

Undergraduate Research in Physics and Astronomy at the University of Rochester -- Summer 2002

1. Kristi Adamson, class of '03 at Brigham Young University, studied theoretical energy transfer rates in photosynthesis with Prof. Robert Knox. The title of her talk at the 2002 REU symposium is: Interpretations of Fluorescence Anisotropy in Peridinin -Chlorophyll-Protein Complex. Adamson won a Goldwater scholarship in 2003
2. Thomas Allen, class of '03 at the University of Rochester, worked with Prof. W. J. Forrest (and Judy Pipher and C. McMurty) on testing bare multiplexers for the next generation space telescope (NGST). The title of his talk at the 2002 REU symposium is: Testing of Bare Multiplexers for the Next Generation Space Telescope (NGST)
 1. 2008A pJ...675..491 Allen, Thomas S.; Pipher, Judith L.; Gutermuth, Robert A.; Megeath, S. Thomas; Adams, Joseph D.; Herter, Terry L.; Williams, Jonathan P.; Goetz-Bixby, Jennifer A.; Allen, Lori E.; Myers, Philip C. *Spitzer, Near-Infrared, and Submillimeter Imaging of the Relatively Sparse Young Cluster, Lynds 988e*
 2. 2006 BAAS...208.0807 Gutermuth, Robert A.; Pipher, J. L.; Myers, P. C.; Megeath, S.; Allen, L. E.; Allen, T. *A Fresh Look at Distributed vs Clustered Star Formation: Molecular Cloud Surveys with Spitzer*
 3. 2005 SPIE.5902..152 McMurtry, Craig W.; Allen, Thomas S.; Moore, Andrew C.; Forrest, William J.; Pipher, Judith L. *Characterization of 2.5 micron HgCdTe VIRGO/VISTA detector array*
 4. 2005 prpl.conf.8585G Gutermuth, R. A.; Megeath, S. T.; Pipher, J. L.; Allen, T. S.; Williams, J. P.; Allen, L. E.; Myers, P. C.; Fazio, G. G. *A Spitzer Survey of Protostars and Disks in Embedded Clusters*
3. Jessica Benjou, class of '03 at the University of Rochester, worked with Prof. Judy Pipher in the Near Infrared Astronomy lab, assisting in infrared detector array testing and optimization and on the analysis of young star cluster data using IDL. She plans on going to graduate school for astrophysics. The title of her talk at the summer 2002 REU symposium is: Near Infrared Astronomy and Young Stellar Clusters
4. Dan Berdine, class of '03 at the University of Rochester, worked with Prof Lynne Orr to write a Monte Carlo simulation to investigate the role played by the decay of W bosons in top quark pair production experiments. The title of his talk at the 2002 REU symposium is: Significance of the W-boson Width in Top Production at Linear Colliders. He plans to continue with this project through the coming academic year and plans to attend graduate school.
5. Jesse Chovjka, class of '03 at Michigan State University, worked with the group of Prof. Paul Tipton and concentrated on spontaneous transitions in the power supplies for the SVXII and ISL layers of the CDF detector at Fermilab. The goal was to achieve a more fundamental understanding of this still recurring problem and develop solutions from that knowledge. A secondary focus was writing software to make W and Z cuts on events from the CDF detector for Run II data.
6. Nathan Clark, class of '04 at the University of Rochester, worked on the creation and optimization of thin film coating designs for InSb detectors for possible use in NASA's Next Generation Space Telescope with Prof. Bill Forrest and Prof. Judy Pipher (and C. McMurty)

in the Near Infrared lab. The title of his talk at the 2002 REU symposium is: Testing of Bare Multiplexers for the Next Generation Space Telescope (NGST).

