## University of Rochester

**Summer 2007 undergraduate research in Physics, Optics, and Astronomy**
(*with selected publications or talks, updated Dec. 17, 2011)*

1. **Manuel Alves, class of '09** at the University of Rochester, worked with Prof. John Howell on a high precision measurement of the gravitational red shift of light using a sagnac interferometer. He plans to apply to graduate school.

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2. **Zachary Brown, Class of '07** at SUNY Fredonia, worked with Prof. Mark Bocko measuring and modeling the acoustic impedance of the bassoon. He plans to apply to graduate school for physics or acoustics.()

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3. **Adam Bublitz, class of '08** at University of Rochester, worked on measuring the position resolution, timing resolution, and light-yield of cosmic muons with professor Kevin McFarland under the MINERvA experiment.()
    1. *Bublitz, Adam (UR Physics) McFarland, Kevin UR Physics VERTICAL SLICE TEST presentation at NCUR 2008*

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4. **Patrick Buchinski, class of '08** at Utica College, studied the effects of cell thresholds on calorimeter noise in CMS at Fermilab with Prof. Regina Demina and Dr. Marek Zielinski. He plans to apply to graduate school for physics.

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5. **Michael Chernicoff, class of '0**9 at Amherst College, worked with Prof. Kevin McFarland on refurbishing veto wall panels for the MINERvA experiment at Fermilab, and testing the panels by making observations of cosmic ray muon showers. He plans on applying to graduate school in physics.

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6. S**arah Eibin class of '09** at Elon University studied the magnetic field created in order to trap atoms and create a Bose-Einstein Condensate with the group of Prof. N. Bigelow. She plans to apply to graduate school in physics.

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7. **Peter Faber, class of '08** at the University of Rochester, studied gap opening scenarios in dusty disks via planetary instability with Prof. Alice Quillen. He plans to apply to graduate school for astrophysics.
    1. 2007MNRAS.382.1823F Faber, Peter; Quillen, Alice C., The total number of giant planets in debris discs with central clearings, Monthly Notices of the Royal Astronomical Society, Volume 382, Issue 4, pp. 1823-1828, 2007arXiv0706.1684F Faber, Peter; Quillen, Alice C.The Total Number of Giant Planets in Debris Disks with Central Clearing
    2. 2006MNRAS.373.1245Q Quillen, Alice C.; Faber, Peter, Chaotic zone boundary for low free eccentricity particles near an eccentric planet , Monthly Notices of the Royal Astronomical Society, Volume 373, Issue 7041, pp. 1245-1250

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8. **Nathan Farwell class of '08** at the University of Rochester, worked with Dr. Olga Korotkova on analysis of data in comparison with the conventional model for optical turbulence. He plans on applying to graduate school in physics.
    1. Spectral changes in stochastic light beams propagating in turbulent ocean , Shchepakina E.; **Farwell N**.; Korotkova O.
       APPLIED PHYSICS B-LASERS AND OPTICS Volume: 105 Issue: 2 Pages: 415-420 DOI: 10.1007/s00340-011-4626-9 Published: NOV 2011
    2. Effect of oceanic turbulence on polarization of stochastic beams , Korotkova Olga; **Farwell Nathan** , OPTICS COMMUNICATIONS Volume: 284 Issue: 7 Pages: 1740-1746 DOI: 10.1016/j.optcom.2010.12.024 Published: APR 1 2011
    3. The effect of the jet-stream on the intensity of laser beams propagating along slanted paths in the upper layers of the turbulent atmosphere , : Korotkova Olga; **Farwell Nathan**; Mahalov Alex, WAVES IN RANDOM AND COMPLEX MEDIA Volume: 19 Issue: 4 Pages: 692-702 DOI: 10.1080/17455030903127653 Published: 2009

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9. **Gregory Feiden, class of '08** at SUNY Oswego, worked with Prof. Bill Forrest, on the detection and characterization of extremely small silicates. He plans on attending graduateschool in physics/astronomy.()

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10. **John K. Golden, class of '10** (Physics and Math) at the University of Rochester, worked with Prof. N. Bigelow on manufacturing a thin wire electrostatic trap (TWIST) for ultracold molecules. He plans to apply to graduate school for physics. Golden was named Goldwater Scholar in 2008,

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11. **David Grayson, class of '08** at the University of Illinois at Urbana-Champaign, contributed to an experiment in Prof. John Howell's laboratory by building several balance detectors, each of which can measure the difference in the intensity of two laser beams. He plans on applying to graduate school in experimental quantum physics. Grayson was named Goldwater Scholar in 2007.

