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# LARA ARIELLE PHILLIPS

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Department of Physics  
University of Notre Dame  
Notre Dame, IN 46556

## Education

**Ph.D. in Astrophysical Sciences**, Princeton University, 2003

Thesis title: *WHIMsical Tracings: The X-ray Signature of the Warm/Hot Intergalactic Medium*

Advisor: Professor Jeremiah P. Ostriker

**B.Sc., First Class Honors in Physics, Minor in Mathematics**, McGill University, Montreal Canada, 1996

**DEC in Pure and Applied Sciences**, Collège de Maisonneuve, Montreal, Canada, 1992

High School Degree, Fine Arts Core Education High School, Montreal, Canada, 1989

## Experience

**Assistant Research Professor**, University of Notre Dame, 2009 – present

Co-founded galaxy evolution and large scale structure computational astrophysics group, developed and taught Westville Education Initiative Physics program, developed and implemented local and international outreach initiatives.

**Amherst Fellow, Amherst College**, 2008 – 2009

**Five Colleges Astronomy Department Science Education and Research Fellow**, Amherst College, 2005 – 2008

**Tolman Fellow and Postdoctoral Scholar**, Theoretical Astrophysics and Relativity Group, Division of Physics, Math and Astronomy, California Institute of Technology, 2002 – 2005

**Physics Workshop Supervisor**, Caltech Freshman Summer Institute, 2003

**Research Assistant** (1996– 2001) and **Teaching Assistant**, 1999, Princeton University

**Summer Fellow**, Canadian Institute for Theoretical Astrophysics, 1996.

**Women in Engineering and Science Scholar**, Dominion Astrophysical Observatory and Canada France Hawaii Telescope (CFHT), 1992 – 1995.

## Awards, Scholarships, Fellowships and Grants

**Luksic Collaboration Grant**, to travel to Chile and film High Z Supernova Search Team members as well as build collaborations with the Astronomy faculty at the Pontificia Universidad Católica de Chile, \$8,400.

Co-authored and awarded two **Institute for Scholarship in the Liberal Arts Large Grant** for Research and Creative Work for \$14,995 and \$13,885.

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**Provost's Initiative on Team Teaching grant, "Science Play: Physics on the Stage"** 2010 – 2014, \$3000

**Provost's Initiative on Building Intellectual Community, "Designing Information"**, 2010 – 2011, \$8750

**Tolman Postdoctoral Fellowship**, California Institute of Technology, 2003 – 2005

**Prize Postdoctoral Fellowship**, California Institute of Technology, 2002 – 2003

**Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship**, 1999 – 2002

**Amelia Earhart Fellowship**, awarded by Zonta International to women in Aerospace Engineering related sciences, 1999 – 2000

**Fonds pour la Formation de Chercheurs et l'Aide à la Recherche Research Scholarship**, 1996 – 1998

**McConnell Scholarship**, 1992 – 1996

**Canada Scholar Fellowship**, 1992 – 1996

**Women in Engineering and Science Scholarship**, awarded to 25 recipients by the National Research Council Canada, 1992 – 1995

Collège de Maisonneuve Prize, 1992

Coloured Women's Club of Montreal 90<sup>th</sup> Anniversary Award, 1992

### **Outreach**

Member and **co-producer of an artistic collaboration High Z**, a project to create a hybrid installation based on the 2011 Nobel Prize winning discovery of the accelerating universe, 2012 – present

Director of 2012 **Notre Dame Transit of Venus activities** that reached over 3000 members of the greater South Bend Community, through concerts, museum displays, lectures, drawing activities, and observation of the event through telescopes and solar glasses on the day

Demonstrations at **science fairs and camps** (Science Alive, Celebrate Science Indiana, Digital Sky Academy, Expand Your Horizons, Art2Science camp, Theatre2Science camp, PAN talks and reception, Michiana Star Party, Astroblast, and BACKBEATS, a collaboration between percussionists, engineers and physicists) 2011 – present

**Master Class on Exoplanets**, design and implementation in the classroom in collaboration with Quarknet, 2011 – present

Guided semester research project for Kristen Lentsch (alumni grand daughter), a student in 8th grade at John Young Middle school in Mishawaka. Ms Lentsch was referred by Amanda Katharine Serenevy, executive director, Riverbend Community Math Center, 2011

Introductory Physics II students design for gymnasium acoustics at Saint Anthony de Padua School, 2011

Science plays productions off campus and open to the community, organizational assistance, 2011

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**Nuclear Lab project**, design of and consultation for animations for a Nuclear astrophysics movie for the DVT, 2009 – 2014

