CURRICULUM VITAE —— Thomas A. Moore

(Updated 1/23/09)

PRESENT POSITION: Associate Professor of Physics, Pomona College
PRESENT ADDRESS: Pomona College
Department of Physics and Astronomy
610 N. College Ave.
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PRIMARY RESEARCH INTERESTS: General Relativity theory, computer modeling of problems in relativistic astrophysics, fundamental issues in quantum mechanics.

OTHER SCHOLARLY INTERESTS: issues in physics education and the teaching of formal reasoning, the history and philosophy of science, issues in Hebrew Bible (Old Testament) language and literature.

EDUCATION:

B.A. in Physics (Magna Cum Laude, with Distinction in Physics) from Carleton College, June of 1976.
M.Phil. in Physics from Yale University, December of 1978.
Ph.D. in Physics from Yale University, May of 1981. Dissertation: *Gravitational Wave Generation by Stellar Core Collapse*.

AWARDS AND HONORS: 1976 Danforth Fellow, member of Phi Beta Kappa and Sigma Xi. Received a Pomona College Wig Prize for outstanding teaching in May 1991.

EMPLOYMENT HISTORY:

July 2000 - present:	Professor of Physics (with tenure), Pomona College
July 1991 - June 2000:	Associate Professor of Physics (with tenure), Pomona College
Sept. 1987 – June 1991:	Assistant Professor of Physics, Pomona College
Sept. 1984 – Aug. 1987:	Assistant Professor of Physics, Luther College
Sept. 1980 – Aug. 1984:	Instructor and Assistant Professor of Physics, Carleton College.

TEACHING EXPERIENCE: I have been teaching full-time at liberal-arts colleges for over twenty-four years, and have taught courses ranging over most of the physics curriculum (see the list on the last page). Student evaluations solicited by the deans of all three institutions for reviews have been very positive, giving me high marks on such things as class organization, enthusiasm, and concern for students and their needs.

RESEARCH: My main research work since 1980 has been on the generation and detection of gravitational waves. My early work focused on gravitational wave generation by stellar core collapse was supported partly with the help of a Research Corporation grant awarded for the summer of 1983. I also worked during the fall of 1989 with a collaborator at the Jet Propulsion Laboratory on a project concerning the gravitational "synchrotron" radiation emitted by cosmic strings, and in the spring of 1999 and in the fall of 2002 with the same collaborator on a project concerning the directional sensitivity of two different proposed space-based gravitational wave detectors.

OTHER SCHOLARLY WORK: From 1990 until 1998, work in pure research was mostly displaced by intense work in physics education. In 1987, I was chosen to be one of fourteen members of the national steering committee for the NSF-funded "Introductory University Physics Project" (IUPP), a project intended to consider how the standard calculus-based introductory physics course might be improved and be made more up-to-date. I formally proposed to IUPP an model curriculum entitled *Six Ideas that Shaped Physics*, which was selected for funding and testing by the IUPP. It formally tested at the University of Minnesota in 1991-1992 and at Smith and Amherst Colleges in 1992-1993 (see articles in the January 1996 and February 1998 issues of *American Journal of Physics* for the evaluation results.) A textbook supporting this curriculum was published by McGraw-Hill in January of 1998 (second edition in 2003), volumes of which are now being used at more than 50 colleges and universities, including universities in Canada and the Netherlands. (A detailed review of the text appeared in the *American Journal of Physics* in March of 2006.) This work has led to a number of workshops and invited presentations on this project, and my work for this project has led to several published articles in addition to the book itself.

STUDENT INVOLVEMENT: Over the years, I have worked on research and/or curriculum-development projects with over 20 students. I have won two Ford Foundation grants for student internship projects, three Hahn Teaching With Technology grants, and supported some student work with IUPP funds.

COLLEGE SERVICE: I was department chair (my turn in the rotation) from 1995 to 1998 and from 2004 to 2007. Major committee assignments have included a 3-yr term on the Curriculum Committee, four separate 1-yr terms on the Medical Sciences Committee, three 1-yr terms on the Teaching Committee, a 1-yr term on the Student Affairs Committee, and a 2-yr term on the Faculty Personnel Committee. I have served as chair of the Teaching and Learn-

ing Committee and as a member of the Teaching and Learning Task Force. I have also served two years as the president of the local chapter of the AAUP.

RECENT GRANTS:

- $7500 from the Mellon Foundation (administered by the Mellon-8 Consortium) in 2007 for a workshop on teaching introductory electricity and magnetism.
- Three successive Hahn Teaching with Technology Grants (for the summers of 2003, 2004, and 2005) for roughly $4000 each, to support development of 3D visualization software.

PUBLICATIONS:

C. Wainwright and **T. A. Moore**, "Observing the positions of spinning binary systems using LISA," *Physical Review D*, 79, 024022 (January 22, 2009).