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12. **Matthew Laurent, class of '09** at Rensselaer Polytechnic Institute, worked with Prof. Lukas Novotny on examining optical field enhancement and localization with gold nanorod antennas.

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13. Alexander Moore, class of '07, University of Rochester, worked withProf. Alice Quillen and Dr. Richard Edgar setting limits to the size of objects involved in collisional cascade models. Also setting limits on ALMA's sensitivity and determining whether it would be able to see features in dusty disks caused by embeded planets and benchmarking the compute power of a Graphics Processing Unit vs a Central Processing Unit. He plans to pursue graduate study in astrophysics.
    1. 2011arXiv1112.0577Q Quillen, Alice C.; Hasan, Imran; Moore, Alexander, Capture of Irregular Satellites via Binary Planetesimal Exchange Reactions in Migrating Planetary Systems
    2. 2011NewA...16..445M Moore, Alexander; Quillen, Alice C.; QYMSYM: A GPU-accelerated hybrid symplectic integrator that permits close encounters; QYMSYM: A GPU-accelerated hybrid symplectic integrator that permits close encounters, New Astronomy, Volume 16, Issue 7, p. 445-455
    3. 2008DPS....40.5809M Moore, Alexander John; Quillen, A. Planet Migration Through

a Self-Gravitating Planetesimal Disk;
American Astronomical Society, DPS meeting #40, #58.09; Bulletin of the American Astronomical Society, Vol. 40, p.504, 2008arXiv0809.2855M Moore, Alexander J.; Quillen, Alice C.; Edgar, Richard G. Planet Migration through a Self-Gravitating Planetesimal Disk

4. 2008DPS....40.1105Q Quillen, Alice C.; Moore, A.; Aggressively Parallel Algorithms of Collision and Nearest Neighbor Detection for GPU Planetesimal Disk Simulation; American Astronomical Society, DPS meeting #40, #11.05; Bulletin of the American Astronomical Society, Vol. 40, p.402
5. 2007MNRAS.380.1642Q Quillen, Alice C.; Morbidelli, Alessandro; Moore, Alex; Planetary embryos and planetesimals residing in thin debris discs; Monthly Notices of the Royal Astronomical Society, Volume 380, Issue 4, pp. 1642-1648

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14. **Erin Mondloch, class of '08** at the University of Montana, worked with Professor Robert Boyd on measuring the generalized Hartman effect in an air-spaced Fabry-Perot interferometer. She plans to apply to graduate school in physics.

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15. **Andrew Nadeau class of '10** at Clarkson University, worked with Yongli Gao studying the band gap of the organic semiconductor PTCDA. He has yet to decide what to do after he graduates.()

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16. **Christopher Osborne** class of '08 at the University of Rochester, worked with Professor Nick Bigelow on Molecules and Multiwavelenth State Control of Cold Trapped Atomes and Molecules . Last year (summer of 2006) he studied laser scattering of plasmont resonant gold nanoparticles for use in DNA detection with Prof. Lewis Rothberg. He plans on applying to graduate school for physics.
    1. *Christopher Osborne Molecules and Multiwavelenth State Control of Cold Trapped Atomes and Molecules ( (advisor Nick Bigelow, Physics) ,(Physics Senior Thesis, 2008)*

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17. **Kishore Padmaraju,** class of '09 at the University of Rochester, worked with Prof. Roman Sobolewski on the EO sampling of a LT-GaAs MSM photoswitch and the computer modeling of MSM photoswitches. He plans on applying to graduate school for electrical engineering.
    1. *Padmaraju, Kishore , advisor Sobolewski, Roman UR Physics presentation at URE 2008 Conference*. ()

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18. **Melanie Pelcher, class of '09** at the University of Rochester, worked to introduce a group of young women to possible careers in physics and other sciences by co-instructing the PREP program (Pre-college Experience in Physics) under the supervision of Prof. Steve Manly. She plans to apply to pursue graduate study in medical physics.

