

# Julia D. Plummer

## Assistant Professor of Science Education

Arcadia University  
Education Department  
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## EDUCATION

- UNIVERSITY OF MICHIGAN, ANN ARBOR 2006  
Ph.D. in Astronomy and Education (Student initiated, combined degree program)  
Dissertation: *Students' Development of Astronomy Concepts across Time*  
Committee: Joseph Krajcik (co-chair), Mario Mateo (co-chair), Scott Paris, Matthew Linke  
NARST Outstanding Doctoral Dissertation Award for 2007
- UNIVERSITY OF MICHIGAN, ANN ARBOR 1999  
M.S. in Astronomy
- WASHINGTON STATE UNIVERSITY, PULLMAN 1997  
B.S. in Physics (magna cum laude)  
Minors: Math and Philosophy

## PROFESSIONAL EXPERIENCE

- ARCADIA UNIVERSITY 2006 TO PRESENT  
Coordinator of Science Education  
Assistant Professor of Science Education  
Responsibilities include teaching elementary science methods courses, graduate seminars in science education, and undergraduate astronomy; conducting research on conceptual development in astronomy, learning in the planetarium, and beliefs and knowledge of astronomy teachers; advising candidates in state science certification programs; coordinating/hiring adjunct faculty in science education, environmental education; and supervise Masters student projects in science and environmental education.
- UNIVERSITY OF MICHIGAN 1997-2003, 2006  
Graduate Student Instructor  
COURSES: Elementary science methods for masters/certification students (2006). Introductory astronomy courses, astronomy discussion sections, and labs (1997-2003). Trained new astronomy graduate students (1998-2003).
- UNIVERSITY OF MICHIGAN 2003-2006  
Curriculum developer, Center for Curriculum Materials in Science.  
Lead developer for a 6<sup>th</sup> grade astronomy unit and member of a team that developed an 8<sup>th</sup> grade unit on energy for a comprehensive middle school science curriculum, adapted for publication by *It's About Time*.
- UNIVERSITY OF MICHIGAN 1997-2006  
Planetarium Operator at the Exhibit Museum of Natural History.
- UNIVERSITY OF MICHIGAN 2002-2003  
Research assistant, ROLE project

UNIVERSITY OF MICHIGAN Research assistant, GIsML project (Guided Inquiry supporting Multiple Literacies); PI: Anne Marie Palinscar	2000-2001
UNIVERSITY OF MICHIGAN Instructor, Michigan Math and Science Scholars program. Developed and co-taught summer astronomy program for high school students ( <i>2 week programs</i> ).	2001-2003
JACKSON COUNTY MATHEMATICS & SCIENCE CENTER Astronomy summer camp instructor - Guided middle and high school students in observations.	2000-2002
NASA GODDARD SPACE FLIGHT CENTER Research Associate, NASA Academy internship program	1997
WASHINGTON STATE UNIVERSITY Planetarium Operator and Undergraduate Teaching Assistant, Program in Astronomy (Dept. of Mathematics)	1994-1997
HARVARD-SMITHSONIAN CENTER FOR ASTROPHYSICS Undergraduate researcher, NSF REU, with Christine Jones and Bill Forman	1996
LOWELL OBSERVATORY Undergraduate researcher, NSF REU, with Deidre Hunter	1995

## GRANTS AND AWARDS

NSF INFORMAL SCIENCE EDUCATION GRANT Principal Investigator, Arcadia University, <i>The Sky Up There</i> , \$1,941,942 [PROPOSAL PENDING]	2010-2013
FACULTY DEVELOPMENT FUND Principal Investigator; Arcadia University, <i>Supporting Students and Teachers in Elementary Astronomy Instruction: Learning to Explain Celestial Motion</i> , \$1200	2009
ELLINGTON BEAVERS FACULTY AWARD FOR INTELLECTUAL INQUIRY Principal Investigator; Arcadia University, <i>Elementary Students' Development of Apparent and Actual Celestial Motion Concepts</i> , \$3000	2007-2009
MATH AND SCIENCE PARTNERSHIP OF GREATER PHILADELPHIA Co-PI; National Science Foundation – Sub-award, <i>Astronomy in the Greater Philadelphia Area: Teacher Preparation and the State Standards</i> , \$18,636	2007-2008
OUTSTANDING DOCTORAL DISSERTATION AWARD National Association for Research in Science Teaching (NARST)	2007
FACULTY DEVELOPMENT FUND Principal Investigator; Arcadia University, <i>Elementary Teachers' Understanding of the Connections between Apparent and Actual Celestial Motion</i> , \$1200	2007
DISSERTATION FINISHING GRANT School of Education, University of Michigan (Tuition waiver)	2006
SPENCER MINI-GRANT School of Education, University of Michigan, <i>Kinesthetic Learning Techniques in the Planetarium</i> , \$1140	2004

DISTINGUISHED STUDENT AWARD 1997  
College of Science, Washington State University

SIGMA XI GRANTS-IN-AID OF RESEARCH 1996  
Observing run to Apache Point Observatory to study tidal stripping in interacting galaxies, \$1000

## PUBLICATIONS

### REFEREED JOURNAL ARTICLES

**Plummer, J.D.** and Krajcik, J.S. (In Press). *Building a Learning Progression for Celestial Motion: Elementary Levels from an Earth-Based Perspective*. Journal of Research in Science Teaching.