T. A. Moore, "Book Review: Gravity from the *Ground Up: an Introductory Guide to Gravity and General Relativity,* by B. Schutz", *American Journal of Physics*, **73**, 2 (February 2005).

T. A. Moore, "Getting the most action out of least action: A proposal," *American Journal of Physics*, **72**(4), April 2004.

R. W. Hellings and **T. A. Moore**, "The information content of gravitational wave harmonics in compact binary inspiral," *Class. Quantum Grav.* **20**, 10 (21 May 2003), S181-S192.

T. A. Moore, *Six Ideas that Shaped Physics*, 2/e, New York: McGraw-Hill, 2003. (Six volumes, 1603 pages.)

T. A. Moore and Ronald W. Hellings, "The Angular Resolution of Space-Based Gravitational Wave Detectors", *Physical Review D ,* **65**(6), p. (March 15, 2002)

T. A. Moore and Ronald W. Hellings, "The Angular Resolution of Space-Based Gravitational Wave Detectors" (a short summary of the paper above), *Proceedings of the 3rd Amaldi Conference on Gravitational Waves*, American Institute of Physics, 2000.

T. A. Moore, *Six Ideas That Shaped Physics*, 1/e, New York: McGraw-Hill, 1998. (Six volumes, 1184 pages).

T. A. Moore, "Free Fall," "Gravitational Attraction," "Mass-Energy," "Least-Action Principle," "Spacetime," and "Collisions," in the *Macmillan Encyclopedia of Physics,* edited by J. S. Rigden, New York: Macmillan, 1996.

T. A. Moore, "An Overview of Six Ideas That Shaped Physics: A New Approach to Calculus-Based Introductory Physics", pp. 1037-1052 in *The Changing Role of Physics Departments in Modern Universities,* edited by E. F. Redish and J. S. Rigden, American Institute of Physics, 1997.

T. A. Moore and D. V. Schroeder, "A Different Approach to Teaching Statistical Mechanics," *American Journal of Physics* **65**, 1 (January 1997).

T. A. Moore, *A Traveler's Guide to Spacetime,* New York: McGraw-Hill, 1996, 223 pages.

D. V. Schroeder and **T. A. Moore,** "A Computer-Simulated Stern-Gerlach Laboratory," *American Journal of Physics* **61**, 9 (September 1993).

E. Seidel and **T. A. Moore,** "Gravitational Radiation from Perturbations of Stellar Core Collapse Models", pp. 146-162 in *Frontiers of Numerical Relativity,* edited by Evans, Finn and Hobill, Cambridge University Press, 1989.

E. Seidel, E. S. Myra, and **T.A. Moore,** "Gravitational Radiation from Type II Supernovae: The Effect of the High-Density Equation of State," *Physical Review D* **38**, 8 (15 October 1988).

E. Seidel and **T. A. Moore,** "Gravitational Radiation from Realistic Relativistic Stars: Odd Parity Fluid Perturbations," *Physical Review D* **35**, 5 (15 April 1987).

OTHER WRITTEN WORK: In addition to my published textbooks, I have written a 250-page lab manual for Carleton College's Introduction to Physics course, a 150-page textbook for Luther College on introductory computer programming in BASIC, a 90-page supplementary text on mechanics for Luther College's General Physics course, a short supplementary text on modern particle physics for my Modern Physics classes at Luther and Pomona, a set of written-out lecture notes on General Relativity for my Pomona class, and have contributed several hundred pages of text materials for Pomona's introductory physics laboratory sequence. I am in the process of revising the Six Ideas materials, and have almost completed a 400-page manuscript for an innovative undergraduate textbook on general relativity tentatively entitled *A General Relativity Workbook*.

RECENT TALKS AND PRESENTATIONS (prior to 1996, only selected talks are listed):

"Teaching Introductory Electricity and Magnetism", a Mellon-funded workshop held at Smith College on June 25-26, 2007. I was responsible for designing the workshop, and gave several presentations on the topic during several sessions and guided discussion during the others.

"Group Research and Interaction Problems," a talk given at the winter 2007 meeting of the American Association of Physics Teachers (AAPT) in Seattle (January 10, 2007)

"Teaching General Relativity with Tensors," an invited presentation at the American Association of Physics Teachers (AAPT) special topical conference on Teaching General Relativity, July 20, 2006.

"Innovative Approaches to Teaching E&M in Introductory Physics," a poster given at a Gordon Conference on *Teaching Electricity and Magnetism*, Holyoke, MA, June 11-16, 2006.

"Using Atmospheric Muons to Test Relativity in the Introductory Lab," a contributed talk given at the winter 2006 meeting of the American Association of Physics Teachers (AAPT) in Anchorage (January 24, 2006).