Planning of **Outreach Center at Amherst College Observatory**, 2008 – 2009

Talks in schools, Société des Innovateurs, Québec, 1995

### Departmental and University Service

Seeking Educational Equity and Diversity (SEED) Cohort, 2016 – 2017

**Class Advisor for class of 2017 Physics Majors**, 2014 – present

**Chair, Department of Physics Outreach Committee**, 2011 – present

introduced graduate and undergraduate student representation, obtained budget for the committee, fostered of new collaborative initiatives,

College of Science reception for Big Picture Science hosts, our home, February 2015

Sophomore Seminar speaker, 2013 – present

**Dr. Brian Schmidt visit to the University of Notre Dame** (first visit to a US institution after his 2011 Nobel Prize), Organizer, February 2012

Member, Designing Information Group, funded through the Provost' Initiative on Building Intellectual Community, 2011

Physics Department Staff "Lunch 'n Learn", February 16, 2011

Member, Colloquium committee, 2010 – 2011

### Teaching and Formation

**Astronomy: Investigating Our Universe, a University of Notre Dame Pre-College track**, developed and taught in collaboration with Dr. Keith Davis (Summer 2016)

**Westville Education Initiative, Physics**, developed and taught a Physics and Astronomy program (three courses and one lab) at the Westville Correctional Facility, 2014 – 2016

**Kaneb Reading group** participant (*Contemplative Practices in Higher Education* by Barbezat and Bush, and *Teaching to Transgress: Education as the Practice of Freedom* by bell hooks) and facilitator (*Teaching and Learning STEM* by Felder and Brent) 2015 – present

**2011 Summer New Faculty Workshop**, American Center For Physics (ACP), College Park, MD

**Courses taught at the University of Notre Dame:** PHYS 10240 *Elementary Cosmology*<sup>†</sup> (Fall 2009 and 2010), PHYS 10222 *Introductory Physics II*<sup>\*†</sup> (Spring 2010 – 2016), PHYS 10555 *Science Play*<sup>†</sup> (Provost Initiative on Team Teaching, Fall 2010\*, Spring 2011\*, Spring 2014), PHYS 20481 *Introduction to Astronomy & Astrophysics*<sup>†</sup> (Fall 2011 – 2015), PHYS 11411 Freshman Labs<sup>\*</sup>(Fall 2011 – 2012), *Advanced Astrophysics*<sup>†</sup> (Fall 2016). (\* indicates courses taught with an increased teaching load, † indicates a course I developed).

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**Courses Taught at Amherst College**, 2005 – 2009: AST 12 *The Unseen Universe*, AST 15 *Science Play: Astronomy and Physics on the Stage*<sup>†</sup>, AST 57 *Astroparticle Physics*<sup>†</sup>, portions of AST 11 *Introduction to Astronomy*, and AST 26 *Cosmology*

Physics Workshop Supervisor, Caltech Freshman Summer Institute, 2003

Teaching Assistant, Princeton University, AST 203 *The Universe*, taught by Professors J. Richard Gott, Michael Strauss, and Neil deGrasse Tyson, 1999

### **Mentoring and Supervision**

**Ali Snedden '15** (University Notre Dame), graduate co-advisor with Professor J. Christopher Howk

Undergraduate Research Supervisor, Physics majors and REU, University of Notre Dame, 2010 – present

Undergraduate Research Supervisor, Amherst College, 2007 – 2009

Student Peer Advisor, McGill University, 1995 – 1996

### **Textbook/Educational Software Consultation/Review**

*Nature* article referee, 2015

*Pathways to Astronomy* by Schneider and Arny, review of LearnSmart probes for McGraw-Hill, 2011

*Cosmology* by George Greenstein for Cambridge University Press, 2010

*Interactive Astronomy* multimedia instructional package, 2008 – 2009

### **Professional Service and Membership**

Collaborator, proposed NSF Science and Technology Center, “Massive Black Holes in the Universe”, a Princeton University based center, 2011

Member of the Ad Hoc Science Planning Committee, Amherst College, 2007 – 2009

Collaborator, PHAROS, a soft X-ray spectroscopic mission to be proposed to the NASA SMEX program

Chandra Cycle 9 Review Panel, 2007

Collaborator, Missing Baryon Explorer (MBE), a proposed soft X-ray spectroscopic mission

Full member of American Astronomical Society (AAS), current

Organizing Committee, Computational Research in Princeton Lecture Series, 1998

Organizer, Astrophysical Sciences Department graduate lunchtime seminar series (1998 – 1999)

President's Standing Committee on the Status of Women, Princeton University, 1997 – 1999

Société des Innovateurs, Québec, 1995 – 1997

Student Representative, Physics Undergraduate Curriculum Committee, 1995 – 1996

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President of McGill Society of Physics Students, 1995 – 1996