7. Michael Dunham, class of '04 at the University of Rochester, worked with Prof. Judy Pipher in the Near Infrared Astronomy Lab, doing image processing and analysis of stellar cluster S140n, using data collected in October 1999 with the STELIR cam infrared detector, on the 48" (1.2m) telescope at the Fred Lawrence Whipple Observatory. The title of his talk at the summer 2002 REU symposium is: Near Infrared Astronomy and Young Stellar Clusters. He plans to go to graduate school for astrophysics.
8. Joe Gester, class of '04 at the University of Rochester, worked on building test equipment and writing interface software to be used in characterizing Germanium/Gallium Blocked Impurity Band Detectors (Ge:GaBIBs) in the Far Infrared lab for Prof. Dan Watson.
9. Nicole Green, class of '03 at Alabama Agricultural and Mechanical University took part in research of some of the properties of photonic crystal fibers(PCF) which has possible applications in optical communications and biomedical optics. She participated in measuring the change of dispersion in bending PCF under Prof. Bob Knox in Physics and Prof. Wayne Knox at the Institute of Optics. She plans on going to graduate school for optics.
10. Kelly Gresham, class of '03 at the University of Rochester, worked with Prof. Wenhao Wu concerning the resistivity of nanorods near absolute zero temperatures with and without and electromagnetic field present. The title of her talk at the 2002 REU summer symposium is: Resistance of Nanorods at Low Temperatures. She plans to go to graduate school for physics.
11. Maritza Hobson, class of 2003 at WakeForest University, worked with Dr. Tom Foster on studying the effects of photodynamic therapy (PDT) treatment of mitochondria in a cancer cell line using confocal fluorescence imaging. The title of her talk at the 2002 REU summer symposium is "PDT Induced Mitochondrial Swelling". She plans to go to graduate school for biophysics or medical physics.
12. Thomas Howard, class of '03 at the University of Rochester, worked with Prof. Dan Watson on testing the properties of Si:Sb and Si:As BIB infrared detectors for NASA's Space Infrared Telescope Facility with Prof. Dan Watson in the far-infrared astrophysics laboratory.
13. Osalgbinosum, class of '03 at the University of Rochester worked with Prof. Judy Pipher, in the Near Infrared Astronomy Lab, and Prof. Dan Watson, in the Far Infrared Astronomy Lab, on various research assignments, including image analysis and database construction to be used in NASA's Space Infrared Telescope Facility (SIRTF).
14. Jonathan Insler, class of '03 at Cornell University, worked on analyzing the background of the W boson's decay to an electron and neutrino to better understand the decay Z to tau tau at the CDF collaboration at Fermilab with Prof. Kevin McFarland. He plans to apply to graduate school for physics in high energy, cosmology, or quantum field theory.
15. Keith Rehermann, class of 2004 at the University of Notre Dame, worked under the guidance of Professor Yongli Gao. He investigated imaging DNA under the influence of an applied AC field using fluorescence microscopy and atomic force microscopy (AFM). The desired results included observing the DNA stretch from its natural random coiled configuration to its full contour length and obtaining current and voltage measurements of the stretched DNA using AFM. The title of his talk at the 2002 REU symposium is: Microscopic Study of DNA and its Stretching.
16. Suzanne Levine, class of '03 at University at Albany, worked with Prof. Frank Wolfs developing Monte Carlo simulations of detector outputs used to study Quark Gluon Plasma (in particular, momentum and time of flight of particles) as part of the PHOBOS collaboration. She plans on pursuing graduate studies in high energy physics or quantum field

theory. The title of her talk at the summer 2002 REU symposium is: How We Almost Became Timing Experts.