"Exploring Contemporary Physics in Introductory University Physics," a four-hour workshop given at the winter 2006 meeting of the American Association of Physics Teachers (AAPT) in Anchorage (January 22, 2006).

"Rethinking Introductory Physics for the 21st Century," an invited colloquium delivered to the students and faculty at the University of New Mexico in Alberquerque on February 25, 2005.

Half of a workshop entitled "Two New Approaches to Teaching Calculus-Based Introductory Physics" at the spring 2005 meeting of the American Physical Society in Los Angeles (March 20, 2005).

"Exploring Contemporary Physics in Introductory University Physics," a four-hour workshop given at the winter 2005 meeting of the American Association of Physics Teachers (AAPT) in Alberquerque (January 8, 2005).

"*Six Ideas That Shaped Physics:* An Exciting New Approach to Calculus-Based Introductory Physics," a 90-minute workshop presented at the same meeting.

"Bringing the Introductory Physics Course into the 21st Century," an invited colloquium given to the faculty and students of Washington University, St. Louis, December 8, 2004.

"General Relativity in a Nutshell," an invited plenary presentation delivered to the fall meeting of the Southern California section of the American Association of Physics Teachers (SCAAPT) at Pomona College on October 24, 2004. (I also delivered a version of this talk to a special class session for Carleton College's introductory physics class on November 3, 2003).

"Action: Training our Majors for Contemporary Physics," an invited presentation at a Gordon Conference on *Teaching Mechanics*, Holyoke, MA, June 15, 2004.

"Two Inexpensive Demonstrations: Freely-Falling Frames and Boltzmann's Factor," a contributed paper at the summer 2004 AAPT meeting in Sacramento, August 4, 2004.

"Gravitational Waves: A New Window on the Universe" as a colloquium for Carleton College physics majors and professors (November 3, 2003).

"Dancing With Bears: Reflections on the Process of Reform" arranged by Carleton's Teaching and Learning Center (November 4, 2003).

"*Six Ideas That Shaped Physics:* An Overview" an invited plenary session talk delivered at a special Introductory Calculus-Based Physics conference in Crystal City, VA (November 1, 2003).

"*Six Ideas That Shaped Physics:* A New Approach to Calculus-Based Introductory Physics" an invited plenary session talk delivered at the XLVI National (Mexican) Congress of Physics meeting in Merida, Mexico (October 28, 2003). (This was partly to prepare the ground for just-authorized Spanish translation of my textbook.)

"Getting the Most Action Out of Least Action," an invited* presentation at the summer 2003 meeting of the American Association of Physics Teachers (AAPT) in Madison, WI: delivered August 5, 2003. *This was technically a contributed paper, because AAPT does not allow more than one invited paper per person per meeting (see below), but this was an invited talk.

"*Spacetime Physics* and Beyond: the Ongoing Revolution in the Pedagogy of Relativity," an (officially) invited presentation at the AAPT summer 2003 meeting in Madison: delivered August 6, 2003.

SELECTED TALKS AND PRESENTATIONS (continued):

"Maxwell's Equations and Wave Machines," presented at the winter 2002 AAPT meeting in Austin, TX: delivered January 14, 2002.

"Six Ideas, Past, Present, and Future," an invited presentation to the New England chapter of the AAPT at Middlebury College, March 31, 2001.

"Dancing with Bears: Lessons in the Dance of Reform," an invited presentation to the New England chapter of the AAPT at Middlebury College, March 30, 2001.

"Using Multipart Problems to Promote Active Learning in the Classroom," presented at the January 2001 meeting of the AAPT in Anaheim, CA.

"Simple Relativistic Arguments for the Time-Derivative Terms in Maxwell's Equations," presented at the January 2001 meeting of the AAPT in Anaheim, CA.

"The Angular Resolution of Space-Based Gravitational Wave Detectors," presented as a colloquium in the Pomona College/Harvey Mudd College Joint Physics Colloquium Series (October 14, 1999).

"Yet Another Y2K Problem: Teaching Physics in the 21st Century," presented to the faculty and students at Pomona College as part of the Faculty Fall Lecture Series (October 5, 1999).

"Integrating Newton's Second Law Graphically Using Trajectory Diagrams," presented at the August 1999 meeting of the AAPT in San Antonio, TX. I also presented a two-hour commercial workshop on the *Six Ideas* text at the conference.

"The Angular Resolution of Space-Based Gravitational Wave Detectors," presented at the 3rd Amaldi Conference on Gravitational Waves at Cal Tech, July 1999.

"Exploring Maxwell's Equations with Simple Calculus," presented at the January 1999 meeting of the AAPT in Anaheim, CA. I also presented a two-hour commercial workshop on *Six Ideas* text at the conference.