### Languages spoken

English and French

### Relevant Publications

Snedden, A., Coughlin, J., **Phillips, L. A.**, Mathews, G. J., & Suh, I.-S., *Star Formation and Gas Phase History of the Cosmic Web*, Mon. Not. Roy. Astron. Soc. 455, 2804, (2016), arXiv:1412.7050

Snedden, A., **Phillips, L. A.**, Mathews, G. J., Coughlin, J., Suh, I.-S., and Bhattacharya, A., *A New Multi-Scale Structure Finding Algorithm to Identify Cosmological Structure*, J. Comp. Phys, 299, 92 (2015), arXiv:1409.7711

Mathews, G.J., Snedden, A., **Phillips, L. A.**, Suh, I. S., Coughlin, J., Bhattacharya, A., Zhao, X., & Lan, N. Q., *Origin and Evolution of Structure and Nucleosynthesis for Galaxies in the Local Group*, 2014, MPLA, 29, 1430012

Furlanetto, S. R., **Phillips, L. A.**, & Kamionkowski, M., *Highly-Ionized Oxygen Absorbers in the Intergalactic Medium*, 2005, MNRAS, 359, 295 [4.888]

**Phillips, L. A.**, *Whimsical Tracings: The X-ray Signature of the Warm/Hot Intergalactic Medium*, Ph.D. thesis, Princeton University, 2003

**Phillips, L. A.**, Ostriker, J. P., & Cen. R., *Searching for Baryons with Chandra*, in "X-ray Astronomy 2000", ASP Conference Proceeding Vol. 234. Edited by Riccardo Giacconi, Salvatore Serio, and Luigi Stella. San Francisco Astronomical Society of the Pacific, 2001

**Phillips, L. A.**, Ostriker, J. P. & Cen, R., *Is There Still Room for Warm/Hot Gas? Simulating the X-ray Background Spectrum*, ApJ 554, L9, 2001 [15.20]

Sander, W. T., et al., *Proposed SMEX to spectrally analyze the diffuse x-ray background: The Baryonic Extragalactic Structure Tracer (BEST)* in "X-Ray and Gamma-Ray Telescopes and Instruments for Astronomy". Edited by Joachim E. Trümper, Harvey D. Tananbaum. Proceedings of the SPIE, Volume 4851, pp. 388-395, 2003

Salmon, D. & Phillips, L. A., *Experiments with Silica Sol Antireflective Coatings*, CFHT Information Bulletin, 34. 16, 1996

### Invited Seminars and Talks

*What's Your Time? Is it warped, crunched, or relative?*, Our Universe Revealed, University of Notre Dame, 2016

*In the Neighborhood Of Galaxies, Nobel Laureates and Gummy Worms*, Seminar, Adler Planetarium, May 2014

*Echos of the Big Bang: What the Cosmic Microwave Background Reveals about the Past and Future Universe*, Indiana University South Bend, April 2014

*The Universe in a Box: What simulations and observations of large scale structure reveal about the evolution of our universe*, Public talk, Valparaiso University, February 2014

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*Galaxy Evolution in the Neighborhood*, Physics and Astronomy Colloquium, Valparaiso University, February 2014

*Chasing a WHIM: The Changing Picture of an Important Baryon Reservoir*, Physics Colloquium, Ohio University, Department of Physics, May 6, 2011

*Chasing a WHIM: The Changing Picture of an Important Baryon Reservoir*, Physics Colloquium, Western Michigan University, Department of Physics, April 19, 2010

*WHIMsical Tracings: The Cosmic Web in the Universe*, Colloquium, School for the Art Institute of Chicago, January 29, 2009

Seminar, Center for Astrophysics, Cambridge, MA, April 27, 2007

Phillips, L. A., *Parsing the WHIM*, APS, H5.00003, 2005

Phillips, L. A. *Whimsical Tracings: The X-ray Signature of the Warm/Hot Intergalactic Medium*, in "Soft X-ray emission from clusters of galaxies and related phenomena", Huntsville, AL, 2002

### Conferences, contributed

Phillips, L. A., *Overlooked genius: perspectives from teaching Physics at the Westville Correctional Facility*, FEMMSS6, Notre Dame, IN, 2016

Phillips, L.A., Snedden, A., Coughlin, J., Mathews, G. J., & Suh, I. S., *Where Do Galaxies Spend Their Time? The Evolving Environment of Galaxies and Their CGM*, AAS, 227, 109.02, 2016

Phillips, L.A., & Snedden, A., *An Evolving Neighborhood: Tracking the Local Environment of Galaxies and Their CGM*, AAS, 225, 253.01, 2015

