. Sci. Instrum. **69**, 1998) p.732.

K. Jayamanna, G. Cojocar, M. Dombisky, T. Kuo, R. Laxdal, M. McDonald, P. Schmor, D. Yuan and A. Zyuzin, *A microwave driven off-line ion source for ISAC at TRIUMF*, *ibid.* 753.

K. Jayamanna, A. Zyuzin, L. Buchmann, G. Cojocar, M. Dombisky, T. Kuo, M. McDonald, P. Schmor and D. Yuan, *An electron cyclotron resonance source for radioactive beryllium ion beam production*, *ibid.* 756.

T. Kuo, D. Yuan, K. Jayamanna, M. McDonald, R. Baartman, G. Mackenzie, P. Bricault, M. Dombisky, P. Schmor, G. Dutto, Y. Lee, K-N. Leung, D. Williams and R. Gough, *Beam characteristics using stable a multicusp source for the TRIUMF ISAC facility*, *ibid.* 767.

T. Kuo, D. Yuan, K. Jayamanna, M. McDonald, R. Baartman, W.Z. Gelbart, N. Stevenson, P. Schmor and G. Dutto, *Further development for the TRIUMF H^-/D^- multicusp source*, *ibid.* 959.

M. Dombisky, R. Baartman, P. Bricault, J. Doornbos, K. Jayamanna, T. Kuo, G. Mackenzie, M. McDonald, P. Schmor and D. Yuan, *Evaluation of a prototype isotope separator accelerator surface ionization source*, *ibid.*, 1170.

D. Yuan, T. Kuo, G. Cojocar, K. Jayamanna, M. McDonald, P. Schmor and Y. Yin, *Design of a parallel-plate energy spread analyzer*, *ibid.* 1194.

M.M. Mouat, B. Davison, S.G. Kadantsev, E. Klassen, K.S. Lee, J.E. Richards, T.M. Tateyama, P.W. Wilmshurst and P.J. Yogendran, *Status report on the TRIUMF central control system*, Proc. **Int. Conf. on Accelerator and Large Experimental Physics Control Systems, ICALEPCS'97, Beijing, November 3–7, 1997**, eds. J. Zhao, A. Daneels (IHEP, Beijing, 1998) p.43.

B. Davison, S.G. Kadantsev, E. Klassen, K.S. Lee, M.M. Mouat, J.E. Richards, T.M. Tateyama, P.W. Wilmshurst and P.J. Yogendran, *Event handling in TRIUMF's central control system*, *ibid.* 92.

K.S. Lee, S.G. Kadantsev, E. Klassen, M.M. Mouat and P.W. Wilmshurst, *Handling CAMAC interrupts in Alpha OpenVMS/PCI*, *ibid.* 237.

D.B. Morris and K.S. Lee, *The control system for a new proton extraction probe at TRIUMF*, *ibid.* 253.

M. Lavery, K. Fong and S. Fang, *A DSP-based control system for the ISAC pre-buncher*, *ibid.* 263.

D. Bishop, D. Dale, H. Hui, J. Lam and R. Keitel, *Distributed power supply control using CAN-bus*, *ibid.* 315.

R. Keitel, M. Leross and G. Waters, *Control system prototype for the ISAC radioactive beam facility*, *ibid.* 372.

J. Lam, G. Waters and R. Keitel, *Conversion of the TISOL control system to EPICS*, *ibid.* 593.

D. Dale, D. Bishop, H. Hui, B. Milton and B. Roberts, *The control system for a 2 MeV tandem accelerator used for contraband detection*, *ibid.* 626.

Theoretical Program

J.N. Ng, *T-odd effects in supersymmetric theories*, Proc. **Int. Workshop on Non-Accelerator New Physics, NANP'97, Dubna, July 7–11, 1997** (Phys. Atom. Nucl. **61**, 1178 (1998); Yad. Fiz. **61**, 1278 (1998)) [TRI-PP-97-29].

V.G.J. Stoks and T.A. Rijken, *NN potential from chiral $SU(3)$ Lagrangian*, Proc. **XVth Int. Conf. on Few-Body Problems in Physics (ICFBP'97), Groningen, July 22–26, 1997**, eds. J.C.S. Bacelar, A.E.L. Dieperink, R.A. Malfliet, L.P. Kok (Nucl. Phys. **A631**, 1998) p.452c [MKPH-T-97-26].

W. Kretschmer, A. Glombik, G. Suft, R. Weidmann, E. Boschitz, B. Brinkmoeller, R. Meier, B. van den Brandt, P. Hautle, J.A. Konter, S. Mango, R. Tacik, P. Amaudruz, C. Riedel and W. Grueebler, *Polarization transfer observables in πd elastic scattering*, *ibid.* 524c.

T.R. Hemmert, B.R. Holstein, G. Knochlein and S. Scherer, *Generalized polarizabilities and the chiral structure of the nucleon*, *ibid.* 607c.