"A Different Approach to Teaching Maxwell's Equations," presented at the January 1998 meeting of the AAPT in New Orleans and the January 1997 AAPT meeting in Phoenix. An earlier version of this talk was offered at the August 1996 AAPT meeting in College Park, Maryland.

"*Six Ideas that Shaped Physics:* A New Approach to Teaching Calculus-Based Introductory Physics" an invited presentation for the Mexico/U.S. Workshop on Teaching Introductory Physics held at Instituto Technológico y de Estudios Superiores de Monterrey (ISETM), Monterry, Mexico, October 24-25, 1997.

"*Six Ideas that Shaped Physics:* an Update," presented at the January 1997 AAPT meeting in Phoenix.

"How to Write a Textbook for a Curriculum Development Project," an invited presentation at the August 1996 meeting of the AAPT in College Park, Maryland.

"Using a Computer Program to Help Teach the Statistical Interpretation of Entropy," presented at the August 1996 meeting of the AAPT in College Park, Maryland, and also at the January 1996 AAPT meeting in Reno.

"*Six Ideas That Shaped Physics:* A New Approach to Introductory Physics," presented at the August 1996 meeting of the AAPT in College Park, Maryland.

"*Six Ideas That Shaped Physics:* What We Have Learned," presented at the August 1996 meeting of the AAPT in College Park, Maryland.

"An Overview of *Six Ideas That Shaped Physics*," an invited presentation/sample class at the International Conference on Undergraduate Physics Education at College Park, Maryland, August 1996.

"Teaching *Six Ideas that Shaped Physics*: A New Approach to Teaching Introductory Physics," an invited day-long workshop presented at Argonne National Laboratory in Batavia, IL, February 1995. I contributed similar workshops at the January 1996 AAPT meeting in Reno and the January 1995 AAPT meeting in Orlando.

"The Introductory University Physics Project: an Overview," presented at the Council on Undergraduate Research (CUR) conference at Bates College (Maine), August 1994.

"Teaching Quantum Mechanics and Relativity in the Introductory Physics Course: Problems and Promise", an invited workshop at the June 1991 AAPT meeting.

SELECTED TALKS AND PRESENTATIONS (continued):

"Report on a Trial Run of an IUPP-Inspired Introductory Physics Course", an invited presentation on my IUPP curriculum work, presented at the June 1990 meeting of the AAPT.

"Can Quantum Mechanics Be Taught at the Introductory Level?" an invited talk presented at the June 1989 meeting of the AAPT.

An invited lecture/demonstration on how one might teach the fundamental concepts of General Relativity to undergraduates, delivered at the October 1986 Iowa/Illinois Joint AAPT meeting at Rock Island, IL.

"Magic and Science", an invited talk about how our culture looks at science, delivered to students and faculty at the University of Wisconsin at Platteville (and repeated a number of times for students at Pomona).

I have also offered a number of commercial workshops about the *Six Ideas* text at selected AAPT meetings in 1998 through 2004.

OTHER NATIONAL SERVICE: I helped Carleton College rethink its physics curriculum in September of 2006. I served as a reviewer for NSF Instructional Laboratory Instrumentation (ILI) grants in February of 1995.

OTHER AWARDS AND HONORS: Pomona College's *Six Ideas That Shaped Physics*-based introductory course was honored as an "exemplary practice" course by the Center for Educational Policy Research in September 2006. This highest honor was only given to a few physics courses out of more than 100 nationwide.

COURSES TAUGHT:
General Physics (with and without calculus, more than 30 semesters, sometimes with multiple sections)
General Relativity and Cosmology (for junior/senior physics majors)
"Good Science, Bad Science, Not Science," a freshman seminar on the nature of science.
Mechanics (at the sophomore/junior level)
Thermal Physics (at both the sophomore and senior level)
Modern Physics (at the sophomore level)
Quantum Mechanics (at both the sophomore and senior level)
Special Relativity (a special January-term course at Luther College)
Electricity and Magnetism (junior level)
Science and Religion
Astrophysics
Introduction to Computer Programming (BASIC)
American Folk Dance

OTHER TEACHING SERVICE: At the request of the Claremont Colleges Protestant Chaplain, I have offered short non-credit courses in each of the ten last springs on various aspects of the Hebrew Bible to Protestant students of the Claremont Colleges, drawing on the best and most up-to-date Biblical scholarship. For more than eight years I offered year-long adult-education Bible classes at the Claremont United Church of Christ, Congregational, and have more recently offered Bible classes at San Dimas Community Church (where my wife is currently pastor), Hillcrest Congregational Church, and Mentone Congregational Church. During the summer of 2003, I spent two weeks at a Congregational church conference in the Marshall Islands (at the request of the Southern California/Nevada conference of the United Church of Christ), where I gave nine presentations on the first three chapters of Genesis and the "Caesar's coin" pericope in the Gospel of Luke.