

## Vita

## RON R. WINTERS

Denison University  
 Department of Physics & Astronomy  
 Granville, Ohio 43023

Retired Spring 2000  
 Tight Family Chair in the Physical Sciences  
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## EDUCATION

1968 Ph.D (Nuclear Physics) Virginia Polytechnic Institute & State Univ.  
 "Half-life of  $^{176}\text{Lu}$ ", Ph.D. Dissertation  
 1963 A.B. (**Magna Cum Laude**) King College, Bristol, TN

## AWARDS AND HONORS

The Tight Family **Chair** in the Physical Sciences  
**Fellow** of the American Physical Society  
**Outstanding Research** Contributions Award (1989) by  
 The Association of Independent Colleges and Universities in Ohio  
 Paper of the Year 1997 **NOVA** Award by the The Oak Ridge National Laboratory  
 King College **Scholar** Award

Phi Beta Kappa  
 Sigma Pi Sigma  
 Sigma Xi

## TEACHING EXPERIENCE

1977-2000 Professor, Denison University  
 1971-77 Associate Professor, Denison University  
 1966-71 Assistant Professor, Denison University

## ADMINISTRATIVE EXPERIENCE

1999-2000 Chair, Ohio Section of the American Physical Society  
 1998-1999 Vice Chair, Ohio Section of the American Physical Society  
 1997-1999 Radiation Safety Officer, Denison University  
 1998-present Director, GLCA/ACM Oak Ridge Science Semester Program  
 1980-82 Chairman, Department of Physics, Denison University  
 1976-1998 Treasurer/Assistant Treasurer, Ohio Section/American Physical Society  
 1975-78 Director, GLCA-Oak Ridge Science Semester Program  
 1975 V. President, Ohio Academy of Science, Section E  
 1971 (fall) Resident Director, GLCA-Oak Ridge Science Semester, ORNL

## RESEARCH EXPERIENCE

1994-present Guest Scientist, Physics Division, Oak Ridge National Laboratory  
 1989-93 Guest Scientist, Engineering Physics and Mathematics Division, ORNL  
 1971-88 Guest Scientist, Physics Division, Oak Ridge National Laboratory  
 1982 (fall) Guest Scientist, Kernforschungszentrum Karlsruhe IAK, W. Germany  
 1980 Guest Scientist, Kernforschungszentrum Karlsruhe IAK, W. Germany  
 1969-71 Visiting Research Associate, Experimental Astronomy Lab, M.I.T.  
 1966-69 Research Appointment, Research Reactor. V.P.I.S.U.

## RESEARCH INTERESTS

**Nuclear Astrophysics:**

**Nuclear Reactions:**

s-process Nucleosynthesis  
Maxwellian-Averaged Neutron Capture Cross Sections

Neutron Total and Capture Cross Sections  
R-Matrix Resonance Parameters  
Dispersive Optical Model  
Statistical Models  
Level Densities and Strength Functions

### Lunar Origin:

Lunar Capture Hypothesis with R. Malcuit, Denison U.  
Late Proterozoic Glaciations with R. Malcuit, Denison U.

### RESEARCH FUNDING

1978-2000 U.S. Department of Energy, Div. of High Energy and Nuclear Physics  
1994-96 U.S. Dept. of Education, Fund for Improvement of Postsecondary Education (FIPSE)  
1994-96 W.M. Keck Foundation  
1991 Denison University Research Foundation Grant  
1989 Denison University, Robert C. Good Fellowship  
1989 Research Corporation  
1987 Denison University Research Foundation Grant  
1985 Denison University Research Foundation Grant  
1984 Denison University Professional Development Grant  
1975-77 U.S. Energy Research and Development Administration  
1978 Denison University Professional Development Grant  
1975 Denison University Faculty Development Grant  
1966-69 Denison University Research Foundation Grant  
1963-66 NASA Traineeship, V.P.I.S.U.  
1962-63 NSF Undergraduate Research Grant in Astronomy, King College  
1961-62 NREA Research Award in Optical Spectroscopy, King College

