James G. O'Brien

Curriculum Vitæ

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Latest version here: http://www.phys.uconn.edu/~obrien/JGOBrienCV.pdf
Abbreviations used throughout are listed below on page 6.

Contact Information

Address: Physics Department, University Of Connecticut, 2142 Storrs Road, Storrs, CT 06279 USA

Email: obrien@phys.uconn.edu

Web: http://www.phys.uconn.edu
http://www.phys.uconn.edu/~obrien/

Phone: (+1) (860) 486 3502

Main Office: (+1) (860) 486 3600

Fax: (+1) (860) 486 3346

Degrees

PhD: PhD, Physics, University of Connecticut, Storrs, CT, USA, to be completed April 20th, 2010

MS: MS, Physics, University of Connecticut, Storrs, CT, USA; 2006

BS: BS Physics, Magna Cum Laude, State University of New York at New Paltz, New Paltz, NY; 2003.

BA: BA Mathematics, Magna Cum Laude, State University of New York at New Paltz, New Paltz, NY; 2003.

Awards

- Outstanding Teaching Assistant, American Association of Physics Teachers (AAPT), USA, 2006
- Outstanding Teaching Award, University of Connecticut Physics Department, Academic Year 2005-2006
- Excellence in Physics Award, State University of New York at New Paltz, Academic Year 2002-2003

Language Skills

English: native

Computing Skills

LaTeX(advanced), Mathematica (advanced), Matlab, Pearl, C++, HTML, Web Assign, Blackboard.

Current Position

Graduate Student, Department of Physics, University of Connecticut, Storrs CT, 06269 USA.

Current Research Interests

General research themes include General Relativity, specifically various fluid models of stars, Cosmology, galactic formations, dark matter and galactic rotation curves, inflation, and metamaterials.

Education

Education History

- **University of Connecticut**, Storrs, Connecticut, USA. Graduate work including MS and PhD degrees in Physics, 2003-2010.
- **SUNY New Paltz**, New Paltz, NY, USA. Undergraduate course leading to BS degree in Physics and BS degree in Mathematics, both with high honors, 1998-2003.

Graduate Work Details

Ph.D. thesis research in the PAN (Particles, Astrophysics, and Nuclei) Group in the Department of Physics at the University of Connecticut, Storrs, CT, USA.

Major Advisor: Phillip D. Mannheim, University of Connecticut, USA.
Associate Advisor: Ronald L. Mallett, University of Connecticut, USA.
Associate Advisor: Alex Kovner, University of Connecticut, USA.
Thesis Research Topics: Applications of Einstein's General Relativity, Gravitational Faraday Effect, Alternative Gravitation Models, Galactic Rotation Curves, Covarientization of Space-Time Fluids, Metamaterials and Transformational Optics.
Thesis Title: "Rotation Curves in Conformal and Standard Gravity"
Thesis available here: http://www.phys.uconn.edu/~obrien/JGOBrienthesis.pdf

Publications

All of the following scientific papers can be downloaded at http://www.phys.uconn.edu/~obrien/.

- "Rotation Cuves in Conformal Gravity for the THINGS Survey", TBD, 2009
- "Keplerian Orbits in Metamaterials", TBD, 2009
- "A Metric Approach to Transformation Optics", Phys. Rev. A, 2009.
- "Challenging the Standard Perfect Fluid Paradigm", Classical and Quantum Gravity, 2009.
- "Gravitational Faraday Effect of a Ring Laser", American Journal of Physics, 2005.

Research Experience as an Undergraduate

- Undergraduate project on group and graph theory and its relation to Language and Alphabet systems. Research conducted at SUNY New Paltz for the 2002-2003 academic year.
- Undergraduate project on Group theory and its relation to Thermodynamical Systems. Research was conducted at SUNY New Paltz for the 2001-2002 academic year.