17. Jarron Leisenring, Class of '05 at the University of Rochester, worked under the direction of Prof. Dan Watson to create an intricate database program holding information for various astronomical objects. He plans to go to graduate school for astrophysics.
18. Angela Lowell, class of '03 at the University of Rochester, worked in the Near Infrared Lab with Prof. J. Pipher's group doing data reduction of the young stellar cluster AFGL490 using the IDL computer program. In the future she hopes to make documentary films. The title of her talk at the summer 2002 REU symposium is: Near Infrared Astronomy and Young Stellar Clusters
19. Garrett Mason, class of '03 at Colgate University, worked with Professor Steve Manly in developing a method for determining the K/pi ratio of particles produced in gold nucleon collisions at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven Lab. This method will be another tool to help to determine whether a Quark-Gluon Plasma (QGP) is formed in these collisions. The title of his talk at the summer 2002 REU symposium is: Quark Gluon Plasma and the K/pi Discriminator. He plans to apply to graduate school in physics.
20. Ronen Mukamel, class of '05 at Harvard University, worked with Prof. John Howell on teleporting the quantum states of photons over long distances. The title of his talk at the summer 2002 REU symposium is: Generalization of Bell's Inequalities. He plans on going to graduate school in either physics or mathematics.
 1. *Bell Inequalities for particles of arbitrary spin in fixed analyzer*, **Ronen Mukamel** and *John C. Howell Phys. Rev. A 70, 054302 (2004)*. [10.1103/PhysRevA.70.054302](https://arxiv.org/abs/10.1103/PhysRevA.70.054302)
21. Jason Nordhaus, class of '03 at the University of Rochester, worked with Professor Eric Blackman on theoretical studies of accretion phenomena in astrophysical disks. He plans to pursue a Ph.D. in theoretical astrophysics. Jason was nominated for a Goldwater Scholarship. He was also the first student to be admitted under the early admissions program to graduate school in Astrophysics at the University of Rochester.
22. Efunwande Osoba, class of '03 at Arizona State, worked with the group of Prof. Nick Bigelow modeling and developing Zeeman slowers. The title of his talk at the 2002 REU Symposium is: Designing an Atomic Beam Slower. She intends to go to graduate school for particle physics or quantum computing.
23. Benjamin D. Pearson, class of '03 at the University at Buffalo. He studied the statistical analysis of climate data to determine the cause of earth's warming trend with Prof. Dave Douglass. The title of his talk at the 2002 REU symposium is: Differences Between Microwave Sounding Unit Satellite Data and the Surface Data and Global Temperature Change. He plans to go to graduate school for physics in quantum information, medical physics or condensed matter.
24. Jonathan Petrucci, class of '03 at the University of Rochester, worked on the analysis of data from the CDF collaboration at Fermilab with Prof. K. McFarland. Specifically, the use of support vector machines to classify data in the search for the Higgs boson. Plans to attend graduate school for physics.
25. Allison Powers, class of '04 at the University of Rochester, worked in the visualization lab of Prof. Adam Frank with programs which simulate the bipolar outflows of young stellar objects using hydrodynamic and soon to be magneto-hydrodynamic code. These simulations were used to analyze the morphology of the jets which will hopefully lead to a better understanding of how and why this phenomenon occurs.

