

## CURRICULUM VITAE

ROBERT RANDALL CADMUS, JR.

Professor Emeritus of Physics

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- Education University of Wisconsin, Madison: M.A. (Physics) 1970, Ph.D. (Physics) 1977  
Swarthmore College: B.A. (Physics) 1968
- Research Experience Assistant Professor, Associate Professor and Professor of Physics, Grinnell College (1978 - present): observational astronomy, primarily in the fields of variable stars and instrumentation. Developed facilities for observational astronomy at Grinnell.
- University House Fellow at the University of Iowa (summer of 1982): observational study of emission nebulae.
- Visiting Assistant Professor at Iowa State University (summers of 1980 and 1981): determination of stellar angular diameters from observations of lunar occultations.
- Research Associate at the University of North Carolina in Chapel Hill (January 1977-August 1978) affiliated with the Triangle Universities Nuclear Laboratory: polarization phenomena in nuclear reactions, high resolution measurements of resonances in proton elastic scattering, and computer simulation of accelerator beam optics.
- Research Assistant at the University of Wisconsin (1968-76): polarization phenomena in nuclear reactions and construction of the Wisconsin polarized-ion source. Ph.D. Dissertation: "The Separation of Proton and Deuteron Spin-Dependent Effects in the  $^{116}\text{Sn}(d,p)^{117}\text{Sn}$  Reaction", under the supervision of Prof. W. Haeberli.
- Research Assistant at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington (Summers of 1966 and 1967): nuclear physics (polarization phenomena) and atomic physics (beam-foil spectroscopy).
- Teaching Experience Assistant Professor, Associate Professor and Professor of Physics, Grinnell College (1978 - present). Courses taught include introductory physics, introductory astronomy, modern physics, wave phenomena (primarily optics), electronics, astrophysics, "Physics in the Arts", first year tutorial, and independent projects in physics, astronomy, electronics and computer science. Created the "Optics and Wave Phenomena", "Astrophysics", and "Physics in the Arts" courses and labs.
- Faculty member for the 1983 Grinnell Institute, a three-week summer program for college-bound high school students focusing on the development of academic skills in the context of an interdisciplinary study of the impact of industrial robots.
- Faculty member for the 1982, 1986, and 1997 Grinnell Alumni Colleges.
- Leader of a 2-week seminar "The World View of Twentieth-Century Physics" for college faculty (summer of 1981). Supported by a grant from the Northwest Area Foundation.
- Teaching Assistant at the University of Wisconsin. Recipient of the University of Wisconsin Teaching Assistantship Award.

Professional Memberships	American Physical Society, American Astronomical Society, Sigma Xi, International Dark Sky Association, American Association of Variable Star Observers, Iowa Academy of Science.
Professional Activities	<p>Chair and Vice-Chair, Physics Section of the Iowa Academy of Science.</p> <p>Reviewer of proposals for NSF and other funding agencies as well as manuscripts for multiple journals.</p> <p>Numerous invited lectures on nuclear physics, astronomy, and the physics of music at various institutions.</p>
Research Grants	<p>1980 - NSF (ROA) - lunar occultations - \$6,139</p> <p>1981 - NSF (ROA) - lunar occultations - \$6,697</p> <p>1981 - University of Iowa - emission nebulae - \$1,600</p> <p>1984 - Research Corporation - variable stars - \$5,380</p> <p>1985 - Sigma Xi - variable stars - \$435</p> <p>1985 - NSF (RUI) - variable stars (3 yrs.) - \$40,100</p> <p>1985 - Research Corporation - variable stars - \$15,415</p> <p>1985 - American Astronomical Society/NASA - variable stars - \$2,000</p> <p>1987 - NSF (REU) - variable stars - \$6,400</p> <p>1988 - NSF (RUI) - variable stars - \$60,300</p> <p>2002 – Grinnell College Faculty Study Leave</p>
Other Grants	<p>1989 - Apple Computer and the Consortium of Liberal Arts Colleges - Visualization of Physical Phenomena (with M.B. Schneider) - Equipment (list price \$9,621)</p> <p>1991 - NSF (ILI) - CCD camera for observatory - \$21,500 + College match</p> <p>1996 - NSF (ARI) - physics renovation - \$275,000</p>
Honors and Awards	<p>Breid-McFarland Chair in Science (Grinnell College)</p> <p>Outstanding Educator and Citizen Award (Grinnell Chamber of Commerce)</p> <p>Noyce Faculty Award in computing (Grinnell College) -- twice</p> <p>University House Fellowship (University of Iowa)</p> <p>Teaching Assistantship Award (University of Wisconsin, campus-wide)</p>
College Service	<p>Science Division Chair (including Executive Council and Budget Committee membership), Physics Department Chair.</p> <p>Committee participation: Curriculum, Academic Standing, (chair, Sub-Committee on Academic Honesty), Instructional Support (chair), Benefits, Computer Studies, Science Building Planning, Academic Computing (chair), Grant Board, Hendrixon Fund (chair), Science Division Shop (chair), Science Division Personnel Board, Master Plan, Campus Center Planning, EcoCampus, others.</p> <p>Scholars' Convocation speaker; numerous public lectures on astronomy and the physics of music.</p> <p>Primarily responsible for the conception, development, and operation of Grinnell's Grant O. Gale Observatory.</p>

