Paul J. Heafner

Instructional Physicist/Astronomer

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There's more to learning science than just science.

Education

Spring 1999 **General Relativity**, *Montana State University*, NTEN.

Fall 1999 **Demystifying Quantum Mechanics**, *Montana State University*, NTEN.

1989–1991 **Master of Science, Physics**, *University of North Carolina at Greensboro.*

1985–1989 **Bachelor of Arts, Astronomy**, *University of North Carolina at Chapel Hill.*

Experience

1992–present **Physics and Astronomy Instructor**, *Catawba Valley Community College*, all levels of introductory physics and introductory astronomy.

1999–2000 **Adjunct Lecturer**, *University of North Carolina at Charlotte*, introductory astronomy lecture and lab.

2000–present **Member American Association of Physics Teachers**.

Member North Carolina Section American Association of Physics Teachers.

1992–present **Member of Catawba Valley Astronomy Club**.

1992–present **Staff member at Lucile Miller Observatory**.

Former volunteer for Catawba Science Center, ran Konica Minolta planetarium system for public shows and conducted live sky talks and laser shows.

Programming Languages, and markups, previously include HTML, CSS, ANSI C, and more recently Python, VPython, GlowScript, LaTeX.

LaTeX, author of the mandi bundle for introductory physics (currently being completely rewritten), https://github.com/heafnerj/mandi.

Professional

Fall 1999 **First in North Carolina to implement *Matter & Interactions*.**

2000–2014 **Contributing editor to *Sky & Telescope*.**

Summer 2007 **AAPT Workshop, Greensboro**, *Incorporating Critical Thinking into Introductory Astronomy*.

Summer 2007 **AAPT Workshop, Greensboro**, *VPython: 3D Programming for Ordinary Mortals*, with Bruce Sherwood and Ruth Chabay.

Summer 2007 **AAPT Contributed Paper, Greensboro**, *Learning Critical Thinking Through Astronomy*.

Summer 2008 **AAPT Contributed Paper, Edmonton**, *Let's Get Rid of Gravity!*.

Spring 2009 **NCS-AAPT Spring Meeting**, *Hosted and organized.*

Summer 2009 **AAPT Workshop, Ann Arbor**, *Incorporating Critical Thinking into Introductory Astronomy*.

Summer 2010 **AAPT Workshop, Portland**, *Critical Thinking in Astronomy*.

Summer 2010 **AAPT Contributed Paper, Portland**, *Homework Questions that Promote Critical Thinking.*

Winter 2011 **AAPT Workshop, Jacksonville**, *Critical Thinking in Introductory Astronomy*.

Winter 2011 **AAPT Invited Session Presider, Jacksonville**, *Astronomy at the University of Florida.*

Summer 2011 **AAPT Workshop, Omaha**, *Critical Thinking in Introductory Astronomy*.

Winter 2012 **AAPT Invited Session Presider, Ontario**, *Frontiers in Space Exploration.*

Spring 2012 **NCS-AAPT Spring Meeting**, *Hosted and organized.*

Summer 2012 **AAPT Invited Paper, Philadelphia**, *Learning Critical Thinking Through Astronomy*.

2012-2011 **NCS-AAPT**, *vice president.*

2011-2012 **NCS-AAPT**, *president.*

2012-2013 **NCS-AAPT**, *past president.*

2012-2013 **AAPT Committee on Space Science and Astronomy**, *vice chair.*

2013-2014 **AAPT Committee on Space Science and Astronomy**, *chair.*

2014-2015 **AAPT Committee on Physics in Two-Year Colleges**, *member.*

2014-present **AAPT Committee on Space Science and Astronomy**, *friend of committee.*

2014-2021 **Editor of AstroNotes column in The Physics Teacher**.

