# Adrienne L. Erickcek CIFAR JUNIOR FELLOW IN COSMOLOGY & GRAVITY

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#### **CURRENT POSITION**

Sept. 2009-	CANADIAN INSTITUTE FOR THEORETICAL ASTROPHYSICS
present	PERIMETER INSTITUTE FOR THEORETICAL PHYSICS
-	Joint CITA/PI Postdoctoral Fellow; Sept. 2009 – Aug. 2011
	CIFAR Junior Fellow in Cosmology and Gravitation; Sept. 2011 - present

#### **RESEARCH INTERESTS**

Theoretical cosmology: dark matter, the early Universe and inflation, dark energy, alternate theories of gravity, the cosmic microwave background.

## **EDUCATION**

Sept. 2004-	CALIFORNIA INSTITUTE OF TECHNOLOGY		
June 2009	Ph.D. in Physics		
	Thesis: "The Consequences of Modifying Fundamental Cosmological Theories"		
	Advisor: Prof. Marc Kamionkowski		
Oct. 2003-	UNIVERSITY OF CAMBRIDGE		
June 2004	Master of Advanced Study in Mathematics with Distinction		
Sept. 1999-	PRINCETON UNIVERSITY		
June 2003	Bachelor of Arts in Physics summa cum laude		
	Thesis: "A New Constraint on Strongly Interacting Dark Matter from X-Ray		
	Quantum Calorimetry"		
	Advisor: Prof. Paul Steinhardt		

## STUDENTS SUPERVISED

Summer/Fall	CO-SUPERVISOR FOR ASTRONOMY GRADUATE STUDENT		
2012	Student: Naoya Kobayashi, first year graduate student in University of Toronto		
	Astronomy Department		
	Co-supervised with Takeshi Kobayashi, a CITA postdoctoral fellow		
	Project: the effects of modulus evolution in inhomogeneous reheating scenarios		
Summer 2012	SUPERVISOR FOR PI SUMMER STUDENT		
	Student: Matus Rybak, fourth-year undergraduate at St. Andrews University		
	Project: mass estimates for dwarf galaxies without spherical symmetry		
	Also gave a Cosmology 101 lecture to all astronomy summer students at U of T		
Summer 2011	SUPERVISOR FOR CITA SUMMER STUDENT		
	Student: Fangda Li, third-year undergraduate at the University of Toronto		
	Project: gravitational lensing by ultra-compact minihalos		
	Also gave a Cosmology 101 lecture to all astronomy summer students		

## Adrienne L. Erickcek Curriculum Vitae and Publication List

# **TEACHING EXPERIENCE**

Spring 2012		ISEE PROFESSIONAL DEVELOPMENT PROGRAM Participated in a three-day workshop on inquiry-based teaching methods Part of a six-member team that designed and taught a two-day inquiry workshop for the students in the astronomy summer undergraduate research program at the University of Toronto	
Winter 2012		Co-INSTRUCTOR, UNIVERSITY OF TORONTO Ast/Phy2401, Cosmology and Black Holes Co-instructors: Harald Pfeiffer and Chris Thompson Taught the third of the course devoted to the early Universe.	
Winter 2011 & Winter 2010		CO-INSTRUCTOR, UNIVERSITY OF TORONTO Phy2401S, Cosmology and Black Holes Co-instructors: Harald Pfeiffer and Ue-Li Pen Taught the third of the course devoted to the early Universe.	
Spring 2010		CO-INSTRUCTOR, PERIMETER INSTITUTE Cosmology Mini-Course for PI Graduate Students Co-instructors: Latham Boyle, Louis Leblond, Ghazal Geshnizjani Gave lectures on cosmological perturbation theory.	
Fall 2007		TEACHING ASSISTANT, CALIFORNIA INSTITUTE OF TECHNOLOGY Ph236a, General Relativity. Professor: Kip S. Thorne Held office hours, prepared solutions, graded assignments.	
Spring 2006		TEACHING ASSISTANT, CALIFORNIA INSTITUTE OF TECHNOLOGY Ay127, Cosmology and Galaxy Formation. Professor: E. S. Phinney Gave two lectures, held office hours, prepared solutions, graded assignments.	
Summer 2000		SUMMER SCIENCE INSTRUCTOR, KALAMAZOO AREA MATH AND SCIENCE CENTER, KALAMAZOO, MI Developed and taught enrichment courses in mathematics, astronomy, and physics for elementary and middle-school students.	
AWARDS			
2011	CIF	AR Junior Fellowship in Cosmology and Gravitation	
2009	Ster	nple Memorial Prize in Physics (Caltech)	
2009	Eve	rhart Lecturer (Caltech)	
2007	PEC	) Scholar Award	
2003	NSI	NSF Graduate Fellowship	
2003	Chu	Churchill Scholarship to Cambridge University	
2003	Sig	Sigma Xi Book Award in Physics (Princeton University)	
2003	The	The Allen G. Shenstone Prize in Physics (Princeton University)	
2002	Bar	Barry M. Goldwater Scholarship	
2002	elec	elected to Phil Beta Kappa The Coorgo D. Wood Logoov Junior Drigo (Drigostor University)	
2002	The	The George B. Wood Legacy Junior Prize (Princeton University)	
2002	The	The Shapire Drize for Academic Excellence (Driversity)	
2001	The	Lucent Prize in Physics (Princeton University)	
2001	The	President's Award for Academic Achievement (Princeton University)	
2000	The	Manfred Pyka Memorial Physics Prize (Princeton University)	