### PUBLICATIONS

- A High resolution neutron capture and transmission measurements and the stellar neutron-capture cross section of  $^{88}\text{Sr}$ , P.E. Koehler, R.R. Winters, K.H. Guber, T. Rauscher, J.A. Harvey, S. Raman, R.R. Spencer, J.C. Blackmon, D.C. Larson, D.W. Dardayan, and T.A. Lewis, accepted Phys. Rev. (2000).
- A High resolution neutron capture and transmission measurements on  $^{137}\text{Ba}$  and their impact on the interpretation of meteoric barium anomalies, P.E. Koehler, R.R. Spencer, K.H. Guber, R.R. Winters, S. Raman, J.A. Harvey, N.W. Hill, J.C. Blackmon, D.W. Darayan, D.C. Larson, T.A. Lewis, D.E. Pierce, and M.S. Smith, Rapid Communications, Phys. Rev. C **57**, No. 4, R1558-R1561 (1998).
- A An Amusing Representation of  $x/\sin x$ , Scott Ahlgren, Lars English, and Ron Winters, The American Mathematical Monthly, **104**, 964-966 (1997).
- A Measurements of  $^{142,144}\text{Nd}(n,\gamma)$  Cross Sections at ORELA for Astrophysical s-process Studies, K.H. Guber, R.R. Spencer, P.E. Koehler, and R.R. Winters, Nuclear Physics A **621**, 266-269 (1997).
- A New Neutron Capture and Transmission Measurements for  $^{134,136}\text{Ba}$  at ORELA and their Impact on s-process Nucleosynthesis Calculations, P.E. Koehler, R.R. Spencer, R.R. Winters, K.H. Guber, J.A. Harvey, N.W. Hill, M.S. Smith, Nuclear Physics A **621**, 258-261 (1997).
- A A  $\text{BaF}_2$  Detector System for  $(n,\gamma)$  Cross Section Measurements at ORELA, K.H. Guber, R.R. Spencer, P.E. Koehler, R.R. Winters, Nuclear Physics A **621** 254-257 (1997).
- A New  $^{142,144}\text{Nd}(n,\gamma)$  Cross Sections and the s-process Origin of the Nd Anomalies in Presolar Meteoric Silicon Carbide Grains, K.H. Guber, R.R. Spencer, P.E. Koehler, and R.R. Winters, Phys. Rev. Ltrs. **78**, No. 14 2704 (1997).
- "Continued Fractions and the Harmonic Oscillator Using Feynman's Path Integrals", L.Q. English and R.R. Winters, Am. J. of Physics **65**, No. 5 390 (1997).
- "Resonance Neutron Capture and Transmission Measurements and the Stellar Neutron Capture Cross Sections of  $^{134}\text{Ba}$  and  $^{136}\text{Ba}$ ", P.E. Koehler, R.R. Spencer, R.R. Winters, K. H. Guber, J.A. Harvey, N.W. Hill, M.S. Smith, Phys. Rev. C **54**, No. 3 1463 (1996).
- "On the Calculation of Maxwellian Averaged Capture Cross Sections", Hermann Beer, F. Voss, R.R. Winters, Astrophys. J. Supp. Series **80**, 403 (1992).
- "A Gravitational Capture Origin for the Earth-Moon System: Implications for the Early History of Earth and Moon", R.J. Malcuit, D.M. Mehringer, and R.R. Winters, The Archaean: Terrains, Processes and Metallogeny, Publication **22**, 223-235, J.E. Glover and S.E. Ho, eds., Geology Dept. (Key Center) and Univ. Extension, The Univ. of Western Australia, (1992).
- "Evidence for Parity Dependence in the Neutron- $^{40}\text{Ar}$  Optical Model Potential", C.H. Johnson, R.F. Carlton, R.R. Winters, Phys. Rev. C **44**, 657 (1991).

