University of Rochester

Summer 2008 undergraduate research in Physics, Optics, and Astronomy
(Including a partial list of Journal articles and Conference Proceedings co-authored by the REU students, updated Dec. 16, 2011)

1**. Laura Arnold, class of '10** 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.

1. Insights into protoplanetary disk evolution from a Spitzer IRS of NGC1333 (RSPS 2010) Laura Arnold, University of Rochester

2 2011arXiv1107.3261A Arnold, L. A.; Watson, Dan M.; Kim, K. H.; Manoj, P.; Remming, I.; Sheehan, P.; Adame, L.; Forrest, W.; Furlan, E.; Mamajek, E.; and 4 coauthors A Spitzer IRS Survey of NGC 1333: Insights into disk evolution from a very young cluster

3 2011ApJS..193...11M Manoj, P.; Kim, K. H.; Furlan, E.; McClure, M. K.; Luhman, K. L.; Watson, Dan M.; Espaillat, C.; Calvet, N.; Najita, J. R.; D'Alessio, P.; and 6 coauthors Spitzer Infrared Spectrograph Survey of Young Stars in the Chamaeleon I Star-Forming Region, The Astrophysical Journal Supplement, Volume 193, Issue 1, article id. 11 (2011)

4. Laura Arnold, "Insights into Protoplanetary Disk Evolution from a Spitzer IRS Survey of NGC1333," Advisor: Prof. Dan Watson (Physics senior Thesis, 2010).

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2. Micaela Bagley, class of '10 at the University of Rochester, worked on simulating the effect of an evolving bar on the formation of rings in spiral galaxies with Prof. Alice Quillen. She plans on applying to graduate school in astrophysics.

1 2011MNRAS.417..762Q Quillen, Alice C.; Dougherty, Jamie; Bagley, Micaela B.; Minchev, Ivan; Comparetta, Justin Structure in phase space associated with spiral and bar density waves in an N-body hybrid galactic disc , Monthly Notices of the Royal Astronomical Society, Volume 417, Issue 1, pp. 762-784

2 2009MNRAS.395..537B Bagley, Micaela; Minchev, Ivan; Quillen, Alice C. The morphology of galactic rings exterior to evolving bars: test-particle simulations , Monthly Notices of the Royal Astronomical Society, Volume 395, Issue 1, pp. 537-553

3 2008arXiv0808.1841B Bagley, Micaela; Minchev, Ivan; Quillen, Alice C, The Morphology of Collisionless Galactic Rings Exterior to Evolving Bars

4. **The Morphology of Galactic Rings Exterior To Evolving Bars: Test Particle Simulations** (RSPS 2010) Micaela Bagley, Ivan Minchev, Prof. Alice Quillen, University of Rochester

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3. **Aaron Bauer, class of '09** at University of Wisconsin – Eau Claire, worked with Prof. Robert Boyd on ghost imaging with a pseudothermal light source. He plans on applying to graduate school in physics.

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4. **Victoria Chan, class of 2009** at Smith College, characterized the propagation of light carrying orbital angular momentum through turbulent media with Professor Boyd and Colin O'Sullivan. She

plans on applying to graduate school in physics.
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5. **Brad Christensen, class of '10** at University of Rochester, worked with Prof. Yongli Gao on measuring the p-doping effect of WO_3 in organic materials such as tris-(8-hydroxyquinoline) aluminum [Alq_3]. He plans to apply to graduate school for physics.
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6. **Dustin Cote, class of '09** at Clarkson University, worked with Prof. Cindy Ebinger and Prof. Alice Quillen on spectral analysis of low-frequency events from the seismological activity in the Afar region of Ethiopia. He plans to apply to graduate school for physics.

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7. **Antonin Coultant** an undergraduate from France worked with Professo Rajeev in Mathematical/Theretical physics.

8. **Laura Coyle, class of '09** at Colgate University, worked with Prof. Nicholas Bigelow on characterizing the optical properties of magnesium fluoride coated window flanges. She plans to apply to graduate school in physics.
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9. **Daniel Gresh, class of '11** (double major in Physics and Mathematics) at the University of Rochester, worked with Prof. Regina Demina and Senior Scientist Marek Zielinski on optimization of algorithms for defining hadron jets for the CMS experiment at the Large Hadron Collider at CERN. He plans to go to graduate school in Physics.