**Plummer, J.D.**, \*Zahm, V. and \*Rice, R. (Accepted). *Inquiry and Astronomy: Preservice Teachers' Investigations in Celestial Motion*. Journal of Science Teacher Education.

**Plummer, J.D.** (2009). *Early Elementary Students' Development of Astronomy Concepts in the Planetarium*. Journal of Research in Science Teaching, 46(2): 192-209.

**Plummer, J.D.** (2009). *A Cross-Age Study of Children's Knowledge of Apparent Celestial Motion*. International Journal of Science Education, 31(12): 1571-1606.

Secker, J., Harris, W.E., and **Plummer, J.D.** (1997). *Dwarf Galaxies in the Coma Cluster. II. Photometry and Analysis*. Publications of the Astronomical Society of the Pacific, 109, 1377-1393.

Hunter, D. and **Plummer, J.D.** (1996) *Sextans A: A Case Study of Star Formation and Gas Densities in Irregular Galaxies*, Astrophysical Journal, 462,732.

### OTHER PAPERS

**Plummer, J.D.** and \*Zahm, V. (in review). *Covering the Standards: Astronomy Teachers' Preparation and Beliefs*. Astronomy Education Review.

**Plummer, J.D.** (2008). *Students' Development of Astronomy Concepts across Time*, Astronomy Education Review, 7(1): 143-152. [Extended thesis abstract.]

**Plummer, J.D.** (2008). *Astronomy at Arcadia University*, Constellation, 23(3): 5-6.

Price, A., et al. (**J. Plummer** included in list of 18 authors) (2007). *Astronomy Education Research Charter and Symposium Report*, Astronomy Education Review, 6(2).

**Plummer, J.D.**, (2006). *Students' Development of Astronomy Concepts across Time*, Unpublished doctoral dissertation, University of Michigan, Ann Arbor, MI.

### CURRICULA

**Plummer, J.D.**, Holt, L.S., Krajcik, J. Starr, M.L., and Linke, M. P.. (2009). *How do you know when objects in the solar system will collide?* In *Project-Based Inquiry Science* (J. Kolodner, J. Krajcik, D. Edelson, B. Reiser, and M. Starr, Eds.). It's About Time: Armonk, NY.

Fortus, D., Nordine, J., **Plummer, J.**, Rogat, A., & Switzer, A. (2009). *How can you use energy to turn out the lights?* In *Project-Based Inquiry Science* (J. Kolodner, J. Krajcik, D. Edelson, B. Reiser, and M. Starr, Eds.). It's About Time: Armonk, NY.

## MANUSCRIPTS IN PREPARATION

**Plummer, J.D.** and Slagle, C. (in preparation). *Children Explaining Celestial Motion: Instruction Supporting Observational Astronomy.*

**Plummer, J.D.** and Agan, L. (in preparation). *Towards a Learning Progression Addressing the Seasons: A Comparison of Two Learning Trajectories with Middle School Students.*

**Plummer, J.D.** and Small, K. (in preparation). *Beliefs and Attitudes about Education in the Planetarium.*

## **CONFERENCE PAPERS AND PRESENTATIONS**

**Plummer, J.D.** and Slagle, C. (2010). *Using Children's Observations to Guide Explanations in Astronomy.* Workshop to be presented at the annual meeting of the National Science Teachers Association, March 18-20, Philadelphia, PA.

**Plummer, J.D.** and Agan, L. (2010). *Towards a Learning Progression Addressing the Seasons: A Comparison of Two Learning Trajectories with Middle School Students.* Paper to be presented at the annual meeting of the National Association for Research in Science Teaching, March 21-24, Philadelphia, PA.

**Plummer, J.D.** and Slagle, C. (2009). *A Learning Progression Approach to Teacher Professional Development in Astronomy.* Paper presented at the Learning Progressions in Science conference, June 24-26, Iowa City, IA.

Small, K. and **Plummer, J.D.** (2009). *Seeking Field Support for Fulldome Research Project.* To be presented at the annual meeting of the South Eastern Planetarium Association, June 16-18, Nashville, TN.