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19. **Ryan Pettibone, class of '08** at the University of Rochester, worked with Prof. Eric Blackman on obtaining an expression for the diffusion coefficient of accretion disc jets performing two dimensional Brownian motion. He plans to apply to graduate school for physics. (1) 2009MNRAS.396.1783P Pettibone, Ryan; Blackman, Eric G. Stochastic wobble of accretion discs and jets from turbulent rocket torques; Monthly Notices of the Royal Astronomical

Society, Volume 396, Issue 3, pp. 1783-1788

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20. Elizabeth Pollock, class of 08' at University of Rochester, worked with Prof. Udo Schroder on constructing scintillator detectors in order to measure cosmic ray muon decay and capture products. She is planning graduate study in physics.
    1. *Cosmic Ray Muon Imaging and Decay and Capture Process Detection - Elizabeth Pollock, Eric Henry and Udo Schröder, RSPS 2008*

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21. Amelia D. Prasad, at the University of Rochester, worked withProf. Alice Quillen on Spitzer Space Telescope Infrared Spectrograph mapping of the central kpc of Centaurus A
    1. 2008MNRAS.384.1469Q Quillen, Alice C.; Bland-Hawthorn, Joss; Green, Joel D.; Smith, J. D.; Prasad, D. Amelia; Alonso-Herrero, Almudena; Cleary, Kieran; Brookes, Mairi H.; Lawrence, Charles R.; Spitzer Space Telescope Infrared Spectrograph mapping of the central kpc of Centaurus A; Monthly Notices of the Royal Astronomical Society, Volume 384, Issue 4, pp. 1469-148 2007arXiv0710.5087Q Quillen, Alice C.; Bland-Hawthorn, Joss; Green, Joel; Smith, J. D.; Prasad, D. Amelia; Alonso-Herrero, Almudena; Brookes, Mairi H.; Cleary, Kieran; Lawrence, Charles R.; Spitzer IRS mapping of the central kpc of Centaurus A

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22. **Eve Privman class of '09 a**t the University of Rochester, worked to introduce a group of young women to possible careers in physics and other sciences by co-instructing the PREP program (Pre-college Experience in Physics) under the supervision of Prof. Steven Manly. She plans to apply to medical and/or graduate school for neuroscience.

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23. **Zhengqing Qi, class of '09**, University of Rochester, worked with Marek Zielinski and Regina Demina on calorimeter cell energy thresholds and its effect on reconstructed jet energy in CMS. He plans to attend graduate school for physics.
    1. ***CMS AN-2008/001 -- Performance of Jet Algorithms in CMS***
       *Authors: P. Schieferdecker P. Kurt G. Dissertori F. Chlebana, D. Elvira, K. Kousouris L. Apanasevich, C. Dragoiu, A. Smoron, N. Varelas F. Ratnikov . Qi, M. Zielinski A. Bhatti*
    2. **CMS AN-2008/002 -- Performance of the SISCone Jet Clustering Algorithm**
       Authors: A. Bhatti F. Chlebana, R. Harris, K. Kousouris Z. Qi, M. Zielinski F. Ratnikov, N. Varelas, C. Dragoiu M. Jha P. Kurt, H. Topakli G. Dissertori P. Schieferdecke
    3. **CMS AN-2010/024 -- Update of calorimeter cell and tower thresholds for jet reconstruction in first CMS collision data**
       Authors: V. Chetluru, J. Hirschauer,K. Ozdemir, Z. Qi, M. Zielinski
    4. *Qi, Zhengqing (Physics), advisor Demina, Regina, UR Physics, Hadronic Jets and Clustering Algorithms in CMS, presented at URE 2008*
    5. *Qi, Zhengqing (UR Physics) (Advisor Demina, Regina, UR Physics), Hadronic Jets and Clustering Algorithms in CMS - RSPS 2008*
    6. ***Jet Clustering Algorithms in CMS*** *(presented at RSPS 2009), Zhen Qi, Department of Physics and Astronomy, University of Rochester. Prof. Regina Demina, Department of Physics and Astronomy, University of Rochester, and Dr. Marek Zielinski, Fermi National Accelerator Laboratory.*