## PUBLICATION LIST

ROBERT R. CADMUS, JR.

### Refereed Journal Articles

- "The Long Term Photometric and Spectroscopic Behavior of the Carbon Star RS Cygni". R.R. Cadmus, Jr., Submitted for publication (2022).
- "The Relationship between Photometric Measurements and Visual Magnitude Estimates for Red Stars". R.R. Cadmus, Jr., *Astronomical Journal* **161**:75 (2021).
- "Systematic Effects in the Visual Estimation of the Brightness of Red Variable Stars". R.R. Cadmus, Jr., *Journal of the American Association of Variable Star Observers* **48**, 140 (2020).
- "Long Term Photometric and Spectroscopic Monitoring of Semiregular Variable Stars". R.R. Cadmus, Jr., *Journal of the American Association of Variable Star Observers* **43**, 3 (2015).
- "Dynamics and Forecasting of Two Chaotic Stars". P.-M. Binder, I.J. Crosson, and R.R. Cadmus, Jr., *Astrophysical Journal Letters* **685**, L145 (2008).
- "Evidence for Low-Dimensional Chaos in Semiregular Variable Stars". J.R. Buchler, Z. Kolath, and R.R. Cadmus, Jr., *Astrophysical Journal* **613**, 532 (2004).
- "The Observational Determination of the Age of the Universe as a Laboratory Exercise". R.R. Cadmus, Jr., *American Journal of Physics* **67**, 665 (1999).
- "Multiperiodicity in Semiregular Variables I, General Properties". L.L. Kiss, K. Szatmary, R.R. Cadmus, Jr., and J.A. Mattei, *Astronomy and Astrophysics* **346**, 542 (1999).
- "A Correlation Between Water Maser Emission and the Visual Light Curve of RX Bootis". J. Hedden, P.J. Benson, I.R. Little-Marenin, and R.R. Cadmus, Jr., *Journal of the American Association of Variable Star Observers* **20**, 198 (1991).
- "S Persei: Optical and Water Maser Variability -- 1984 to 1990". I.R. Little-Marenin, P.J. Benson, M. McConahay, R.R. Cadmus, Jr., R.E. Stencel, and K. Eriksson, *Astronomy and Astrophysics* **249**, 465 (1991).
- "Observation of Possible Mode Switching in Three Semiregular Variable Stars". R.R. Cadmus, Jr., L.A. Willson, C. Sneden, and J.A. Mattei, *Astronomical Journal* **101**, 1043 (1991).
- "Chromospheric Variability of M-Giant Semiregular Variables". J.A. Eaton, H.R. Johnson, and R.R. Cadmus, Jr., *Astrophysical Journal* **364**, 259 (1990).
- "A Video Technique to Facilitate the Visualization of Physical Phenomena". R.R. Cadmus, Jr., *American Journal of Physics* **58**, 397 (1990).
- "j-Dependence of the Vector Analyzing Power in the  $^{40}\text{Ca}(\text{d,p})^{41}\text{Ca}$  Reaction at 4 MeV". R.R. Cadmus, Jr. and W. Haeberli, *Physical Review C* **28**, 1837 (1983).
- "Lunar Occultation Stellar Angular Diameter Measurements III". W.I. Beavers, R.R. Cadmus, Jr., and J.J. Eitter, *Astronomical Journal* **87**, 818 (1982).
- "Spins and Parities of Low-Lying States in  $^{79}\text{Kr}$  from the  $^{78}\text{Kr}(\text{d,p})^{79}\text{Kr}$  Reaction". B.L. Burks, R.R. Cadmus, Jr., T.B. Clegg, and E.J. Ludwig, *Nuclear Physics A* **377**, 105 (1982).
- "Lunar Occultation Stellar Angular Diameter Measurements II". W.I. Beavers, R.R. Cadmus, Jr., and J.J. Eitter, *Astronomical Journal* **86**, 1404 (1981).
- "Effect of the Deuteron D-State on the Polarization and Analyzing Power of  $I_n = 0$  (d,p) Reactions". R.R. Cadmus, Jr. and W. Haeberli, *Nuclear Physics A* **349**, 103 (1980).