Small, K. and **Plummer, J.D.** (2009). *Seeking Field Support for Fulldome Research Project.* Presented at the annual meeting of the Middle Atlantic Planetarium Association meeting, May 13-16, Seabrook, MD.

**Plummer, J.D.** and Slagle, C. (2009). *Children Explaining Celestial Motion: Development of a Learning Progression.* Paper presented at the annual meeting of the National Association for Research in Science Teaching, April 20, Garden Grove, CA.

**Plummer, J.D.** (2008). *Astronomy in Middle and High Schools in the Greater Philadelphia Region,* Presented at the 3<sup>rd</sup> Annual Conference of the Math and Science Partnership of Greater Philadelphia, November 15, West Chester, Pennsylvania.

Howard, L., **Plummer, J.D.**, and Moore, G. (2008). *Connecting Science to the "Real" World: General Education for Non-Science Majors.* Presented at Engaging Science, Advancing Learning: General Education, Majors, and the New Global Century, November 6-8, Providence, Rhode Island.

**Plummer, J.D.**, \*Rice, R. and \*Zahm, V. (2008). *Inquiry and Astronomy: Investigations in Celestial Motion.* Paper presented at the National Association for Research in Science Teaching, March 30-April 2, Baltimore, Maryland.

**Plummer, J.D.** and Krajcik, J.S. (2008). *A Learning Progression for Celestial Motion.* Paper presented at the National Association for Research in Science Teaching, March 30-April 2, Baltimore, Maryland.

**Plummer, J.D.** (July, 2007). *A Learning Progression for Astronomy: Assessing the Current State of Research.* Paper presented at the Center for Curriculum Materials in Science, Knowledge Sharing Institute, July 22-25, Washington, D.C.

**Plummer, J.D.** (2007). *Developing Students' Understanding of Astronomy in the Planetarium*. Paper presented at the National Association for Research in Science Teaching annual meeting, April 15-18, New Orleans, Louisiana.

**Plummer, J.D.** (2006). *Kinesthetic Learning Techniques in the Planetarium*. Presented at the Annual Meeting of the Association for Science and Technology Centers, October 28-30, Louisville, Kentucky.

**Plummer, J.D.** (2006). *Kinesthetic Learning with Celestial Motion in the Planetarium*. Presented at the annual meeting of the Philadelphia Area Planetarium Association, October 27, Upper Dublin, Pennsylvania.

**Plummer, J.D.** (2005). *Kinesthetic Learning with Elementary Students in the Planetarium*. Presented at the 40<sup>th</sup> annual meeting of the Great Lakes Planetarium Association, October 19-22, Grand Rapids, Michigan.

**Plummer, J.D.,** Jones, C., Forman, W., Donnelly, R. H. and Rines, K.J. (1997). *Cosmological Implications of ROSAT Observations of Distant Galaxy Clusters*, Bulletin of the American Astronomical Society, 28, 1317

**Plummer, J.D.** and Hunter, D. (1996). *Star Formation and Gas Densities in the Dwarf Irregular Galaxy Sextans A*, Bulletin of the American Astronomical Society, 27, 1296

**\*Arcadia University students labeled with an asterisk.**

#### INVITED TALKS

**Plummer, J.D.** (February, 2010). *A Research-Based Approach to Teaching and Learning Astronomy in the Planetarium*. Rittenhouse Astronomical Society, Franklin Institute, Philadelphia, PA.

**Plummer, J.D.** & Zahm, V. (December, 2009). *Covering the Standards: Astronomy Teachers Preparation and Beliefs*. 21<sup>st</sup> Century Partnership for STEM Education, Conshohocken, PA.

**Plummer, J.D.** (August, 2009). *Students' Preconceptions in Astronomy*. Philadelphia Chapter of *Project Astro*, West Chester University, West Chester, PA.

**Plummer, J.D.** (January, 2008). *Understanding Astronomy: Challenges in Teaching through Observation of the Sky*. Association of Women in Science, Philadelphia Chapter.

**Plummer, J.D.** (October, 2007). *The road from novice to expert: Application of the learning progression framework to astronomy education*. Astronomy Department, University of Pennsylvania, Philadelphia, PA.