- "Total Cross Section and Neutron Resonance Spectroscopy for  $n+^{40}\text{Ar}$ ", R.R. Winters, R.F. Carlton, C.H. Johnson, N.W. Hill, M.R. Lacerna, *Phys. Rev. C* **43**, 492 (1991).
- "Neutron Scattering in  $^{189}\text{Os}$  for Nucleosynthesis Rates of the Odd-A Os Isotopes and Nucleochronology", M.T. McEllistrem, R.R. Winters, R.L. Hershberger, Z. Cao, R.L. Macklin, N.W. Hill, *Phys. Rev. C* **40**, 591 (1989).
- "Resonance Neutron Capture by Argon-40", R.L. Macklin, R.R. Winters, D.M. Schmidt, *Astron. and Astrophys.* **216**, 109 (1989).
- "Numerical Simulation of Gravitational Capture of a Lunar-like Body by Earth", R.J. Malcuit, D.M. Mehringer, R.R. Winters, *Proceedings of the 19th Lunar and Planetary Science Conference*, Cambridge Univ. Press, 581 (1989).
- "Extrapolation of the Dispersive Optical Model to the Resonance Region for Neutrons on  $^{86}\text{Kr}$ ", C.H. Johnson, R.F. Carlton, R.R. Winters, *Phys. Rev. C* **39**, 415 (1989).
- "Total Cross Section and Resonance Spectroscopy for  $n+^{86}\text{Kr}$ ", R.F. Carlton, R.R. Winters, C.H. Johnson, N.W. Hill, J.A. Harvey, *Phys. Rev. C* **38**, 1605 (1988).
- "Evidence for State Dependence of the Imaginary Part of the Empirical Optical Potential", C.H. Johnson, R.R. Winters, *Phys. Rev. C* **37**, 2340 (1988).
- "Resonance Neutron Capture by  $^{20,22}\text{Ne}$  in Stellar Environments", R.R. Winters, R.L. Macklin, *Astrophys. J.* **329**, 943 (1988).
- "The  $^{189}\text{Os}(n,\gamma)$  Cross Section and Implications for the Duration of Stellar Nucleosynthesis", R.R. Winters, R.L. Macklin, R.L. Hershberger, *Astron. and Astrophys.* **171**, 9 (1987).
- "Maxwellian-Averaged Neutron Capture Cross Sections for  $^{99}\text{Tc}$  and  $^{95,96,97,98}\text{Mo}$ ", R.R. Winters, R. L. Macklin, *Astrophys. J.* **313**, 808 (1987).
- "A Spherical Optical Model Potential for the Re/Os Stellar Nucleosynthesis Chronometer from s-Wave Neutrons on  $^{186,187,188}\text{Os}$ ", R.R. Winters, R.F. Carlton, J.A. Harvey, N.W. Hill, *Phys. Rev. C* **34**, 840 (1986).
- " $^{148,150}\text{Sm}$ : A Test for s-Process Nucleosynthesis", R.R. Winters, F. Kappeler, K. Wisshak, A. Mengoni, G. Reffo, *Astrophys. J.* **300**, 41 (1986).
- "Energy Average of the Scattering Matrix in Picket Fence Models", C.H. Johnson, C. Mahaux, R.R. Winters, *Phys. Rev. C* **32**, 359 (1985).
- "Optical Model for Low-Energy Neutrons on  $^{60}\text{Ni}$ ", R.R. Winters, C.H. Johnson, A.D. MacKellar, *Phys. Rev. C* **31**, 384 (1985).
- "Majority-Logic NE-110 Detector for keV Neutron", N.W. Hill, J.A. Harvey, D.J. Horen, G.L. Morgan, R.R. Winters, *IEEE Transactions on Nuclear Science* **NS-32**, 367 (1985).
- "Modification of a Measurement of the Intensity of Solar Radiation", R.R. Winters, L. E. Larson, "Apparatus Notes", *Am. J. of Phys.* **53**, 90 (1985).
- Reply to "Calculation of the Lorentz-Weighted Average S Matrix from High-Resolution Low-Energy Neutron Scattering Data", C.H. Johnson, N.M. Larson, C. Mahaux, R.R. Winters, *Phys. Rev. C* **29**, 1563 (1984).
- " $^{187}\text{Os}(n,n')$  Inelastic Cross Section at 34 keV", R.L. Macklin, R.R. Winters, N.W. Hill, J.A. Harvey, *Astrophysical J.* **274**, 408 (1983).
- "Resonance Parameters of  $^{60}\text{Ni} + n$  from Measurements of Transmission and Capture Yields from 1 to 450 keV", C.M. Perey, J.A. Harvey, R.L. Macklin, F.G. Perey, R.R. Winters, *Phys. Rev. C* **27**, 2556 (1983).
- "Calculation of the Energy-Averaged Scattering Function from High Resolution Low-Energy Neutron Scattering Data", C.H. Johnson, N.M. Larson, C. Mahaux, and R.R. Winters, *Phys. Rev. C* **27**, 1913 (1983).
- " $^{187}\text{Os} + n$  Resonance Parameters in the Interval 27-500 eV Neutron Energies", R.R. Winters, R. F. Carlton, J. A. Harvey, N.W. Hill, **PROCEEDINGS OF THE CONFERENCE ON NUCLEAR DATA FOR SCIENCE AND TECHNOLOGY**, Knoxville, Tn., 943-944, K. H. Bockhoff, ed. (1983).
- "Average Scattering Matrix Elements from High Resolution Neutron Total Cross Sections for  $^{32}\text{S}$ ", C.H. Johnson, R.R. Winters, *Phys. Rev. C* **27**, 416 (1983).
- "The Average  $^{186,187,188}\text{Os}(n,\gamma)$  Cross Section and Age of the Galaxy via  $^{187}\text{Re}$  Decay to  $^{187}\text{Os}$ ", R.R. Winters, R.L. Macklin, *Phys. Rev. C* **25**, 208 (1982).
- "Uranium-238 Inelastic Neutron Scattering at 82 keV", R. R. Winters, N. W. Hill, R. L. Macklin, J. A. Harvey, D. K. Olsen, *Nucl. Sci. Eng.* **78**, 147 (1981).
- "Stable Isotope Capture Cross Sections from Oak Ridge Electron Linear Accelerator", R. L. Macklin, R. R. Winters, *Nucl. Sci. Eng.* **78**, 110 (1981).
- "Neutron Total Cross Sections of Sulfur: Single Level to Multilevel to Optical Model", C. H. Johnson, R. R. Winters, *Phys. Rev. C* **21**, 2190 (1980).
- " $^{186,187,188}\text{Os}(n,\gamma)$  Cross Sections and Galactic Nucleosynthesis", R. R. Winters, R. L. Macklin, J. Halperin, *Phys. Rev. C* **21**, 563 (1980).
- "Resonance Structure of  $^{32}\text{S} + n$  from Measurements of Neutron Total and Capture Cross Sections", J. Halperin, C. H. Johnson, R. R. Winters, R. L. Macklin, *Phys. Rev. C* **21**, 545 (1980).