"The Separation of Proton and Deuteron Spin-Dependent Effects in the  $^{116}\text{Sn}(\text{d,p})^{117}\text{Sn}$  Reaction". R.R. Cadmus, Jr. and W. Haeberli, *Nuclear Physics* **A327**, 419 (1979).

"Spins and Parities of Low-Lying States in  $^{77}\text{Kr}$  from the  $^{78}\text{Kr}(\text{d,t})^{77}\text{Kr}$  Reaction". R.R. Cadmus, Jr., T.B. Clegg, E.J. Ludwig, and S.A. Wender, *Nuclear Physics* **A319**, 165 (1979).

"A Polarimeter for 2-14 MeV Vector-Polarized Deuteron Beams". R.R. Cadmus, Jr. and W. Haeberli, *Nuclear Instruments and Methods* **129**, 403 (1975).

"A Solar Interferometer Operating at 3 Centimeters". R. R. Cadmus, Jr. and J. Warren, *Sky and Telescope* **36**, 160 (1968).

## Other Articles

"Minor Planet Observations (Geocentric Occultation Observations)". Herald, D., R.R Cadmus, Jr., and 70 others, Minor Planet Circular, No. 65630, id.9 (2009)

"Minor Planet Observations (Geocentric Occultation Observations)". Herald, D., R.R Cadmus, Jr., and 76 others, Minor Planet Circular, No. 64752, id.5 (2009)

"A possible new star: Evidence a quaternary star added to a tertiary star system may have been found during the (336) Lacadiera occultation of 3UC197-115376". T. George, R.R. Cadmus, Jr., and seven others, *Journal of Double Star Observations* **8**, 306 (2012).

"Minor Planet Observations (Geocentric Occultation Observations)". Herald, D., R.R Cadmus, Jr., and 77 others, Minor Planet Circular, No. 61165, id.13 (2007)

"Light, Time, and the Universe". R.R. Cadmus, Jr., *Grinnell Magazine* **27**, No.1, 17 (1994).

"RV Andromedae". R.R. Cadmus, Jr., *IAU Circular 4489*, edited by D.W.E. Green (International Astronomical Union, 1987).

"Will the Children See Comet Halley Again?". R.R. Cadmus, Jr., *Grinnell Magazine* **18**, 2 (1986).

"The Universe As Seen From Grinnell". R.R. Cadmus, Jr., *Grinnell Magazine* **17**, 19 (1985).

"The Physics of Musical Sounds". R.R. Cadmus, Jr., *Grinnell Magazine* **15**, 14 (1982).

## Book Chapters

"The Grinnell College Photometer". R.R. Cadmus, Jr. in *Photoelectric Photometry of Variable Stars*, 2nd ed., by D.S. Hall and R.M. Genet (Willmann-Bell, Richmond, 1988), p. 64.

## Conference Presentations

"The Semiregular Variable Star Observing Program at Grinnell College". R.R. Cadmus, Jr., Poster at meeting of the American Astronomical Society, Boston, June 2014.

"Some Semiregular Puzzles". R.R. Cadmus, Jr., Stars: Old, Young, and Variable Symposium, Ames, IA, May 2014.

"The Semiregular Variable Star Observing Program at Grinnell College ". R.R. Cadmus, Jr., Poster at Stars: Old, Young, and Variable Symposium, Ames, IA, May 2014.

"Assorted Perplexing Observations of SR Stars". R.R. Cadmus, Jr., Dust Mini-Symposium, Ames, IA, April 2014.

"Reconciling Information and Engagement in an Upper Level Physics Course". R.R. Cadmus, Jr., Poster at Faculty Teaching Fair, Grinnell College, April 2012.

"Chaos in the Music of the Spheres". J.R. Buchler, Z. Kollath, and R.R. Cadmus, Jr, in *Experimental Chaos: 6th Experimental Chaos Conference held 22-26 July, 2001 in Potsdam, Germany*. Edited by Stefano Boccaletti, *et al.* (American Institute of Physics, Melville, NY, 2002), p.61.