## **PARTICIPATION IN PROFESSIONAL ORGANIZATIONS**

### PROFESSIONAL SERVICE

Revision Panel for the Massachusetts Science and Technology/Engineering Curriculum Framework – Research consultant (2010)

Massachusetts Department of Elementary & Secondary Education

Co-Strand Coordinator: Science Learning, Understanding and Conceptual Change

National Association for Research in Science Teaching (2009-2011)

Arcadia University's Shared Futures project - Member (2006-present)

Association of American Colleges and University's (AAC&U)

Astronomy Education Research Charter – Member (2007)

Symposium held at Tufts University

Pedagogical Content Knowledge Science Retreat -- Consultant (2006)

Merck Institute for Science Education  
 Board of Directors - Docent Representative (2002-2006)  
 The Exhibit Museum of Natural History, University of Michigan  
 Introductory Astronomy Course Committee - Member (2003)  
 Department of Astronomy, University of Michigan  
 Strategic Planning Committee - Member (2003)  
 The Exhibit Museum of Natural History, University of Michigan

REVIEWING

International Conference on the Learning Sciences  
 National Association for Research in Science Teaching (Strand 1 & 2)  
 Astronomy Education Review  
 Cognition and Instruction  
 Sage Publishers

PROFESSIONAL AFFILIATIONS

Association of Women in Science (2008 – present)  
 Astronomical Society of the Pacific (1992-present)  
 National Association for Research in Science Teaching (2006-present)  
 National Science Teachers Association (2006-present)

**COMMUNITY SERVICE**

Event Organizer Arcadia University, Astronomy Lecture Series and Observing Nights	2009
Board Member Philadelphia Chapter of the Astronomical Society of the Pacific's Project Astro (Run through West Chester University)	2009
Keynote Speaker PAGES (Philadelphia Area Girls Enjoying Science) annual event for 6 <sup>th</sup> grade girls.	2009
Event Organizer Arcadia University Astronomy Night for Families. Organized students to run activities and the telescopes for the event. Advertized to local schools and community groups.	2009
Science Fair project advisor Advising Robyn Smith, High School student at Christopher Dock HS, on her astronomy research projects: <i>The evolution of galaxies</i> (2008), <i>Using irregular galaxy satellites to test the Holmberg effect</i> (2009)	2007-present
Earth Day Celebration Wissahickon Charter School, students in my graduate elementary science methods course planned and taught lessons at the Earth Day event.	2007, 2008
Presentation to the Upper Dublin High School Astronomy Club <i>The Status of the Planet Pluto</i> , Upper Dublin HS, Upper Dublin, PA.	2006

**CONFERENCES AND WORKSHOPS ATTENDED AS A PARTICIPANT**

Moving beyond conceptual models: Developing assessments to test and study learning progressions NSF-funded workshop; Invited participant (out of 30 total invited)	2009
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University of Michigan, August 3-7, 2009, Ann Arbor, MI

Math and Science Partnership conference 2008  
Philadelphia Education Fund, Arcadia University, December 12, 2008, Glenside, PA.

Exploring the Brain: Implications for Teaching and Learning 2008  
Widener University –NSF Math and Science Partnership of Greater Philadelphia, June 4, 2008.

First Annual Birding Workshop for Educators 2008  
John James Audubon Center, May 17 & 18, 2008, Mill Grove, PA.

Philadelphia Area Astronomers Meeting 2008  
Widener University, April 5, 2008

Astronomy Education Research Symposium 2007  
Tufts University, September 24, 2007, Medford, MA.

Shared Futures meeting, Arcadia team member 2007  
Sonoma State University, July 16-20, 2007, California,

Shared Futures meeting, Arcadia team member 2007  
American Association of Colleges & Universities conference, March 1-3, Miami, Florida

## CONTRIBUTIONS TO THE UNIVERSITY

### ADVISOR FOR MASTERS DEGREE CULMINATING PROJECTS

Robin Albright (2007), Jeff Deussing (2006), Judy Elinow (2007), Doug Faulkner (2007), Amber Geller (2008), Karen J. Johnston (2007), Joanne Long (2007), Victoria Meder (2007), Cindy Dale Miller (2008), Marie Duke Murphy (2008), Andrew Plunkett (2008), Dennis Robertson (2006), Dave Vinci (2008), Sophia Wang (2008), Emily Wash (2008), Kristin Kelly (2009), Michael Aviles (2009), Jessica Sonis (2009), Chris Bennett (2009)

### PRESENTATIONS TO THE CAMPUS COMMUNITY

**Plummer, J.D.** (February, 2010). *The Night Skies of Pennsylvania*. Arcadia University Alumni Events, Glenside, PA.

**Plummer, J.D.** (December, 2008). *Elementary Students Explaining Astronomical Observations*. Faculty Spotlight Series, Arcadia University, Glenside, PA.

**Plummer, J.D.** (November, 2006). *The demotion of Pluto: A new definition for planets*, Arcadia University Alumni Association Meeting, Arcadia University, Glenside, PA.

**Plummer, J.D.** (October, 2006). *The demotion of Pluto: A new definition for planets*, Graduate Colloquium series, Arcadia University, Glenside, PA.