Presentations

A working sample of the following presentations can be found at http://www.phys.uconn.edu/~obrien/

Invited Talks

Physics Research Audience

- "The Schrodinger Equation and Departures from Classical Mechanics", Physics Department, State University of New York at New Paltz, New Paltz NY 12561, USA 15th November 2008.
- "Galactic Rotation Curves and Missing Mass", Physics Department, University of Connecticut, Storrs, CT USA 8th October 2008.
- "Continuum Spectrum Radio Astronomy", Physics Department, University of Connecticut, Storrs, CT USA 8th September 2007.
- "Gravitational Frame Dragging by Light", Physics Department, University of Connecticut, Storrs, CT USA, October 2006.
- "Four Vectors and Fourier Transforms", Physics Department, University of Connecticut, Storrs, CT USA, November 2005.

Student Audience

- "Rotation Curves in Detail", University of Connecticut Physics Club Talk, September 2009.
- "Dark Energy, Past and Present", University of Connecticut Physics Club Talk, March 2009.
- "Music in Nature", University of Connecticut Music Theory Club Talk, December 2008.
- "The Connections of Physics and Philosophy", University of Connecticut Philosophy Club Talk, May 2008.
- "Metamaterials and Negative Index of Refraction", University of Connecticut Physics Club Talk, March 2008.
- "Maxwell's Equations from Special Relativity", University of Connecticut Physics Club Talk, October 2007.
- "Gravitational Faraday Effect", University of Connecticut Physics Club Talk, February 2006.
- "Fourier Transforms for Physicists", University of Connecticut Physics Club Talk, February 2005.
- "Legendre Transforms for Physicists", University of Connecticut Physics Club Talk, September 2005.

Contributed Conference Presentations

Oral Presentations

- "Galactic Rotation Curves without Dark Matter for the THINGS Survey", 2009 CAM Conference, Acapulco , Guerrero , Mexico.
- "Gravitational Frame Dragging By Light", SLAC Summer School 2006, Stanford University, California, USA.
- ""Confusion" in Continuum Radio Astronomy", SDSS 2006, GBT Greenbank Observatory, Greenbank, WV, USA.

- "Gravitational Frame Dragging By Light", IARD Bi-Annual Conference 2005, University of Connecticut, Storrs, CT, USA.

Poster Presentations

- "Galactic Rotation Curves without Dark Matter for the THINGS Survey", 2009 CAM Conference, Acapulco , Guerrero , Mexico.
- "Gravitational Frame Dragging By Light", SLAC Summer School 2006, Stanford University, California, USA.
- "Perfect Fluid Space-Time Solutions to GR ", SLAC Summer School 2006, Stanford University, California, USA.

Teaching Experience

Teaching Comepetencies

My research, education and teaching experience listed below have prepared me to teach both upper division and introductory courses in physics and astronomy. I am also competetint in teaching elective and interdisciplanry courses for physics and astronomy exposure to non-majors. More information on courses can be obtained at http://www.phys.uconn.edu/~obrien/

Instructor of Record

Instructor of Record for various lecture courses at The University of Connecticut, Storrs, CT, USA since fall 2005. Responsibilities include lectures, preparation of online notes, preparation of exams, coordination of laboratory TA's, office hours and grading. Courses Lectured:

- PHYS 151 General Physics I: Vectors, statics, dynamics, Newton's laws, Conservation of Energy and Momenta, rotational kinematics and dynamics, fluid mechanics, thermodynamics.(calculus based). Lectured Spring 2006.
- PHYS 152 General Physics II: Electrostatics, Magnetostatics, AC/DC circuits, Potentials, waves, and Maxwell's Equations. (calculus based). Lectured Fall 2006.
- PHYS 123 Problem Solving in Physics: Bridge course to give calculus credit to students who took non calculus based physics, 121,122. Lectured Summer 2007, Summer 2008.
- PHYS 107 The Physics of Music: non-calculus based course on waves, wave mechanics, acoustics, instrumental design, musical scales, music theory, and the electromagnetic spectrum. Lectured Fall 2007, Fall 2008.
- PHYS 298 Special Topics: Mathematical Physics. See outline of Phys 240. Lectrured Fall 2005.
- PHYS 240 Mathematical Methods for Scientists: Vector and Integral Calculus, Tensor Calculus, Partial Differential Equations, Complex Variables, Fourier Analysis, Hilbert Space Introduction, Group Theory. Lectured Spring 2007, Spring 2008, Spring 2010.
- Various Laboratory courses, listed below.