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24. **Ben Schmitt**, **class of 2008** worked with Alice Quillen on Optical Characterization of a 16-Image Kirkpatrick-Baez C-Ray Microscope for ICDF Experiments. He won a Fulbright in 2008. Schmitt, who is a double degree senior with a bachelor of science degree in physics and astronomy, and a bachelor of arts degree in mathematics and German, will spend his Fulbright year in Germany conducting physics research at the Max Planck Institute for Nuclear Physics in Heidelberg, and pursuing a master's degree in astronomy and astrophysics at Heidelberg University. He has previously conducted research at the University's Laboratory for Laser Energetics, Cornell University's Laboratory for Elementary Particle Physics, and the Max Planck Institute in Heidelberg. Schmitt has co-authored several scientific papers and intends to pursue a doctoral degree in physics and a research career in a government or academic laboratory setting
    1. *Ben Schmitt, Optical Characterization of a 16-Image Kirkpatrick-Baez C-Ray Microscope for ICDF Experiments. (advisor Alice Quillen, Physics and Astronomy) (Physics Senior Thesis, 2008)*

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25. D**avid Slocum, class of '09** at St. John Fisher College, studied muons and cosmic ray showers with Professor Kevin McFarland. He plans on applying to graduate schools in physics.

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26. C**yprian Tayrien, class of '08** at University of Rochester, worked with Prof. Bill Forrest and Ben Sargent on fitting silicate features to spectra from objects in the Taurus region. He plans to apply to graduate school for astrophysics.
1 2009ApJS..182..477S Sargent, B. A.; Forrest, W. J.; Tayrien, C.; McClure, M. K.; Watson, Dan M.; Sloan, G. C.; Li, A.; Manoj, P.; Bohac, C. J.; Furlan, E.; and 2 coauthors Dust Processing and Grain Growth in Protoplanetary Disks in the Taurus-Auriga Star-Forming Region
ASTROPHYSICAL JOURNAL SUPPLEMENT SERIES Volume: 182 Issue: 2 Pages: 477-508 DOI: 10.1088/0067-0049/182/2/477 Published: JUN 2009

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2 2009ApJ...690.1193S Sargent, B. A.; Forrest, W. J.; Tayrien, C.; McClure, M. K.; Li, A.; Basu, A. R.; Manoj, P.; Watson, D. M.; Bohac, C. J.; Furlan, E.; and 3 coauthors Silica in Protoplanetary Disks, ASTROPHYSICAL JOURNAL Volume: 690 Issue: 2 Pages: 1193-1207 DOI: 10.1088/0004-637X/690/2/1193 Published: JAN 10 2009

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3 2008ApJ...683L.187M McClure, M. K.; Forrest, W. J.; Sargent, B. A.; Watson, Dan M.; Furlan, E.; Manoj, P.; Luhman, K. L.; Calvet, N.; Espaillat, C.; D'Alessio, P.; ; Tayrien, C. and 2 coauthors, A Sub-AU Outwardly Truncated Accretion Disk around a Classical T Tauri Star
ASTROPHYSICAL JOURNAL LETTERS Volume: 683 Issue: 2 Pages: L187-L190 DOI: 10.1086/591666 Published: AUG 20 2008
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27. **Brian Turkett, class of '08** at the University of Rochester, worked with Dr. Judith Pipher and Tom Allen on Flamingos spectroscopy of Young Stellar Clusters to determine the ages of the clusters, and to compare the mass functions and accretion properties between young clusters, as well as within individual clusters.
1 **Brian Turkett,** supervisor: Prof. Judy Pipher "Near-infrared spectroscopy of young stellar objects in Cepheus A" (Physics Senior Thesis 2008)

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28. **Gennady Voronov, class of '08** at University of Rochester, with the group of Prof. N. Bigelow, worked on calculations of the depths of magnetic traps for Bose Einstein condensate studies. ()

