

CURRICULUM VITAE

Anthony J. Baltz

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Personal:

Place of Birth – Indianapolis, Indiana

Date of Birth – March 10, 1942

Education:

Sept. 1966- Case Western Reserve University
Jan. 1971

Jan. 1971 Ph.D. (Physics)
Advisors: Professors W. Tobocman, M.A. Nagarajan
Dissertation: “A Shell Model Calculation of Ti⁴⁹”

June 1968 M.S. (Physics)

Sept. 1964- B.S. (Physics), Spring Hill College
May 1966

Sept. 1960 (Classics), University of Detroit
Aug. 1964

Honors: National Merit Scholarship Finalist 1960
B.S. *cum laude* 1966
NASA Pre-doctoral Trainee 1966–1968
Fellow of AAAS, elected 1989
Fellow of APS, elected 2010

U. S. Patent: #4,445,102
Craig E. Thorn, Chellis Chasman, and Anthony J. Baltz,
“Magnet Pole Tips”
issued April 24, 1984

Professional Employment:

Apr. 2012- Brookhaven National Laboratory, Upton, NY
present Senior Physicist Emeritus

Nov. 2001 – Senior Physicist
Mar. 2012

July 1976 – Physicist
Oct. 2001

July 1973 – Associate Physicist
June 1976

Sept. 1971 – Research Associate
June 1973

February – Case Western Reserve University, Cleveland, OH
May 1971 Research Associate

Visiting Appointments

Feb. 1977 – Lawrence Berkeley Laboratory
Oct. 1977 University of California
Berkeley, California

March 1982 – Instituto de Fisica
April 1982 Universidade de Sao Paulo (one month)
Sao Paulo, Brazil

April 1984 – Department of Theoretical Physics
May 1984 University of Manchester (one month)
Manchester, England

August 1984 – Detailee for Nuclear Theory
July 1985 Division of Nuclear Physics, ER-23
U. S. Department of Energy
Germantown, MD

July 1999 – Detailee for Nuclear Theory
June 2000 Division of Nuclear Physics, SC-23
U. S. Department of Energy
Germantown, MD

PUBLICATIONS:

1. Instructional Uses of the Computer: Orbiting satellites for the elementary laboratory
Amer. J. Phys. 39, 333 (1971)
(with S. Machlup)
2. Two-nucleon transfer with heavy ions
Phys. Rev. Lett. 29, 1267 (1972)
(with S. Kahana)
3. Calculation of the indirect contribution to the heavy-ion nucleon transfer reaction amplitude
Nucl. Phys. A205, 193 (1973)
(with W. Tobocman, R. Ryan and S. Kahana)
4. Anomalous and normal angular distributions in Ni (^{18}O , ^{16}O) reactions
Phys. Rev. Lett. 30, 1078 (1973)
(with E.H. Auerbach, P.D. Bond, C. Chasman, J.D. Garrett, K.W. Jones, S. Kahana, M.J. LeVine, K.J. Schneider, A.Z. Schwarzschild and C.E. Thorn)
5. Possible L -dependent angular distributions in the reaction $^{48}\text{Ca} (^{14}\text{N}, ^{13}\text{C}) ^{49}\text{Sc}$
Phys. Rev. Lett. 31, 320 (1973)
(with M.J. Schneider, C. Chasman, E.H. Auerbach and S. Kahana)
6. $^{94,96}\text{Mo} (^{13}\text{C}, ^{12}\text{C}) ^{95,97}\text{Mo}$ reactions
Phys. Rev. C9, 2001 (1974)
(with P.D. Bond, C. Chasman, M.J. LeVine, A.Z. Schwarzschild and C.E. Thorn)
7. Recoil corrections in heavy-ion induced transfer
Phys. Rev. C9, 2243 (1974)
(with S. Kahana)
8. Oscillating forward angle cross sections for the $^{60}\text{Ni} (^{18}\text{O}, ^{16}\text{O}) ^{62}\text{Ni}_{\text{g.s.}}$ transition
Phys. Rev. C10, 1602 (1974)
(with M.J. LeVine, P.D. Bond, J.D. Garrett, S. Kahana and C.E. Thorn)
9. Recoil corrections in distorted-wave Born approximation calculation of heavy-ion transfer reactions
Phys. Rev. C10, 1856 (1974)
(with J.S. Blair, R.M. DeVries, K.G. Nair and W. Reisdorf)
10. Heavy-ion optical potentials from few-nucleon transfer reactions
Phys. Rev. C12, 136 (1975)
(with P.D. Bond, J.D. Garrett and S. Kahana)
11. Heavy-ion distorted-wave Born approximation recoil to second order in a Taylor Series
Phys. Rev. C13, 668 (1976)