- "Variations in Atmospheric Extinction Resulting from the Mt. Pinatubo Volcanic Eruption". J.B. Rost and R.R. Cadmus, Jr. Annual meeting of the Iowa Academy of Science (1996).
- "The Time-Dependence of the Frequency Components in the Light Curve of RV Andromedae". R.R. Cadmus, Jr., J.B. Rost, and K.A. Young. Annual meeting of the Iowa Academy of Science (1996).
- "The Time-Dependence of the Frequency Components in the Light Curve of RV And". R.R. Cadmus, Jr., J.B. Rost, and K.A. Young, *Bulletin of the American Astronomical Society* **28**, 918 (1996).
- "Three Short Period Miras - Z Aql, RZ SCO and R Cet: Water Maser Emission and its Implications". I.R. Little-Marenin, S.B. Staley, P.J. Benson, and R.R. Cadmus, Jr., *Bulletin of the American Astronomical Society* **27**, 758 (1994).
- "Phase Lags Between Water Maser Emission and Optical Light Curves of LPVs". S.B. Staley, I.R. Little-Marenin, P.J. Benson, and R.R. Cadmus, Jr., *Bulletin of the American Astronomical Society* **26**, 948 (1994).
- "Variations of Optical and Water Maser Emission from Long Period Variables". I.R. Little-Marenin, P.J. Benson, and R.R. Cadmus, Jr., in *Astrophysical Masers: Proceedings of a Conference Held in Arlington, Virginia, USA: 9-11 March 1992*, edited by A.W. Clegg and G. E. Nedoluha (Springer Verlag, New York, 1993), p. 271.
- "Water Maser and Optical Variability for V778 Cyg and EU And, 1987 - 1991". I.R. Little-Marenin, P.J. Benson, and R.R. Cadmus, Jr., in *Astrophysical Masers: Proceedings of a Conference Held in Arlington, Virginia, USA: 9-11 March 1992*, edited by A.W. Clegg and G.E. Nedoluha (Springer Verlag, New York, 1993), p. 295.
- "Water Maser Variability in the Silicate-Carbon Star V778 Cygni 1987 - 1991". I.R. Little-Marenin, P.J. Benson, and R.R. Cadmus, Jr., in *Cool Stars, Stellar Systems and the Sun: Seventh Cambridge Workshop*, edited by M.S. Giampapa and J.A. Bookbinder (Astronomical Society of the Pacific, San Francisco, 1992), p. 594.
- "The Silicate-Carbon Stars: EU And and V778 Cyg -- Water Maser and Optical Variability: 1987 - 1991". P.J. Benson, I.R. Little-Marenin, and R.R. Cadmus, Jr., *Bulletin of the American Astronomical Society* **23**, 1381 (1991).
- "Chromospheric Variation and Phase Relation in M Giants". H.R. Johnson, J.A. Eaton, and R.R. Cadmus, Jr., in *Evolution in Astrophysics: IUE Astronomy in the Era of New Space Missions* (European Space Agency, 1990), p. 335.
- "The 1988 Brightening of S Persei: Optical and Water Maser Variability". M. McConahay, I.R. Little-Marenin, P.J. Benson, and R.R. Cadmus, Jr., *Bulletin of the American Astronomical Society* **22**, 798 (1990).
- "Chromospheric Variability of M-Giant SR Variables". J.A. Eaton, H.R. Johnson, and R.R. Cadmus, Jr., in *Cool Stars, Stellar Systems, and the Sun*, edited by G. Wallerstein (Astronomical Society of the Pacific, San Francisco, 1989), p. 488.
- "Observation of Possible Mode-switching in the Semiregular Variable RV Andromedae". R.R. Cadmus, Jr., L.A. Wilson and C. Sneden, *Bulletin of the American Astronomical Society* **20**, 672 (1988).
- "Studies of Semiregular Variable Stars at Grinnell's Grant O. Gale Observatory". R.R. Cadmus, Jr., *Proceedings of the Iowa Academy of Science* **94**, No. 1 (1987).
- "Photometric Mapping of Emission Nebulae". M.A. Ormsby and R.R. Cadmus, Jr., *Proceedings of the Iowa Academy of Science* **94**, No. 1 (1987).
- "The Instrumentation and Observing Program at Grinnell College's Grant O. Gale Observatory". R.R. Cadmus, Jr. and F.M. Melsheimer, in *Instrumentation and Research Programmes for Small Telescopes* (IAU Symposium No. 118), edited by J.B. Hearnshaw and P.L. Cottrell (D. Reidel, Dordrecht, 1986), p. 79.
- "MgII Emission from Shock Waves in Mira Variables". E.W. Brugel, L.A. Willson, and R.R. Cadmus, Jr., in *New Insights in Astrophysics - 8 Years of Astronomy with IUE*, (ESA SP-263, London, 1986), p. 213.
- "Pulsation, Shock Waves, and Calorospheres in Carbon Stars". R.R. Cadmus, Jr., L.A. Willson, and G.H. Bowen, *Bulletin of the American Astronomical Society* **18**, 684 (1986).