- "Absolute Neutron Capture Yield Calibration", R. L. Macklin, J. Halperin, R. R. Winters, Nucl. Instr. Meth. **164**, 213 (1979).
- "<sup>104,105,106,108,110</sup>Pd(n,γ) Cross Sections above 2.6 keV", R. L. Macklin, J. Halperin, R. R. Winters, Nucl. Sci. Eng. **71**, 182 (1979).
- "Neutron Capture Cross Sections of Structural Materials for Fast Reactors", with B. J. Allen et al., in **NEUTRON DATA OF STRUCTURAL MATERIALS FOR FAST REACTORS**, K. Bockhoff, ed., Pergamon, Oxford (1979).
- "<sup>51</sup>V(n,γ) Reaction in the keV Incident Neutron Energy Range", R. R. Winters, R. L. Macklin, J. Halperin, Phys. Rev. C **18**, 2092 (1978).
- "The Lunar Capture Hypothesis Revisited", R. R. Winters, R. Malcuit, The Moon **17**, 353 (1977).
- "Neutron Capture by <sup>208</sup>Pb at Stellar Temperatures", R. L. Macklin, J. Halperin, R. R. Winters, Astrophys. J. **217**, 222 (1977).
- "The Lunar Capture Hypothesis: Early Post-capture Lunar Orbital Evolution and Implications for Earth History", R. R. Winters, R. Malcuit, Transactions, Am. Geophys. Union **58**, 428 (1977).
- "Possible Signature for a Capture Origin of the Earth-Moon System", R. Malcuit, R. R. Winters, M. Mickelson, Transactions, Am. Geophys. Union **57**, 752 (1976).
- "Stellar Neutron Capture in the Thallium Isotopes", R. L. Macklin, R. R. Winters, Astrophys. J. **208**, 812 (1976).
- "Valence Neutron Capture in <sup>88</sup>Sr", J. Boldeman, B. J. Allen, A. R. de Musgrove, R. L. Macklin, R. R. Winters, Nucl. Phys. A **269**, 397 (1976).
- "The Lunar Capture Hypothesis: A Post-Apollo Evaluation", R. R. Winters, R. Malcuit, M. Mickelson, Transactions, Am. Geophys. Union **57**, 272 (1976).
- "Angular Momentum Constraints on Lunar Accretion and Implications for Lunar Origin", R. Malcuit, R. R. Winters, L. Larson, M. Mickelson, Transactions, Am. Geophys. Union **56**, 605 (1975).
- "Accretion-Driven and Encounter-Driven Dynamos as Sources of Lunar Rock Magnetism", M. Mickelson, R. R. Winters, R. Malcuit, Transactions, Am. Geophys. Union **56**, 387 (1975).
- "Gold Neutron Capture Cross Section from 3 to 550 keV", R. L. Macklin, J. Halperin, R. R. Winters, Phys. Rev. C **11**, 1270 (1975).
- "Neutron Capture Cross Section of the Stable Lead Isotopes", B. J. Allen, R. L. Macklin, R. R. Winters, C. Y. Fu, Phys. Rev. C **8**, 1504 (1973).
- "Comments on the Doorway State in <sup>206</sup>Pb", B. J. Allen, R. L. Macklin, C. Y. Fu, R. R. Winters, Phys. Rev. C **7**, 2598 (1973).
- "Neutron Capture in Fluorine Below 1500 keV", R. L. Macklin, R. R. Winters, Phys. Rev. C **7**, 1766 (1973).
- "Neutron Resonance Parameter of <sup>92</sup>Mo", O. A. Wasson, B. J. Allen, R. R. Winters, R. L. Macklin, J. A. Harvey, Phys. Rev. C **7**, 1532 (1973).
- "Investigations of the Trapped Magnetic Field", R. R. Winters, Measurement Systems Laboratory, MIT Pub. **RE-63**, Massachusetts Institute of Technology (1969).