12. One- and two-nucleon transfer reactions with heavy ions
Advances in Nuclear Physics, 9, p. 1-222 (1977)
(with S. Kahana)
13. Side peaking in reaction data induced by massive heavy ions
Phys. Rev. Lett. 38 1197 (1977)
14. Long-range absorption in the heavy-ion optical potential
Phys. Rev. Lett. 40, 20 (1978)
(with S.K. Kauffmann, N.K. Glendenning and K. Pruess)
15. Surface transparent potentials and a CCBA study of diffractive behavior in heavy-ion induced reactions
Phys. Rev. C17, 555 (1978)
(with S. Kahana)
16. Systematic study of Coulomb absorption in heavy-ion scattering
Phys. Lett. 76B, 556 (1978)
(with P. Doll, M. Bini, D.L. Hendrie, S.K. Kauffmann, J. Mahoney, A. Menchaca-Rocha, D.K. Scott, T.J.M. Symons, K. Van Bibber, Y.P. Viyogi and H. Wieman)
17. Long-range absorption and other optical model effects from strong inelastic coupling
Nucl. Phys. A327, 221 (1979)
(with N.K. Glendenning, S.K. Kauffmann and K. Pruess)
18. Multiple Coulomb polarization potential for heavy-ion scattering
Phys. Lett. 98B, 409 (1981)
(with B.V. Carlson and M.S. Hussein)
19. Spiral design and beam dynamics for a variable energy heavy-ion cyclotron
IEEE Transactions on Nuclear Science NS28, 2098 (1981)
(with C. Chasman and C.E. Thorn)
20. New magnet pole shape for isochronous cyclotrons
IEEE transactions on Nuclear Science NS28, 2089 (1981)
(with C.E. Thorn and C. Chasman)
21. Elastic and inelastic scattering of ^{86}Kr from ^{208}Pb at 695 MeV
Phys. Rev. Lett. 47, 1039 (1981)
(with Jiang Cheng-Lie, P.R. Christensen, Ole Hansen, S. Pontoppidan, F. Videbaek, D. Schüll, Shen Wen-Qing, P.D. Bond, H. Freiesleben, F. Busch and E.R. Flynn)
22. Λ -nuclear properties from the spectroscopy of $^{13}_{\Sigma}\text{C}$
Phys. Rev. Lett. 47, 1110 (1981)
(with E.H. Auerbach, C.B. Dover, A. Gal, S.H. Kahana, L. Ludeking and D.J. Millener)

23. Coupled channels and nuclear de-excitation in heavy-ion reactions
Phys. Rev. C25, 240 (1982)
24. Quantal theory of Coulomb absorption in heavy-ion scattering
Ann. Phys. (NY) 138, 215 (1982)
(with B.V. Carlson and M.S. Hussein)
25. Proximity potential for heavy-ion reactions on deformed nuclei
Phys. Rev. C26, 1969 (1982)
(with B.F. Bayman)
26. On the formation and spectroscopy of $\Lambda\Lambda$ hypernuclei
Phys. Lett. 123B, 9 (1983)
(with C.B. Dover and D.J. Millener)
27. On the suppression of multiple rotational excitation in heavy-ion inelastic scattering above the Coulomb barrier
Phys. Lett. 125B, 25 (1983)
(with P.D. Bond)
28. Hypernuclear spectroscopy in the p -shell
Ann. Phys. (NY) 148, 381 (1983)
(with E.H. Auerbach, C.B. Dover, A. Gal, S.H. Kahana, L. Ludeking and D.J. Millener)
29. Giant resonance and relativistic effects on sub-barrier heavy-ion elastic scattering
Phys. Lett. 132B, 274 (1983)
(with M.S. Hussein)
30. Space charge effects in a heavy-ion cyclotron
Nucl. Instr. and Meth. 219, 279 (1984)
(with C. Chasman)
31. Single neutron transfer induced by massive heavy ions
Phys. Rev. C29, 2392 (1984)
(with P.D. Bond, Ole Hansen, Jiang Cheng-Lie, P.R. Christensen, S. Pontoppidan, F. Videbaek, D. Schüll, Shen Wen-Qing and H. Freiesleben)
32. Small effects in sub-barrier heavy-ion elastic scattering
Phys. Rev. C30, 184 (1984)
(with M.S. Hussein, V.L.M. Franzin and R. Franzin)
33. Specificity of the (p, n) reaction at 35 MeV for Gamow-Teller strength
Phys. Rev. Lett. 53, 2078 (1984)
(with J. Weneser, B.A. Brown and J. Rapaport)
34. Polarization potentials in heavy-ion scattering
Phys. Rep. 113, 133 (1984)
(with M.S. Hussein and B.V. Carlson)