## **CONFERENCE AND SEMINAR PRESENTATIONS**

- "Kicking Chameleons: early universe challenges for chameleon gravity," Case Western Reserve University Astroparticle Seminar; Cleveland, OH; October 2012. Perimeter Institute Cosmology Seminar; Waterloo, ON; October 2012.
- "The power of small scales to probe inflation," contributed talk at *Cosmic Acceleration Workshop*; Carnegie Mellon University; Pittsburgh, PA; August 2012.
- "The power of small scales to probe the early Universe," presentation at the CIFAR Cosmology & Gravity Annual Meeting; Whistler, BC; April 2012.
- "Microhalos: Messengers from the Early Universe," University of Illinois Astrophysics Colloquium; Urbana-Champaign, IL; March 2012. Rochester Institute of Technology Astronomy Colloquium; Rochester, NY; March 2012.
- "Dark matter microhalos: messengers from the early universe," KICP Friday noon seminar; University of Chicago; Chicago, IL; October 2011.
- "What dark matter microhalos can tell us about reheating," invited presentation at *Unravelling Dark Matter Conference;* Perimeter Institute; Waterloo, ON; September 2011.
- "Astrometric microlensing by local subhalos: a new window on reheating?" invited presentation at *Dark Matter from Every Direction Workshop*; McGill University; Montreal, QC; April 2011.
- "Detecting local dark matter with stellar astronomy," contributed talk at *Indirect and Direct Detection of Dark Matter*; Aspen Center for Physics; Aspen, CO; February 2011.
- "Astrometric microlensing by local dark matter subhalos," contributed talk at *AAS Meeting #217*; Seattle, WA; January 2011.
- "Shining light through the darkness: detecting local dark matter with stellar astrometry," University of Waterloo Astronomy Seminar, Waterloo, ON; September 2010.
- "Origins of the CMB hemispherical power asymmetry," invited presentation at *Low-l, Large-Angle Anomaly Workshop*; Case Western Reserve University; Cleveland, OH; February 2010.
- "Looking Beyond the Cosmological Horizon," invited Everhart Lecture at Caltech, Pasadena, CA; March 2009.
- "Inflationary Origins of the Cosmic Power Asymmetry," invited presentation at *Perimeter Institute Young Researchers Conference*, Waterloo, ON; December 2008.
- "Structure Beyond the Horizon: Inflationary Origins of the Cosmic Power Asymmetry," Fermilab theoretical astrophysics seminar, Batavia, IL; December 2008.
   KIPAC cosmology seminar, Stanford, CA; November 2008.
   Institute for Advanced Study informal seminar, Princeton, NJ; November 2008.
   UC Berkeley TAC Seminar, Berkeley, CA; October 2008.
   CITA Seminar, Toronto, ON; October 2008.
   Perimeter Institute Cosmology Seminar, Waterloo, ON; October 2008.
- "How to Generate a Cosmological Power Asymmetry," contributed talk at *Cosmo '08*, Madison, WI; August 2008.
- "Chern-Simons Gravity: its effects on bodies orbiting the Earth," contributed talk at the 7<sup>th</sup> Annual Theoretical Astrophysics in Southern California Meeting, UCLA; November 2007.
- "Solar System Tests DO Rule Out 1/R Gravity," contributed talk at the 6<sup>th</sup> Annual Theoretical Astrophysics in Southern California Meeting, UCSB/KITP; October 2006. Winner of the Student Presentation Competition

## **MEETINGS ORGANIZED**

*PI/CITA Seminar Day* February 15, 2010; Perimeter Institute Co-organizers: Latham Boyle (Perimeter Institute), Dick Bond (CITA)

*CITA/PI Seminar Day* September 13, 2010; CITA Co-organizers: Latham Boyle (Perimeter Institute)