#### INVITED PAPERS

- "Computer-Based Symbolic Computation: Not Just for Mathematics Anymore", R.R. Winters, Z.A. Karian, Proceedings of the Seventh Annual International Conference on Technology in College Mathematics, p. 535 (1996)
- "Symbolic Manipulators in Undergraduate Physics Courses", R.R. Winters, Program/Abstracts, 159th Nat'l Meeting of the Am. Assoc. for the Advancement of Science, 151, Boston, MA, Feb. 1993.
- "Insights: Physical and Mathematical", R. R. Winters, Proceedings of the Denison Conference on the Use of Symbolic Computation in Undergraduate Mathematics, Denison University, June 1992.
- "r and s Processes: Chronometers, Thermometers and Neutron Dosimeters", R. R. Winters, AIP Conference Proceedings **124**, **NEUTRON-NUCLEUS COLLISIONS: A PROBE OF NUCLEAR STRUCTURE**, 484-503, edited by J. Rapaport et al., Am. Inst. of Phys. (1985).
- "Resonance Capture Reactions with a Total Energy Detector", R. L. Macklin, and R. R. Winters, **PROCEEDINGS OF THE THIRD INTERNATIONAL SYMPOSIUM ON NEUTRON CAPTURE GAMMA-RAY SPECTROSCOPY AND RELATED TOPICS**, 475-484, edited by R. E. Chrien and W. R. Krane, Plenum Press (1979).
- "Neutron Sensitivity of Capture Gamma Ray Detectors", B. J. Allen, A. R. de Musgrove, R. L. Macklin, R. R. Winters, **PROCEEDINGS OF A SPECIALISTS' MEETING ON NEUTRON DATA OF STRUCTURAL MATERIALS FOR FAST REACTORS**, 447, edited by K. Bockhoff, Pergamon, Oxford (1979).

#### WORKSHOPS

- AUse of the Maple Symbolic Computing System in Science and Mathematics Instruction@, R.R. Winters and Z.A.

- Karian, Directors, NSF Chautauqua Workshop, Dayton, OH, May 1997.
- "Science and Engineering Instruction with Maple", Z.A. Karian and R.R. Winters, workshop presented at 9th Annual Internat'l Conf. on Technology in Collegiate Mathematics, Reno, NV, Nov. 1996.
- "Use of the Maple Symbolic Computing System in Science and Mathematics Instruction", R.R. Winters and Z.A. Karian, Directors, NSF Chautauqua Workshop, Dayton, OH, May 1996.
- "Hands-on demonstrations of applications of symbolic computation", Z.A. Karian and R.R. Winters, Teaching and Technology Workshop - GLCA Pilot Project, Denison University, April 1996.