35. Nuclei containing an antinucleon
Phys. Rev. C32, 1272 (1985)
(with C. Dover, M. Sainio, A. Gal and G. Toker)
36. The effect of transmission through the Earth on neutrino oscillations
Phys. Rev. D35, 528 (1987)
(with J. Weneser)
37. Spatial development of inelastic scattering and particle transfer cross sections in very heavy ion reactions
Phys. Rev. C36, 1807 (1987)
(with L.J.B. Goldfarb)
38. Matter oscillations: neutrino transformation in the Sun and regeneration in the Earth.
Phys. Rev. D37, 3364 (1988)
(with J. Weneser)
39. Solar neutrinos and neutrino phenomena.
Comments on Nuclear and Particle Physics 18, 227 (1988)
(with J. Weneser)
40. Quantum mechanical coupled channels calculation of the $^{208}\text{Pb} + ^{238}\text{U} (0^+, 2^+, \dots, 40^+)$ reaction.
Phys. Rev. C38, 1674 (1988)
41. Are variations in the ^{37}Cl experiment interpretable as solar matter exclusions?
Nucl. Phys. A505, 67 (1989).
(with J. Weneser)
42. Comment on "A solution of the solar neutrino problem"
Phys. Rev. Lett. 66, 520 (1991).
(with J. Weneser)
43. Heavy ion transverse energy production at AGS energies: Single or multiple scattering?
Phys. Rev. C43, 1420 (1991)
44. The energy dependence of bound-electron positron pair production at very high energy ion-ion transits
Phys. Rev. A44, 5569 (1991).
(with M.J. Rhoades-Brown and J. Weneser)
45. Direct tests for solar neutrino mass, mixing and Majorana magnetic moment
Phys. Rev. D44 3786 (1991)
(with R.S. Raghavan, A. B. Balantekin, F. Loreti, S. Pakvasa, and J. Pantaleone)

46. Bound-electron positron-pair production in relativistic heavy-ion collisions
Phys. Rev. A47, 3444 (1993).
(with M.J. Rhoades-Brown and J. Weneser)
47. Calculation of the cross section for e^+e^- (K orbit) pairs by very-high-energy fully stripped heavy ions at perturbational impact parameters
Phys. Rev. A48, 2002 (1993).
(with M.J. Rhoades-Brown and J. Weneser)
48. Convergence of bound–electron–positron pair production calculations for relativistic heavy ion collisions.
Phys. Rev. A50, 4842 (1994).
(with M.J. Rhoades–Brown and J. Weneser)
49. Strange cluster formation in relativistic heavy ion collisions.
Phys. Lett. B325, 7 (1994).
(with C.B. Dover, S.H. Kahana, Y. Pang, T.J. Schlagel, and E. Schnedermann)
50. Implications of gallium results on the possibility of observing day–night matter oscillations at SNO, Super–Kamiokande, and Borexino.
Phys. Rev. D50, 5971 (1994).
(with J. Weneser)
51. Possibility of radiochemical observation of day–night matter oscillations in light of current solar neutrino results.
Phys. Rev. D51, 3960 (1995).
(with J. Weneser)
52. Coulomb potential from a particle in uniform ultrarelativistic motion.
Phys. Rev. A52, 4970 (1995)
53. On the production of pions in relativistic heavy ion collisions.
Phys. Lett. B345, 119 (1995).
(with E. Schnedermann, and C.B. Dover)
54. Modeling cluster production at the AGS.
Phys. Rev. C54, 338 (1996).
(with D.E. Kahana, S.H. Kahana, Y. Pang, C.B. Dover E. Schnedermann, and T.J. Schlagel)
55. Quark model of ϕ coalescence from kaons in heavy-ion reactions.
Phys. Rev. C53, 362 (1996).
(with C.B. Dover)
56. Heavy-ion partial beam lifetimes at RHIC and LHC due to Coulomb induced processes.
Phys. Rev. E54, 4233 (1996).
(with M.J. Rhoades-Brown and J. Weneser)