"The Facilities and Observing Programs of the Grant O. Gale Observatory". R.R. Cadmus, Jr., *Proceedings of the Iowa Academy of Science* **92**, No. 2 (1985).

"Measurement and DWBA Analysis of the  $^{78}\text{Kr}(\text{d},\text{p})^{79}\text{Kr}$  Reaction". B.L. Burks, R.R. Cadmus, Jr., T.B. Clegg, and E.J. Ludwig in *Polarization Phenomena in Nuclear Physics - 1980* (Fifth International Symposium, Santa Fe), edited by G.G. Ohlsen, R.E. Brown, N. Jarmie, W.W. McNaughton, and G.M. Hale (American Institute of Physics, New York, 1981), p. 647.

"A Polarized-Beam Study of the  $^{78}\text{Kr}(\text{d},\text{p})^{79}\text{Kr}$  Reaction". B.L. Burks, R.R. Cadmus, Jr., T.B. Clegg, and E.J. Ludwig, *Bulletin of the American Physical Society* **24**, 107 (1979).

"The  $^{78}\text{Kr}(\text{d},\text{p})^{79}\text{Kr}$  Reaction Using Vector-Polarized Deuterons". B.L. Burks, R.R. Cadmus, Jr., T.B. Clegg, G.B. Lipton, E.J. Ludwig, and S.A. Wender, *Bulletin of the American Physical Society* **23**, 954 (1978).

"Cross Sections and Vector Analyzing Powers for the  $^{78}\text{Kr}(\text{d},\text{t})^{77}\text{Kr}$  Reaction at 16 MeV". R.R. Cadmus, Jr., T.B. Clegg, G.B. Lipton, E.J. Ludwig, and S.A. Wender, *Bulletin of the American Physical Society* **22**, 1027 (1977).

"The Effects of Pressures and Preparation on the Graduate Teaching Assistant". R.R. Cadmus, Jr., *Bulletin of the American Physical Society* **22**, 628 (1977). (This corresponds to an invited paper at the 1977 Washington Meeting of the American Physical Society.)

"Application of Folding Models to the Description of Cross Section and Polarization Data for  $^{116}\text{Sn}(\text{d},\text{d})^{116}\text{Sn}$  and  $^{116}\text{Sn}(\text{d},\text{p})^{117}\text{Sn}$ ". R.R. Cadmus, Jr., W. Haeberli, and R.C. Johnson, *Bulletin of the American Physical Society* **21**, 963 (1976).

"An Absolute Standard for Deuteron Vector Polarization". K. Stephenson, L.D. Knutson, W. Haeberli, R.P. Goddard, and R.R. Cadmus, Jr., *Bulletin of the American Physical Society* **21**, 637 (1976).

"Separation of Proton and Deuteron Spin-Dependent Effects in the  $I_n = 0$  Reaction  $^{116}\text{Sn}(\text{d},\text{p})^{117}\text{Sn}(\text{g.s.})$ ". R.R. Cadmus, Jr. and W. Haeberli, *Bulletin of the American Physical Society* **21**, 638 (1976).

"A Polarimeter for 2-14 MeV Vector-Polarized Deuteron Beams". R.R. Cadmus, Jr. and W. Haeberli, in *Proceedings of the Fourth International Symposium on Polarization Phenomena in Nuclear Reactions*, Zurich (1975), edited by W. Gruebler and V. Konig (Birkhauser Verlag, Basel, 1976), p. 901.

"Observation of a Doublet at 3.62 MeV in  $^{41}\text{Ca}$ ". H.B. Hichwa and R.R. Cadmus, Jr., *Bulletin of the American Physical Society* **18**, 1406 (1973).

"Inconsistency in Spin Assignments to the 3.62 MeV State in  $^{41}\text{Ca}$ ". R.R. Cadmus, Jr. and W. Haeberli, *Bulletin of the American Physical Society* **18**, 1406 (1973).