1. *Implementing a Semantic Web Knowledge Database for Scientific Control and Diagnostic Systems (presented at RSPS 2007)* - Daniel Gresh and Prof. Richard Kidder, Laboratory for Laser Energetics, University of Rochester
2. **Effect of Thresholds on Noise and Jet Energy in ECAL (presented at RSPS 2009), Daniel Gresh and Prof. Regina Demina (Physics Dept. U of R).**
3. Design and Implementation of a Timing Control System for use in a Bose-Einstein Condensate (BEC) Experiment **(RSPS 2010)** Daniel N. Gresh and Nicholas P. Bigelow University of Rochester
4. **Design and Implementation of a Timing Control System for use in a Bose-Einstein Condensate (BEC) Experimen (RSPS 2011)** Daniel N. Gresh and Nicholas P. Bigelow University of Rochester
5. Dan Gresh, presentation at the Frontiers in Optics 2010/Laser Science XXVI and the 2010 Industrial Physics
   Forum) in Rochester, NY in October 2010
6. Daniel Gresh - Presentation, Annual Optical Society of America meeting in San Jose, California in October 2009

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10. Samuel Harrold, class of '09 at the University of Rochester, worked under Prof. Dan Watson analyzing mid-infrared spectra of protoplanetary disks observed with the Spitzer Space Telescope. He is applying to graduate schools for astrophysics.

1 2010AAS...21542810L Lacy, John H.; Watson, D. M.; Harrold, S. T.
Non-LTE Modeling of Infrared Molecular Line Emission From Protoplanetary Disks: Evidence for Dust Settling, American Astronomical Society, AAS Meeting #215, #428.10; Bulletin of the American Astronomical Society, Vol. 42, p.346

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2 2009ApJ...700.1017K Kim, K. H.; Watson, Dan M.; Manoj, P.; Furlan, E.; Najita, J.; Forrest, W. J.; Sargent, B.; Espaillat, C.; Calvet, N.; Luhman, K. L.; and 3 coauthors Mid-Infrared Spectra of Transitional Disks in the Chamaeleon I Cloud, The Astrophysical Journal, Volume 700, Issue 2, pp. 1017-1025 (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.; and 3 coauthors A Sub-AU Outwardly Truncated Accretion Disk around a Classical T Tauri Star, The Astrophysical Journal, Volume 683, Issue 2, pp. L187-L190

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4 2007ApJ...664L.111E Espaillat, Catherine; Calvet, Nuria; D'Alessio, Paola; Bergin, Edwin; Hartmann, Lee; Watson, Dan; Furlan, Elise; Najita, Joan; Forrest, William; McClure, Melissa; and 3 coauthors Probing the Dust and Gas in the Transitional Disk of CS Cha with Spitzer, The Astrophysical Journal, Volume 664, Issue 2, pp. L111-L114

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11. **Swen Hauksoon, an undergarduate at UC Irvine** worked with Professor Manly in the area of Neutrino Physics.

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12. David Heaton, class of '09 at the University of Rochester, worked under Prof. Paul Ampadu on improvements to the design of a simulator for custom ballistic nanostructures. David plans on applying to graduate school in electrical and computer engineering.

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13. **Sendawula (Joel) Kajubi,** an undergraduate at the University of Rochester, worked with Professors Pipher and Forrest in the area of infrared astronomy.

1. The Designing and Testing of Infrared Detector Arrays (presented at RSPS 2009) Sendawula Kajubi, Craig McMurtry, Department of Physics and Astronomy, University of Rochester.

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14. Colin Kinz-Thompson, class of '10 at the University of Rochester, worked on performing molecular dynamics simulations of charge migration in DNA with Prof. Esther Conwell. He plans to attend grad school for Chemistry.

1. Localization of a Hole on an Adenine-Thymine Radical Cation in B-Form DNA in Water Kravec S. M.; Kinz-Thompson C. D.; Conwell E. M.
JOURNAL OF PHYSICAL CHEMISTRY B Volume: 115 Issue: 19 Pages: 6166-6171 DOI:

10.1021/jp110062y Published: MAY 19 2011

2. Proton Transfer in Adenine-Thymine Radical Cation Embedded in B-Form DNA Kinz-Thompson Colin; Conwell Esther
JOURNAL OF PHYSICAL CHEMISTRY LETTERS Volume: 1 Issue: 9 Pages: 1403-1407 DOI: 10.1021/jz100214h Published: MAY 6 2010

3. Polarons in DNA Oligomers Kucherov Victor M.; Kinz-Thompson Colin D.; Conwell Esther M.
JOURNAL OF PHYSICAL CHEMISTRY C Volume: 114 Issue: 3 Pages: 1663-1666 DOI: 10.1021/jp908809t Published: JAN 28 2010

4. Polarons in DNA Oligomers (RSPS 2009) Victor Kucherov, Colin Kinz-Thompson, Professor Esther Conwell, University of Rochester

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15. **Daniel Klein, class of '10** at Tufts University, worked with Prof. Robert Boyd on light polarization effects related to artificial planar chiral nanostructures.