### PAPERS

- "Neoproterozoic rifting and sedimentation events on Earth: Possible lunar connection", Robert J. Malcuit and Ronald R. Winters, 31<sup>st</sup> International Geological Congress, Abstracts on CD-ROM, Section 9-6, (Rio de Janeiro, Brazil, August 6-17, 2000).
- "Geometry of retrograde stable capture zones for tidal capture of satellites by planet Neptune", Robert J. Malcuit and Ronald R. Winters, 31<sup>st</sup> International Geological Congress, Abstracts on CD-ROM, Section 28, (Rio de Janeiro, Brazil, August 6-17, 2000).
- "Retrograde gravitational (tidal) capture of planetoids by planet Neptune: Effects of the mass of the planetoid", Robert J. Malcuit and Ronald R. Winters, Transactions of the American Geophysical Union, Spring Meeting Supplement, **81**, No. 19, p. S297, (Washington, D.C., May 30-June 3, 2000).
- "Gravitational capture of planetoids for planets Earth and Mars: Implications for the development of life systems", Robert J. Malcuit and Ronald R. Winters, Geological Society of America, North-Central Sectional Meeting, abstracts with Program, **29**, No. 4, p. A-49, (Indianapolis, IN., April 6-7, 2000).
- "Late Precambrian events on Earth: Possible lunar involvement", Robert J. Malcuit and Ronald R. Winters, Ohio Journal of Science, Program Abstracts, **100** No. 1, p. A-30, (Ohio Northern University, March 31-April 2, 2000).
- ANumerical simulations of gravitational capture of satellites for planet Mars, Robert J. Malcuit and Ronald R. Winters, Transactions of the American Geophysical Union, Spring Meeting Supplement, (Boston, Mass., May 26-29, 1998).
- ANeoproterozoic Events on Earth: Possible Lunar Connection, Robert J. Malcuit and Ronald R. Winters, North-Central Sectional Meeting of the Geological Society of America, Abstracts Vol. **30**, No. 2, p. 58, (Columbus, OH, March 19-20, 1998).
- AAre lunar origin models compatible with a primitive (pre-3.9 Ga) terrestrial crust?, Robert J. Malcuit and Ronald R. Winters, National Annual Meeting of the Geological Society of America, Abstracts Vol. **29**, No. 6, pp. A409-A410, (Salt Lake City, Oct. 20-23, 1997).
- AHigh resolution neutron capture and transmission measurements on <sup>137</sup>Ba and their impact on the interpretation of meteoric barium anomalies, P.E. Koehler, R.R. Spencer, K.H. Guber, R.R. Winters, S. Raman, J.A. Harvey, N.W. Hill, J.C. Blackmon, D.W. Darayan, D.C. Larson, T.A. Lewis, D.E. Pierce, and M.S. Smith, Second Annual Oak Ridge Atomic and Nuclear Astrophysics Conference, Oak Ridge, TN, December 2-6, 1997.
- "Experimental Opportunities at the Pulsed Neutron Source ORELA", K.H. Guber, D.C. Larson, P.E. Koehler, R.R. Spencer, S. Raman, J.A. Harvey, N.W. Hill, T.A. Lewis, and R.R. Winters, in **Nuclear Data for Science and Technology**, edited by G. Reffo, A. Ventura, and C. Grandi (Societa Italiana di Fisica, Bologna, Italy, 1997), p.559.
- AHigh Resolution Neutron Capture and Transmission Measurements and the Stellar Neutron Capture Cross Section of <sup>116,120</sup>Sn, P.E. Koehler, R.R. Spencer, K.H. Guber, J.A. Harvey, N.W. Hill, and R.R. Winters, in **Nuclear Data for Science and Technology**, edited by G. Reffo, A. Ventura, and C. Grandi (Societa Italiana di Fisica, Bologna, Italy, 1997), p.1581.
- AHigh Resolution Neutron Capture and Transmission Measurements and the Stellar Neutron Capture Cross Section of <sup>116,120</sup>Sn, P.E. Koehler, R.R. Spencer, K.H. Guber, J.A. Harvey, N.W. Hill, and R.R. Winters, Bull. Am. Phys. Soc. **42**, No. 2 983 (1997).
- APredictable Patterns for Tidally-Generated Rhythmites of Archean Age for both Tidal-Capture and Giant-Impact Scenarios, Robert J. Malcuit, Ronald R. Winters, Abstracts with Programs, 1996 Annual Meeting, Geological Society of America, V. **28**, No. 7, p. A227 (Denver CO Oct. 28-31, 1996).
- "New High Precision Transmission Measurements on <sup>208</sup>Pb at ORELA and their Impact on the Electric Polarizability of the Neutron", K.H. Guber, J.A. Harvey, N.W. Hill, P. Riehs, S. Kopecky, and R.R. Winters, Bull. of Am. Phys. Soc., DNP Program **41**, No. 5 1236 (1996).
- AA Prograde Gravitational Capture Model for the Origin of the Earth-Moon System: Is it compatible with the geological record of earth and moon?, R.J. Malcuit, R.R. Winters, Abstracts, V. 1 of 3, p. 6, 30<sup>th</sup> International Geological Congress, August 1996.
- ANumerical Simulation of Gravitational Capture Scenarios for Planets Venus and Earth: Implications for the contrasting