57. Exact Dirac equation calculation of ionization and pair production induced by ultra-relativistic heavy ions.
Phys. Rev. Lett. 78, 1231 (1997).
58. Correlated forward-backward Coulomb dissociation and luminosity monitoring at heavy ion colliders.
Nucl. Inst. & Methods in Phys. Research A417, 1 (1998).
(with Chellis Chasman and Sebastian N. White)
59. Suppression of heavy ion $\gamma\gamma$ production of the Higgs by Coulomb dissociation.
Phys. Rev. D57, 548 (1998).
(with M. Strikman)
60. The Solar Neutrino Puzzle: An Oscillation Solution with Maximal Neutrino Mixing
Phys. Rev. Lett. 81, 5730 (1998).
(with Alfred Scharff Goldhaber and Maurice Goldhaber)
61. Two center light cone calculation of pair production induced by ultrarelativistic heavy ions.
Phys. Rev. C58, 1679 (1998).
(with Larry McLerran)
62. Exact Dirac equation calculation of ionization induced by ultrarelativistic heavy ions,
Phys. Rev. A61, 042701-1 (2000).
63. Coulomb corrections to e^+e^- production in ultra-relativistic nuclear collisions,
Nucl. Phys. A695, 395 (2001).
(with F. Gelis, L. McLerran, and A. Peshier)
64. Some exact analytical results and a semi-empirical formula for single electron ionization induced by ultrarelativistic heavy ions,
Phys. Rev. A64, 022718 (2001).
65. Probing an extended region of Δm^2 with rapidly oscillating ${}^7\text{Be}$ solar neutrinos,
Phys. Rev. D65, 053005 (2002).
66. Coherent Vector-Meson Photoproduction with Nuclear Breakup in Relativistic Heavy-Ion Collisions,
Phys. Rev. Lett. 89, 012301 (2002).
(with Spencer R. Klein and Joakim Nystrand)
67. Coulomb corrections in the calculation of ultrarelativistic heavy ion production of continuum e^+e^- pairs,
Phys. Rev. C68, 034906 (2003).
68. Calculation of heavy ion e^+e^- pair production to all orders in $Z\alpha$,
Phys. Rev. C71, 024901 (2005).

69. Impact parameter dependence of heavy ion e^+e^- pair production to all orders in $Z\alpha$, Phys. Rev. C74, 054903 (2006).
70. Evidence for Higher Order QED Effects in e^+e^- Pair Production at the BNL Relativistic Heavy Ion Collider, Phys. Rev. Lett. 100, 062302 (2008).
71. The Physics of Ultrapерipheral Collisions at the LHC, Phys. Rep. 458, 1 (2008). (with G. Baur, D. d'Enterria, L. Frankfurt, F. Gelis, V. Guzey, K. Hencken, Yu. Kharlov, M. Klasen, S. R. Klein, V. Nikulin, J. Nystrand, I. A. Pshenichnov, S. Sadovsky, E. Scapparone, J. Seger, M. Strikman, M. Tverskoy, R. Vogt, S. N. White, U. A. Wiedemann, P. Yepes, and M. Zhalov)
72. Higher-order QED calculation of ultrarelativistic heavy-ion production of $\mu^+\mu^-$ pairs, Phys. Rev. C80, 034901 (2009).
73. Two-photon interactions with nuclear breakup in relativistic heavy ion collisions, Phys. Rev. C80, 044902 (2009). (with Yuri Gorbunov, Spencer R. Klein, and Joakim Nystrand)
74. Higher order QED in high-mass e^+e^- pair production at energies available at the BNL Relativistic Heavy Ion Collider (RHIC), Phys. Rev. C82, 027901 (2010). (with Joakim Nystrand)
75. Measurement of the Total Cross Section of Uranium-Uranium Collisions at $\sqrt{s_{NN}} = 192.8$ GeV, arXiv:1401.0213v1 [nucl-ex], Phys. Rev. C (in press). (with W. Fischer, M. Blaskiewicz, D. Gassner, K.A. Drees, Y. Luo, M. Minty, P. Thieberger, M. Wilinski, and I.A. Pshenichnov)