26. Kathrine Schultz, class of '03 at the University of Rochester (Optics major/German minor), worked under the direction of Dr. Priscilla Auchincloss on the PREP program and on education research and the development of hands-on learning of physics by inquiry for high school girls. She plans to attend graduate school in optics. In 2003-4 she was named Fulbright Scholar to Germany. She plans to study Optical Metrology at Freidrich-Schiller-Universitaet in Jen Germany in 2004-2005. She is the first UR Fulbright Scholar since the 1999-2000 competition.
27. James Steinman, class of '03 at the University of Rochester, worked with Prof .Nick Bigelow's cooling and trapping team to produce a double-species Bose-Einstein Condensate confined on a nanochip . The title of his talk at the 2002 REU Symposium is: Laser Cooling and Trapping of Atoms. Future plans are to remain at UR for grad school and continue working in experimental quantum optics.
28. Joseph Terry, class of '03 at the University of Rochester worked with the group of Prof. Adam Frank studying the outflows from stellar objects, planetary nebulae and from the centers of active galaxies. This involved the study of hydrodynamics as well.
29. Stephen Thorndike, class of '03 at Alfred University, studied capture theory of solar system dust particles in resonances with Prof. Alice Quillen . The title of his talk at the 2002 REU Symposium is: The Capture of Dust Particles into Mean Motion Resonances with Extra Solar Planets He plans to apply to graduate school for astrophysics.
30. Joseph Tuggle, class of '03 at TuftsUniversity , worked to improve reconstruction code for the D-Zero Luminosity Group at the Fermi National Accelerator Laboratory, under Dr. M. Beigel and Prof. Tom Ferbel. He plans to go to graduate school for high energy physics.
31. Dan Vacco, class of '04 at OswegoState University, investigated paleo climate temperature fluctuations to better understand the Earth's cyclic properties with Prof. David Douglass. The title of his talk at the 2002 REU Symposium is: Predicting the End of the Holocene. He plans to go to graduate school for quantum information, astrophysics or engineering.
32. Len Zheleznyak, class of '05 at the University of Rochester , workedwith Prof. Frank Wolfs in the PHOBOS lab developing a data acquisition system which is to be used with the particle detector. The title of her talk at the summer 2002 REU symposium is: How We Almost Became Timing Experts.. He plans ongoing to graduate school for physics.
33. Saba Zuberi, class of '03 at the University of Rochester , worked with the testing of T0 counters with the time of flight group of Prof. FrankWolfs, involved in the PHOBOS collaboration. The title of her talk at the summer 2002 REU symposium is: How We Almost Became Timing Experts. She plans to attend graduate school for physics.\
34. Lisa Tumia (a PREP High School student funded by University startup funds of Alice Quillen) is studied remote sensing (airborne images) that were originally observed to study Lake Ontario water quality (courtesy of the Remote Sensing and Imaging Lab at Rochester Institute of Technology). She is using them to study long-shore sandbars which we see under the water. This is a pilot project to involve high school students, high school teachers and REU undergraduates in the analysis of data from large archives which are accessible over the internet. Archives with standardized data formats are linked in large databases such as NED/IRSA (infrared oriented, primarily extragalactic), MAST (multiwavelength, HST and UV oriented), HESEARC (X-ray oriented) and SIMBAD (galactic).

Two other high school teachers (Suzen Clark from Thorma-Jefferson middle school in Rochester, NY, and Paul Pavone from Pittsford-Sutherland high school, in Pittsford, NY) were supported from the PARTICLE project.

SUMMER RESEARCH IN PHYSICS AND ASTRONOMY

Student Presentations

August 8, 2002 in B&L 106

- 10:00 Session I Chair: Priscilla Auchincloss
Jessica Benjou, Mike Dunham and Angela Lowell; advisor, J. Pipher
Near Infrared Astronomy and Young Stellar Clusters
Jim Steinman; advisor, N. Bigelow
Laser Cooling and Trapping of Atoms
Dammy Osoba; advisor, N. Bigelow
Designing an Atomic Beam Slower
Keith Rehermann; advisor, Y. Gao
Microscopic Study of DNA and its Stretching
- 11:00 Break
- 11:15 Session II Chair: A. Bodek
Dan Berdine; advisor, L. Orr
Significance of the W-boson Width in Top Production at Linear Colliders
Garrett Mason; advisor, S. Manly
Quark Gluon Plasma and the K/pi Discriminator
Suzanne Levine, Len Zheleznyak and Saba Zubari; advisor, F. Wolfs
How We Almost Became Timing Experts
Ronen Mukamel; advisor, J. Howell
Generalization of Bell's Inequalities
Dan Vacco; advisor, D. Douglass
Predicting the End of the Holocene
- 12:30 Lunch in B&L 208 for program participants and faculty
- 1:15 pm Session III Chair, R. S. Knox
Maritza Hobson; advisor, T. Foster

Kristi Adamson; advisor, R. Knox
**Interpretations of Fluorescence Anisotropy in
Peridinin-Chlorophyll-Protein Complex**
Ben Pearson; advisor, D. Douglass
**Differences Between Microwave Sounding Unit Satellite Data
and the Surface Data and Global Temperature Change**
Stephen Thorndike; advisor, A. Quillen
**The Capture of Dust Particles into Mean Motion
Resonances with Extra Solar Planets**
Kelly Gresham; advisor, W. Wu
Resistance of Nanorods at Low Temperatures

Tom Allen and Nathan Clark; advisors, W. J. Forrest and C. McMurtry

Testing of Bare Multiplexers for the Next Generation Space Telescope (NGST)