Laboratory Instruction

- Laboratory Instructor for PHYS 151, fall 2003.
- Laboratory Instructor for PHYS 152, spring 2004.

- Laboratory Instructor for PHYS 132, spring 2004.
- Laboratory Instructor for PHYS 121, fall 2004.
- Laboratory Instructor for PHYS 107, fall 2004.
- Laboratory Instructor / Telescope Operator for Phys 104 (Astronomy), spring 2005.

Other Teaching Experience

- Summer 2009 Instructor for UCONN KAST programme, a one week academic camp for students in Astronomy.
- Spring 2007 Served as advisor for Undergraduate research in cosmology for 2 senior undergraduates.
- During the years 2005, 2006, 2007, I acted as a private tutor for students outside UCONN.
- Coordinating Member of the UCONN Physics Olympics, a one-day program for high school students to get hands-on experience with physics, May 2006, 2007, 2008.
- Summer 2006, Summer School Instructor at Mount Saint Michael Academy, Bronx, New York, USA, for Physics and Chemistry.
- Fall 2006, Conducted the Astronomy observation sessions, using the Physics department 1m Optical Telescope, three nights a week for PHYS 104 (Astronomy)
- Summer 2005, Summer School Instructor at Mount Saint Michael Academy, Bronx, New York, USA, for Mathematics.
- Fall 2004, lead the Discussion sections for problem solving for Physics 151 and 152.
- Spring 2003, High School Long Term Substitute Position for Mathematics, at Onteora High School, Onteora NY, USA.

Administrative Experience

- 2008-2009 Served as graduate student representative on Course and Curriculuum meetings, to decide which courses the undergradautes at UCONN should take, and when they should be taken.
- 2005-2007: Served on the UCONN Physics Textbook Committee, to choose a textbooks appropriate for introductory physics courses in the department, namely 151/152 courses (calculus based physics for engineers) and 121/122 courses. (algebra based introductory physics for science majors).
- 2005: Served as Lead Developer for Physics 298 (later named Phys 240), Mathematical Methods for Scientists. Developed the course curriculuum, scope and applications for this new but essential course for upper level undergraduates. I have since been the only instructor of record for this course.
- 2004-2006: Served as graduate student representative on the Teaching Assignments and Assesments Committee at the University of Connecticut Physics Department, responsible for choosing appropriate professors for teaching assignments, and evalutation for tenure.

Professional Societies

- American Physical Society (APS), USA
- American Association of Physics Teachers (AAPT), USA
- Sigma Pi Sigma Physics National Honors Society, USA

Citizenship and Visa Status

- Citizenship: American.

References

- Dr. Phillip D. Mannheim, Department of Physics, University of Connecticut, 2152 Hillside Road, Storrs CT 06269, phillip.mannheim@.uconn.edu (860) 486-3691.
- Dr. Ronald L. Mallett, Department of Physics, University of Connecticut, 2152 Hillside Road, Storrs CT 06269, mallet@aol.com (860) 486-4693.
- Dr. William Stwalley, Department of Physics, University of Connecticut, 2152 Hillside Road, Storrs CT 06269, stwalley@phys.uconn.edu (860) 486-4924.
- Dr. George Gibson, Department of Physics, University of Connecticut, 2152 Hillside Road, Storrs CT 06269, gibson@phys.uconn.edu (860) 486-3587.
- Dr. Cynthia Peterson, Department of Physics, University of Connecticut, 2152 Hillside Road, Storrs CT 06269, gibson@phys.uconn.edu (860) 486-6310.

Abbreviations:

APS: American Physical Society

CAM: Canadian , American, Mexico Association of Physicists
GR: General Relativity
SUNY: State University of New York, USA
UCONN: University of Connecticut, USA
IARD: International Association of Relativistic Dynamics
GBT: Green Bank Telescope
SLAC: Stanford Linear Accelerator
SDSS: Single Dish Summer School
KAST: Kids Are Scientists Too