Invited Talks and Conference Proceedings

76. Two-nucleon form factors for heavy-ion DWBA calculations
Symposium on *Heavy-Ion Transfer Reactions*
Argonne National Laboratory ANL/PHY-1973B, Vol. I, p. 273
(with S. Kahana)
77. Systematics of heavy ion one and two nucleon transfer reactions
American Physical Society Meeting, (1976)
78. Systematics of quasi-elastic processes induced by heavy ions
Symposium on *Macroscopic Features of Heavy-Ion Collisions*
Argonne National Laboratory ANL/PHY-76-2 (1976)
79. Long-range absorption and other direct reaction components of the optical potential
Microscopic Optical Potentials, Proceedings, Hamburg 1978
Ed. H.V. von Geramb (Springer-Verlag, New York 1979)
(with N.K. Glendenning, S.K. Kauffmann and K. Pruess)
80. The proximity potential for heavy ion reactions on deformed nuclei
Simposio Brasileiro de Fisica Fotonuclear Instituto de Fisica de Sao Paulo
Sao Paulo, Brazil, April 1982
(with B.F. Bayman)
81. Specificity of $^{71}\text{Ga}(p, n)^{71}\text{Ge}$ at 35 MeV for Gamow-Teller strength
Conf. Proc. *Antinucleon- and Nucleon-Nucleus Interactions*
Telluride, Colorado, March 1985,
G.E. Walker et al, ed, pp. 365-70, (Plenum Press NY 1985)
(with J. Weneser, B.A. Brown and J. Rapaport)
82. Matter oscillations: Neutrino transformation and regeneration in the Earth
Proc. of the *BNL Neutrino Workshop*, 1987 (BNL-39629)
(with J. Weneser)
83. The day-night effect, *Conference on physics with solar neutrinos*, Santa Barbara,
(1987)
84. Regeneration of solar neutrinos passing through the earth
American Physical Society Meeting, (1987)
85. Deformed proximity potential for heavy ion reactions
Proc. of the *Sixth Nordic Meeting on Nuclear Physics*
Kopervik, Norway, August 1989
Physica Scripta **T32**, 71 (1990)
86. Neutrino mass and mixing from the day-night effect, *Workshop on the Many Aspects of Neutrino Physics*, Fermilab, (1991)

87. Exact Two-center light cone calculation of electromagnetic pair production induced by ultrarelativistic heavy ions, selected for oral presentation at the *International Nuclear Physics Conference*, Paris, (1998), Nucl. Phys. A654, 611c (1999) (with Larry McLerran)
88. Evidence for Neutrino Oscillations, *American Chemical Society Meeting*, Anaheim, (1999)
89. Coherent electromagnetic heavy ion reactions: (1) exact treatment of pair production and ionization; (2) mutual Coulomb dissociation, selected for oral presentation at *Quark Matter '99*, Torino, (1999), Nucl. Phys. A661, 317c (1999)
90. Calculation of Pair Production and Ionization Induced by Relativistic Heavy Ions *Workshop on Computational Challenges in Atomic and Molecular Physics* (2000) Institute for Theoretical Atomic and Molecular Physics (ITAMP) at the Harvard-Smithsonian Center for Astrophysics
91. Variation of total cross sections and Coulomb-nuclear effects, *RHIC Topical Workshop: Estimating Npart and Ncoll*, BNL (2001)
92. Aspects of Coulomb Dissociation and Interference in Peripheral Nucleus-Nucleus Collisions *Electromagnetic Probes of Fundamental Physics, Erice, Italy, 16-21 October, 2001*, Editors, W. Marciano and S. White, *World Scientific* (with Joakim Nystrand and Spencer R. Klein)