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29. Julia Voronov, class of '08 at University of Rochester, studied magnetic directions recorded in the Cretaceous Chatham Island Basalts with Prof. John Tarduno and Rory Cottrell. She plans to apply to graduate school in geology ()

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30. Lauren Weiss, class of 2010 at Harvard University, worked with Prof. Eric Blackman to show that the gas around post-AGB objects lies in a disc. She plans to pursue a PhD in physics.()

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31. Alexandra Witthoft, class of '08 at Mt. Holyoke College, studied protostellar envelopes and protoplanetary disks with Prof. Dan Watson. She plans to attend graduate school. ()

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32. Nicholas Zufelt, class of '09 at SUNY Potsdam, worked with Prof. Alice Quillen on an Infrared Survey of Brightest Clluster Galaxies using Spitzer. He plans on applying to graduate school in physics, astronomy, or cosmology
    1. 2009AIPC.1201..182O O'Dea, Christopher P.; Quillen, Alice; Park, Jaehong; Zufelt, Nicholas; Baum, Stefi A.; Privon, George; Noel-Storr, Jacob; Edge, Alastair; Russell, Helen; Fabian, Andy; and 5 coauthors; Spitzer Observations of Star Formation in Brightest Cluster Galaxies; THE MONSTER'S FIERY BREATH: FEEDBACK IN GALAXIES, GROUPS, AND CLUSTERS. AIP Conference Proceedings, Volume 1201, pp. 182-185 (2009).
    2. 2009yCat..21760039Q Quillen, A. C.; Zufelt, N.; Park, J.; O'Dea, C. P.; Baum, S. A.; Privon, G.; Noel-Storr, J.; Edge, A.; Russell, H.; Fabian, A.; and 4 coauthors IR survey of brightest cluster galaxies I. (Quillen+, 2008); VizieR On-line Data Catalog: J/ApJS /176/39. Originally published in: 2008ApJS..176...39Q
    3. 2008IAUS..245..185O O'Dea, Christopher P.; Quillen, Alice; Zufelt, Nicholas; Park, Jaehong; Edge, Alastair; Russell, Helen; Fabian, Andy; Baum, Stefi
       Why are some brightest cluster galaxies forming stars?; Formation and Evolution of Galaxy Bulges, Proceedings of the International Astronomical Union, IAU Symposium, Volume 245, p. 185-188
    4. 2008ApJ...681.1035O O'Dea, Christopher P.; Baum, Stefi A.; Privon, George; Noel-Storr, Jacob; Quillen, Alice C.; Zufelt, Nicholas; Park, Jaehong; Edge, Alastair; Russell, Helen; Fabian, Andrew C.; and 5 coauthors; An Infrared Survey of Brightest Cluster Galaxies. II. Why are Some Brightest Cluster Galaxies Forming Stars?; The Astrophysical Journal, Volume 681, Issue 2, pp. 1035-1045
    5. 2008ApJS..176...39Q Quillen, Alice C.; Zufelt, Nicholas; Park, Jaehong; O'Dea, Christopher P.; Baum, Stefi A.; Privon, George; Noel-Storr, Jacob; Edge, Alastair; Russell, Helen; Fabian, Andy; and 4 coauthors An Infrared Survey of Brightest Cluster Galaxies. I.;
       The Astrophysical Journal Supplement Series, Volume 176, Issue 1, pp. 39-58.

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## Research Experience for Teachers (2007)

1. Rainer Benz, a physics teacher at Fairport High School in Fairport, NY, worked with Prof. Lucas Novotny's group building an atomic force microscopy (AFF) head as part of a scattering-type scanning near field optical microscope.
2. Lawanda Brown, a science teacher at Northwest College Preparatory HS, Rochester, NY worked with Prof. Lewis Rothberg's group on DNA sequence detection. The title of her research paper is "Can a Colormetric Dipstick be Made to Work".
3. Matthew Greene, a physics teacher at Rush Henrietta High Schoo, in Henrietta, NY worked with Prof. Kevin McFarland's group on developing classroom activities to incorporate portable muon detecto.
4. Doug Hollinger, a physics teacher at Pavillion High School in Pavillion, NY worked with Prof. Kevin McFarland's group on enhancing classroom activities to incorporate portable muon detectors.