2015-2016 **AAPT Committee on Physics in Two-Year Colleges**, *vice chair.*

2016-2017 **AAPT Committee on Physics in Two-Year Colleges**, *chair.*

2017-present **AAPT Committee on Physics in Two-Year Colleges**, *friend of committee.*

Winter 2018 **AAPT Workshop, San Diego**, *Introduction to LaTeX for Teachers and Students.*

Winter 2018 **AAPT Invited Session Presider, San Diego**, *Highlights from the TPT AstroNotes Column.*

Spring 2018 **NCS-AAPT Contributed Paper, Edgecombe CC**, *Bringing LaTeX into Introductory Calculus-Based Physics.*

Spring 2018 **Invited Talk, NC *Matter & Interactions* User Group, High Point University**, *Bringing LaTeX into Introductory Calculus-Based Physics.*

Summer 2018 **AAPT Contributed Paper, Washintgon, D. C.**, *Bringing LaTeX into Introductory Calculus-based Physics for Homework and Computation.*

Winter 2019 **AAPT Workshop, Houston**, *Introduction to LaTeX for Teachers and Students.*

Winter 2019 **AAPT Invited Paper, Houston**, *Using LaTeX in Introductory Calculus-based Physics.*

Spring 2019 **NCS-AAPT Contributed Paper, Wake Forest University**, *Some Thoughts on Vector Analysis in Introductory Physics.*

Fall 2020 **NCS-AAPT Spring Meeting Contributed Talk**, *Unwrapping Vector Dot and Cross Products.*

Spring 2021 **AAPT CPTYC Zoom Meeting Invited Talk**, *Oral Interviews as Assessments.*

Spring 2021 **AAPT CPTYC Zoom Meeting Invited Talk**, *Workshop on Incorporating LaTeX and GlowScript Into Introductory Physics.*

Spring 2021 **NCS-AAPT Spring Meeting Contributed Workshop (could not present due to an emergency)**, *Workshop on Incorporating LaTeX and GlowScript Into Introductory Physics.*

Awards and Honors

Spring 2015 **Named AAPT Fellow**.

Summer 2014 **AAPT Homer L. Dodge Citation for Distinguished Service to AAPT**.

Fall 2006 **NCS-AAPT Meeting**, *Best Pedagogical Paper.*

Spring 1999 **NCS-AAPT Meeting**, *Best Pedagogical Paper.*

Books Authored or Coauthored

Heafner, Paul J. *Fundamental Ephemeris Computations.* Willmann-Bell, Inc., 1999.

– *Learning Critical Thinking Through Astronomy.* Redhawk Publishing, 2019.

Titus, Aaron and Heafner, Paul J. *Instructor Solutions for Matter & Interactions, Third Edition.* John Wiley and Sons, 2011.

– *Instructor Solutions for Matter & Interactions, Fourth Edition.* John Wiley and Sons, 2015.

– *Student Solutions for Matter & Interactions, Fourth Edition.* John Wiley and Sons, 2015.

Publications in The Physics Teacher

Heafner, Joe. "Matter & Interactions I: Modern Mechanics and Matter & Interactions II: Electric & Magnetic Interactions, by Ruth Chabay and Bruce Sherwood". *The Physics Teacher* 41(9) (Dec. 2003), p. 554.

– "University Teaching Credential". *The Physics Teacher* 44(7) (Oct. 2006), p. 406.

– "Beware! Innovative Textbook Ahead!" *The Physics Teacher* 46(9) (Dec. 2008), p. 563.

– "A New Approach to Astronomy Textbooks". *The Physics Teacher* 48(5) (May 2010), p. 351.

– "The Einstein Theory of Relativity: A Trip to the Fourth Dimension, by Lillian R. Lieber". *The Physics Teacher* 51(3) (Mar. 2013), p. 191.

– "Bringing Critical Thinking into Introductory Astronomy". *The Physics Teacher* 53(4) (Apr. 2015), p. 250.

– "Knowing is not Enough". *The Physics Teacher* 53(5) (May 2015), pp. 312–313.

– "The Language of the Arrows". *The Physics Teacher* 53(7) (Oct. 2015), pp. 445–446.

– "Words words words!" *The Physics Teacher* 53(6) (Sept. 2015), pp. 377–378.

– "Same Concept...Different Terms". *The Physics Teacher* 56(3) (Mar. 2018), pp. 184–185.

– "Variations on a Simple Dice Game". *The Physics Teacher* 56(4) (Apr. 2018), pp. 262–263.