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16. **Jonathan Kurvits, class of '10** at the University of Rochester, worked on measuring gravitational acceleration using rubidium pressure gradients with Prof. John Howell. He plans on attending graduate school in physics.

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17. **Dan Linford, class of '09** at the University of Rochester, worked with Stephen Teitel on a simulation of granular materials in the jammed state. He plans on applying to graduate school in physics.

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18. **Sean Lourette, class of '11** at Washington University in St Louis, constructed an optical device capable of measuring the spatial coherence of a planar sample with Professor Lukas Novotny. He plans to apply to graduate school in physics.

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19. **Orlando Marrero,** an undergraduate at the University of Rochester worked with Professor L. Rothberg in the area of Chemical Physics.

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20. **Justin Mathew,** an undergarduate at the University of Rochester worked with Professor Mark Bocko on Physical Modeling of a Clarinet.

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21. **Heather Moore, class of '10** at The College of Wooster, worked on creating a working Atomic Force Microscopy set up for use by the Nano-Optics Group at the University of Rochester. This project was supervised by Prof. Lukas Novotny. She plans on pursuing graduate school for physics.

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22. Julia Nelson, class of '10 at University of Rochester, worked with Prof. John Tarduno and Rory Cottrell of the Earth and Environmental Science department on a project involving the characterization of magnetization held by Archean age zircons from the Barberton Belt of South Africa. She plans to apply to graduate school for geology.

1 2009AGUFMGP33B..07T Tarduno, J. A.; Cottrell, R. D.; Watkeys, M. K.; Hofmann, A.; Doubrovine, P. V.; Nelson, J.; Usui, Y., Paleointensity, solar wind and magnetopause 3.45 billion years ago (Invited) American Geophysical Union, Fall Meeting 2009, abstract #GP33B-07
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23. Danielle Nielsen, class of '09 at Colby College, studied the dust composition of disks of T Tauri stars in Chamaeleon with Prof. Bill Forrest. She plans to apply for graduate school in astrophysics.
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24. Melanie Pelcher, class of '09 at the University of Rochester, worked with Professor Tom Foster in the area of Biological/Medical Physics

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25. Jamilynn Poletto an undergraduate 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.
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26. Elizabeth Pollock, class of 08' at University of Rochester, worked with Prof. Udo Schršder 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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27. 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 in experimental high energy 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 {University of Maryland, College Park, MD, USA.\footnote } Z. 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 {University of Maryland, College Park, MD, USA. \footnote } 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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28. Roshita Ramkhalawon, class of '10 at University of Rochester, worked in Prof. Nicholas Bigelow's group to set up an optical resonator aiming at producing efficient second harmonic generation light. She plans on applying to graduate school in physics.

1. **Efficient Second Harmonic Generation (SHG) of Ti:sapphire Laser Using Non-Linear BBO Crystal** (presented at RSPS 2009)
Roshita Ramkhalawon, Department of Physics and Astronomy, University of Rochester. Kyle Taylor, Department of Physics and Astronomy, University of Wisconsin-Stevens Point. Advisor: Prof. Nicholas Bigelow, Department of Physics and Astronomy, University of Rochester.

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29. Valerie Rapson, class of '10 at the University of Rochester (transferred from Florida Inst. of Technology for Fall 2008), worked with David Douglass and Robert Knox on studying volcanic eruptions and using energy balance models to analyze aerosol based geo-engineering proposals. She plans on applying to graduate school in physics.

1. Analysis of an aerosol-based geo-engineering proposal (presented at RSPS 2009), Valerie A. Rapson, Prof. Robert S. Knox, Department of Physics and Astronomy, University of Rochester.

2. Valerie Rapson, *A Spitzer View of NGC 2264*, Senior Thesis, Advisor: Prof. Judith Pipher (Physics Senior Thesis 2010) ()

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30. Benoit Richard, class of '09 at the University of Rochester, worked on a semi-classical approximation method to matrix algebra using Grassmann variables with Prof. Sarada Rajeev. He plans on applying to graduate school in physics.