- thermal histories of these planets@, R.J. Malcuit, R.R. Winters, Abstracts, V. 3 of 3, p. 506, 30<sup>th</sup> International Geological Congress, August 1996.
- "A BaF<sub>2</sub> Detector System for (n, $\gamma$ ) Cross Section Measurements at ORELA", K.H. Guber, R.R. Spencer, P.E. Koehler and R.R. Winters, presented at Nuclei in the Cosmos IV, Notre Dame, IN, June 1996.
- "New (n, $\gamma$ ) and Total Cross Section Measurements for <sup>134,136</sup>Ba and their Impact on s-process Nucleosynthesis Calculations", P.E. Koehler, R.R. Spencer, R.R. Winters, K.H. Guber, J.A. Harvey and N.W. Hill, presented at Nuclei in the Cosmos IV, Notre Dame, IN, June 1996.
- "Measurements of <sup>142,144</sup>Nd(n, $\gamma$ ) Cross Sections at ORELA for Astrophysical s-Process Studies", K.H. Guber, R.R. Spencer, P.E. Koehler, and R.R. Winters, presented at Nuclei in the Cosmos IV, Notre Dame, IN, June 1996.
- "Symbolic Computation in Classical and Quantum Mechanics Courses", R. R. Winters, Div. C Symposium - Symbolic computation in undergraduate science instruction, Am. Educational Research Assoc., 1996 Annual Meeting Program, p. 68, April 1996.
- AGeometry of Stable Capture Zones for Planet Earth: Potential for calculation of the probabilities of gravitational capture of satellites@, R.J. Malcuit, R.R. Winters, Ohio Journal of Science, April, Program Abstracts, 96, No. 2, A-30 (1996).
- AEvolution of the Earth-Moon System: Can the geological record of tidal deposits be used to distinguish between giant-impact and tidal capture scenarios?@, R.J. Malcuit, R.R. Winters, Abstracts, Tidalites >96, International Conference on Tidal Sedimentology, p.67-68 (1996).
- AGeometry of Stable Capture Zones for Planet Earth and Implications for Estimating the Probability of Stable Gravitational Capture of Planetoids from Heliocentric Orbit@, R.J. Malcuit, R.R. Winters, Abstract Volume, Part 2, 27<sup>th</sup> Lunar and Planetary Science Conference, p. 799-800 (1996).
- "Maple, Quarks, and a Pedagogical Disappointment", R.R. Winters, Bull. of Am. Phys. Soc., Transactions B 40 No. 14, 2101 (1995).
- "Science Instruction Through the Use of Maple", R.R. Winters and Z.A. Karian, The Eighth Annual International Conference on Technology in Collegiate Mathematics, ICTCM Program, p. 36 November 1995.
- APlanetoid Capture Models: Implications for the Great Contrast in Planetological Features of Planets Venus and Earth@, R.J. Malcuit, R.R. Winters, Abstracts with Programs, 1995 Annual Meeting, Geological Society of Am., V. 27, No.7, p. A208 (1995).
- "A BaF<sub>2</sub> Detector for (n, $\gamma$ ) Cross Section Measurements for Astrophysical s-process Studies", R.R. Winters, K.H. Guber, R.R. Spencer et al., Bull. Am. Phys. Soc. DNP Program 40 No. 10, 1627 (1995).
- <sup>142,144</sup>Nd(n, $\gamma$ ) Cross Sections for Astrophysical s-process Studies", K.H. Guber, R.R. Spencer, R.R. Winters, et al., Bull. Am. Phys. Soc. DNP Program 40 No. 10, 1627 (1995).
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