– "A Primer on Some Celestial Geometry". *The Physics Teacher* 57(4) (Apr. 2019), pp. 264–265.

– "Farmer's almanacs in Introductory Astronomy I: 10^2 questions for inquiry and investigation". *The Physics Teacher* 57(2) (Feb. 2019), pp. 120–121.

Publications in Sky & Telescope

Heafner, Joe. "Screen Shot: All Eyes on the Moon". *Sky & Telescope* 100(3) (Sept. 2000), p. 70.
– "Screen Shot: All-in-One Software". *Sky & Telescope* 99(4) (Apr. 2000), p. 66.
– "Screen Shot: Erroneous Universe". *Sky & Telescope* 101(2) (Feb. 2001), p. 76.
– "Screen Shot: High Score for Version Four". *Sky & Telescope* 102(1) (July 2001), p. 68.
– "Screen Shot: Sky Maps at Your Service". *Sky & Telescope* 102(6) (Dec. 2001), p. 68.
– "Screen Shot: Out Among the Galaxies". *Sky & Telescope* 103(5) (May 2002), p. 57.
– "Screen Shot: Universe Well Rendered". *Sky & Telescope* 104(6) (Dec. 2002), p. 59.
– "Screen Shot: A Solid and Nostalgic Performer". *Sky & Telescope* 106(3) (Sept. 2003), pp. 64–65.
– "Screen Shot: Astronomy Day Software". *Sky & Telescope* 106(6) (Dec. 2003), pp. 67–68.
– "Screen Shot: Very Few Cons with This Pro". *Sky & Telescope* 105(4) (Apr. 2003), p. 66.
– "Screen Shot: Mac's Sky". *Sky & Telescope* 107(3) (Mar. 2004), p. 65.
– "Test Report: Martian Flights". *Sky & Telescope* 107(6) (June 2004), pp. 101–102.
– "Test Report: Sun Follower". *Sky & Telescope* 108(3) (Sept. 2004), p. 103.
– "Books and Beyond: Bite-Size Delicacies". *Sky & Telescope* 110(2) (Aug. 2005), p. 93.
– "Test Report: Celestial Free-dom". *Sky & Telescope* 109(5) (May 2005), p. 91.
– "Test Report: Double Duty". *Sky & Telescope* 110(4) (Oct. 2005), p. 82.
– "Test Report: Keeping It Simple". *Sky & Telescope* 109(2) (Feb. 2005), p. 100.
– "Mira AL: Powerful Introduction to Image Processing and Analysis". *Sky & Telescope* 112(6) (Dec. 2006), p. 93.
– "Traveling Through the Solar System". *Sky & Telescope* 114(11) (Nov. 2007), p. 32.
– "Test Report: Sky Voyager". *Sky & Telescope* 116(1) (July 2008), pp. 32–36.
– "The SkyX Student Edition". *Sky & Telescope* 117(4) (Apr. 2009), p. 38.
– "Southern Stars SkySafari 3". *Sky & Telescope* 122(6) (Nov. 2011), p. 54.

Other Publications

Heafner, Joe. "Bringing Planetary Math Down To Earth". *Visual Basic Programmer's Journal* (Oct/Nov 1993), pp. 60–63.
– "Teaching credentials". *Physics Education* 41(6) (Nov. 2006), p. 566.
– "New Teaching Credential". *Physics Today* 60(5) (May 2007), p. 12.
– "Reply to letter by Murray Peshkin". *Physics Today* 60(2) (Feb. 2007), p. 12.

References

Available upon request.

Speaker Bio

Joe Heafner, AAPT Fellow, began providing learning environments for astronomy and physics in 1992. His approach to teaching emphasizes the model of critical thinking developed by Richard Paul and Linda Elder, and the reasoning behind science rather than blind use of equations. He was the first instructor in North Carolina to adopt *Matter & Interactions*, a reformed approach to presenting introductory calculus-based physics that incorporates computer modeling. His introductory astronomy course has a flavor unlike that at any other institution. He just finished writing his fourth book, which is an inquiry-based introductory astronomy textbook.