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31. Adi Robinson, class of '10 at the University of Rochester, worked with Prof. Frank Wolfs on the development of the advanced nuclear science education laboratory. He plans to apply to graduate school for physics and chemistry.

1. Modernizing the Mossbauer Experiment. (presented at RSPS 2009) , Adi Robinson, Prof. Frank Wolfs, Department of Physics and Astronomy, U. of Rochester. **2. Analyzing Ge Detector Pulses Using a Moving Window Deconvolution Algorithm** (RSPS 2010) Adi Robinson, University of Rochester

3. **Adi Robinson**, *Analyzing Ge Detector Pulses Using a Moving Window Deconvolution Algorithm*, Advisor: Prof. Frank Wolfs (Senior Thesis 2010)

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32. Chaz Ruggieri, class of '09 at The College of New Jersey, worked with Prof. Adam Frank's group on clumped-jet outflow simulations of young stars and their interaction with the interstellar medium. He plans on applying to graduate school in physics.

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33. Patrick Sheehan, class of '11 at the University of Rochester, worked with Prof. Dan Watson on transitional disks in the Orion Nebula and water emission lines in the spectra of protostars, using data from the Spitzer Space Telescope. He plans on applying to graduate school in astrophysics.

1 2011arXiv1110.4172L Lisse, C. M.; Wyatt, M. C.; Chen, C. H.; Morlok, A.; Watson, D. M.; Manoj, P.; Sheehan, P.; Currie, T. M.; Thebault, P.; Sitko, M. L.
Spitzer Evidence for a Late Heavy Bombardment and the Formation of Urelites in {eta} Corvi at ~1 Gyr, accepted for publication in the Astrophysical Journal 01 Dec 2011

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2 2011arXiv1107.3261A Arnold, L. A.; Watson, Dan M.; Kim, K. H.; Manoj, P.; Remming, I.; Sheehan, P.; Adame, L.; Forrest, W.; Furlan, E.; Mamajek, E.; and 4 coauthors A Spitzer IRS Survey of NGC 1333: Insights into disk evolution from a very young cluster, submitted to the Astrophysical Journal Supplement Series

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3 2011LPI....42.2438L Lisse, C. M.; Chen, C. H.; Wyatt, M. C.; Morlok, A.; Thebault, P.; Bryden, G.; Watson, D. M.; Manoj, P.; Sheehan, P.; Sloan, G.; Currie, T. M.
Spitzer Observations of η Corvi: Evidence at ~1 Gyr for an LHB-Like Delivery of Organics and Water-Rich Material to the THZ of a Sun-Like Star,
42nd Lunar and Planetary Science Conference, held March 7–11, 2011 at The Woodlands, Texas. LPI Contribution No. 1608, p.2438

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4 2009ApJ...701.1367C Chen, Christine H.; Sheehan, Patrick; Watson, Dan M.; Manoj, P.; Najita, Joan R.
Solar System Analogs Around IRAS-Discovered Debris Disks,
The Astrophysical Journal, Volume 701, Issue 2, pp. 1367-1372 (2009).

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5. **Accretion Processes in Class 0/I Protostars** (RSPS 2011) P.D. Sheehan, P. Manoj, and D.M. Watson University of Rochester
6. P.D. Sheehan - Physics BS Thesis, 2011, D.M. Watson Advisor, (Stoddard Prize for Best Senior Thesis 2001)

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34. Roger Smith, "Single Photons from Colloidal Quantum Dots Hosted in Cholesteric Liquid Crystal," Advisor: Prof. Svetlana Lukishova (Physics Senior Thesis, 2009, Stoddard Prize, best senior thesis 2009) ()

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35. Kyle Taylor, an undergraduate at the University of Wisconsin (Stevens Point), worked with Professor Nick Bigelow on Frequency Doubling of a Ti:Sapphire Laser in a Resonator Cavity.

1. **Efficient Second Harmonic Generation (SHG) of Ti:sapphire Laser Using Non-Linear BBO**

Crystal (presented at RSPS 2009)
Roshita Ramkhalawon, Department of Physics and Astronomy, University of Rochester. Kyle Taylor, Department of Physics and Astronomy, University of Wisconsin-Stevens Point. Advisor: Prof. Nicholas Bigelow, Department of Physics and Astronomy, University of Rochester.
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36. Cyprian 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.; and 3 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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37. Christopher Zou, an undergraduate at Rice University, worked with Professor Yongli Gao on I-V Measurement of Cs-doped Copper Pthalocyanine OTFT.
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