H.W. Fearing, R. Lewis, N. Mobed and S. Scherer, *Radiative and non radiative muon capture on the proton in heavy baryon chiral perturbation theory*, *ibid.* 735c [TRI-PP-97-30].

H.R. Fiebig, H. Markum, A. Mihaly, K. Rabitsch and R.M. Woloshyn, *Two-body spectra of pseudoscalar mesons with an $\mathcal{O}(\alpha^2)$ improved lattice action using Wilson fermions*, Proc. **Lattice'97: 15th Int. Symp. on Lattice Field Theory, Edinburgh, July 22–26, 1997** (Nucl. Phys. **B63**, 1998), p.188 [HEPLAT-9709152].

M.M. Musakhanov, A. Rakhimov, U. Yakhshiev and F.C. Khanna, *Nucleon-Skyrmion properties in a baryon-rich environment*, Proc. **Physics and Astrophysics of Quark-Gluon Plasma, August, 1997**, eds. B.C. Sinha, D.K. Srivastava and Y.P. Viyogi (Narosa, New Delhi, 1998) p.417.

Books

J.A. Behr, A. Gorelov, D. Melconian, M. Trinczek, P. Dubé, O. Häusser, U. Giesen, K.P. Jackson, T. Swanson, J.M. D'Auria, M. Dombbsky, G. Ball, L. Buchmann, B. Jennings, J. Dilling, J. Schmid, J. Deutsch, W.P. Alford, D. Asgeirsson and W. Wong, *Search for scalar contributions to the ^{38m}K beta-neutrino correlation in a magneto optic trap*, in Trapped Charged Particles and Fundamental Physics, ed. D.H.E. Dubin (AIP, 1998).

K.H. Chow, B. Hitti and R.F. Kiefl, *μSR on muonium in semiconductors and its relation to hydrogen*, chapter 4 in Semiconductors and Semimetals, vol. **51A** "Identification of defects in semiconductors" (1998) p.137 .

F. Seitz, E. Vogt and A.M. Weinberg, *Eugene Paul Wigner 1902–1995, A biographical memoir*, vol. **74** of Biographical Memoirs (National Academy Press, Washington, 1998) [TRI-PP-98-5].

V. Sossi, K.S. Morrison, T.R. Oakes and T.J. Ruth, *Emission-transmission realignment using a simultaneous emission-transmission post-injection scan*, in Quantitative Functional Brain Imaging With Positron Emission Tomography (Academic, in press).

V.K. Verma, *Managing the project team*, vol. **3** of Human Aspects of Project Management (PMI, Upper Darby, PA, 1998).

V.K. Verma, *Conflict management*, chapter 22 in Project Management Institute Handbook, ed. J.K. Pinto (Jossey-Bass, San Francisco, 1998) p.353.

Theses

P. Bhargava, *The ^{12}C pion absorption cross sections* (M.Sc., Physics, Regina).

P. Botton, *Studio e sviluppo di un rivelatore di silicio a microstrip a doppia faccia per FINUDA* (M.Sc., Trieste).

F. De Mori, *Analisi delle caratteristiche funzionali di un rivelatore a microstrip di silicio per l'esperimento FINUDA* (M.Sc., Trieste).

A. Fumagalli, *Progettazione e test di un Telescopio per la discriminazione in massa fra pioni e muoni* (Laurea (M.Sc.), Trieste).

M. Kryzwinski, *Evaluation of new iterative and rebinning reconstruction algorithms in fully three-dimensional positron emission tomography* (M.Sc., Physics, UBC).

S. Ryneveld, *Measurement of proton beam dose profiles using a sensitive scintillation screen observed with a CCD camera* (M.Sc., Physics, UBC).

J. Schmid, *Aufbau einer magnetooptischen Falle für neutrale Kaliumatome* (Diplomarbeit, Physics and Astronomy, Heidelberg).

L. Gan, *A study of the sensitivity of the H dibaryon search experiment E813 at BNL through $(\Sigma^-, p)_{atom} \rightarrow \Lambda + n$* (Ph.D., Physics and Astronomy, Manitoba).

J. Gräter, *Inclusive pionic double charge exchange reactions on 3He and 4He* (Ph.D., Physics, Tübingen).

A.A. Hamian, *The measurement of parity violation in proton-proton scattering and 221 MeV* (Ph.D., Physics, Manitoba).

G.D. Morris, *Muonium formation and diffusion in cryocrystals* (Ph.D., Physics and Astronomy, UBC).

J.E. Sonier, *The magnetic penetration depth and vortex core radius in type-II superconductors* (Ph.D., Physics and Astronomy, UBC).

T.J. Stocki, *Measurement of muonic hyperfine transition rates and muon capture yields in light nuclei* (Ph.D., Physics, UBC).

J. Stone, *Capturing the rare decay $K^+ \rightarrow \pi^+ \nu \bar{\nu}$* (Ph.D., Physics, Princeton).

T.K. Yokoi, *Search for T-violating muon polarization in $K^+ \rightarrow \pi^0 \mu^+ \nu_\mu$ decay* (Ph.D., Physics, Tokyo).