Snedden, A., Phillips, L.A., Mathews, G. J., Coughlin, J., Bhattacharya, A., & Suh, I. S., *The Evolution of the Distribution of Enriched Material in Large Scale Structure from  $z=3$  to  $z=0$* , AAS, 222, 119.03, 2013

Snedden, A. & Phillips, L.A., *Characterizing Cosmic Voids in Large Scale Simulations*, AAS, 219, 336.03, 2012

Phillips, L.A., & Snedden, A., *Chasing a WHIM: The Changing Picture of an Important Baryon Reservoir*, AAS, 218,410.02, 2011

Phillips, L. A. *Science Play: Using Theater to Teach Astronomy*, Cosmos in the Classroom, Pomona, CA, 2007

Phillips, L. A. *Mapping the Intergalactic Medium in Chandra Deep Fields*, AAS, 209, 77.07, 2007

Phillips, L. A., *Peering Through the Sheets: Characterizing the WHIM*, American Astronomical Society HEAD Meeting, 8, 02.23, 2004

Phillips, L. A., *Finding Filaments with a New Algorithm to Ferret Out Structures in Simulations*, AAS, 204, 15.01, 2004

Phillips, L. A., *A Little WHIM: Predictions for the Warm Hot Intergalactic Medium from Theory and Observational Constraints*, AAS, 203.4105, 2003

Phillips, L. A., *Whimsical Tracings: The X-ray Signature of the Warm/Hot Intergalactic Medium*, in "Soft X-ray emission from clusters of galaxies and related phenomena", Huntsville, AL, .2002 (invited talk)

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Phillips, L. A., Unmasking the Baryons: Warm/Hot Gas in the Universe, AAS, 197.9506, 2000

Phillips, L. A., Ostriker, J. P., & Cen, R., *O VII/O VIII Emission of Warm/Hot Gas*, AAS, 196.3424, 2000

Phillips, L. A., Ostriker, J. P., Freyberg, M. J., & Trümper, J., *Prospecting for Warm/Hot Gas in Filaments*, AAS, 195.1303, 1999

Phillips, L. A., & Turner, E. L., *Local Underdensity Model for Near Infrared Galaxy Counts* AAS, 18110503, 1997

### Submitted Proposals

“The research and public engagement balance of early-career astrophysicists”, a Templeton Small Grant OFI, in collaboration with Jonathan Crass, 2016

“BACKBEATS: Bridging Analogous Concepts and Knowledge Between Engineering, Arts, Technology, and Science” a NSF DRL-AISL proposal, in collaboration with Jay B. Brockman et al., 2015

“WAVES: Connecting Analysis and Design through STEM and Musical Performance”, a NSF DRL-AISL, in collaboration with Jay B. Brockman et al., 2014

“College-Level Immersion Programming (CLIP): Advancing the use of Digital Visualization Theaters in STEM education -- Physics and Astronomy,” a NSF DUE - CCLI-Type 1 (Exploratory) proposal, in collaboration with Dr. Keith Davis, 2009.

“Collaborative Research: Contextual Research-Empirical Research--Evaluating Astronomy Learning in Immersive Virtual Environments at Different Institutions of Higher Learning,” a NSF DRL - Research & Evaluation on Education in Science Engineering proposal, 2009

“College--Level Immersion Programming (CLIP): Transforming the use of fulldome theaters in undergraduate STEM education,” a NSF DUE - TUES-Type 1 proposal, in collaboration with Dr. Keith Davis, in consultation with Dr. Christopher Kolda and Dr. Peter Garnavich, and Dr. Kevin Barry, 2010 (NSF 2010a)

“Nuclear Physics and Astrophysics Elements: Advancing the use of fulldome theaters in STEM education with college-level modular content,” a NSF DUE - TUES-Type 1 proposal, in collaboration with Drs. Keith Davis and Philippe Collon, 2010 (NSF 2010b)

“College--Level Immersion Programming (CLIP): Transforming the use of fulldome theaters in undergraduate STEM education,” a NSF DUE - TUES-Type 1 proposal, in collaboration with Dr. Keith Davis, in consultation with Dr. Christopher Kolda and Dr. Peter Garnavich, and Dr. Kevin Barry, 2011 (NSF 2011)

“Massive Black Holes in the Universe,” a NSF Science and Technology Center proposal, a Princeton University based center, 2011 (NSF Princeton)

“Parsing the Cosmic Web: Galaxy Evolution Clues in Filaments and Voids,” a NASA Astrophysics Theory Proposal, in collaboration with Dr. J Christopher Howk and Ali Snedden, 2011

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