Cosmological Frontiers of Fundamental Physics June 15-18, 2010; Perimeter Institute Co-organizers: Niayesh Afshordi, Latham Boyle, Robert Myers, Andrew Tolley, Neil Turok (Perimeter Institute), Ben Craps (Solvay), and Thomas Hertog (APC)

*PI/CITA Seminar Day* December 8, 2009; Perimeter Institute Co-organizers: Latham Boyle (CITA), Robert Myers (Perimeter Institute)

## **PROFESSIONAL SERVICE**

Referee: Physical Review D, Physical Review Letters, and JCAP

#### OUTREACH

Guided high-school students through a four-day investigation of dark matter as part of the International Summer School for Young Physicists at the Perimeter Institute. July 2012.

Public Lecture: "Inflation: The Universe's Growth Spurt" Mississauga Centre of the Royal Astronomical Society of Canada, May 25, 2012. Astronomy Public Tours, University of Toronto, September 6, 2012.

Spoke to high-school physics teachers about my research during the "Meet a Scientist" activity at the annual conference of the Ontario Association of Physics Teachers hosted at PI April 26, 2012.

#### CITIZENSHIP

United States

#### REFERENCES

Prof. Marc Kamionkowski Johns Hopkins University Department of Physics and Astronomy 3400 N. Charles St Baltimore, MD 21218 +1 (410) 516-0373 kamion@pha.jhu.edu

Prof. Latham Boyle Perimeter Institute for Theoretical Physics 31 Caroline Street North Waterloo, ON N2L 2Y5 Canada +1 (519) 569-7600 Iboyle@perimeterinstitute.ca Prof. Kris Sigurdson University of British Columbia Department of Physics and Astronomy 6224 Agricultural Rd Vancouver, B.C. V6T 1Z1 Canada +1 (604) 822-3853 krs@phas.ubc.ca

Prof. Niayesh Afshordi Perimeter Institute for Theoretical Physics 31 Caroline Street North Waterloo, ON N2L 2Y5 Canada +1 (519) 569-7600 nafshordi@perimeterinstitute.ca

## **PUBLICATION LIST**

- Adrienne L. Erickcek, Neil Barnaby, Clare Burrage, and Zhiqi Huang. "The catastrophic consequences of kicking the chameleon." Submitted to Physical Review Letters, November 2012.
- Sarah Shandera, Adrienne L. Erickcek, Pat Scott, and Jhon Yana Galarza. "Number Counts and Non-Gaussianity." Submitted to JCAP, November 2012.
- Jens Chluba, Adrienne L. Erickcek, and Ido Ben-Dayan. "Probing the inflaton: Small-scale power spectrum constraints from measurements of the CMB energy spectrum." *ApJ* **758**, 76 (2012). [arXiv:1203.2681]
- Fangda Li\*, Adrienne L. Erickcek, and Nicholas M. Law. "A new probe of the small-scale primordial power spectrum: astrometric microlensing by ultracompact minihalos." *Phys. Rev. D* 86, 043519 (2012). [arXiv:1202.1284] \*undergraduate student working under my supervision
- Adrienne L. Erickcek and Kris Sigurdson. "Reheating effects in the matter power spectrum and implications for substructure." *Phys. Rev. D* 84, 083503 (2011). [arXiv:1106:0536]
- Adrienne L. Erickcek and Nicholas M. Law. "Astrometric microlensing by local dark subhalos." *ApJ* 729, 49 (2011) [arXiv:1007.4228]
- Adrienne L. Erickcek, Christopher M. Hirata, and Marc Kamionkowski. "A scale-dependent power asymmetry from isocurvature perturbations." *Phys. Rev. D* 80, 083507 (2009). [arXiv:0907.0705]
- Adrienne L. Erickcek, Sean M. Carroll, and Marc Kamionkowski. "Superhorizon perturbations and the cosmic microwave background." *Phys. Rev. D* 78, 083012 (2008). [arXiv:0808.1570]
- Adrienne L. Erickcek, Marc Kamionkowski, and Sean M. Carroll. "A hemispherical power asymmetry from inflation." *Phys. Rev. D* 78, 123520 (2008). [arXiv:0806.0377]
- Tristan L. Smith, Adrienne L. Erickcek, Robert R. Caldwell, and Marc Kamionkowski. "Effects of Chern-Simons gravity on bodies orbiting the Earth." *Phys. Rev. D* 77, 024015 (2008).
  [arXiv:0708.0001]
- Adrienne L. Erickcek, Paul J. Steinhardt, Dan McCammon, and Patrick C. McGuire. "Constraints on the interactions between dark matter and baryons from the x-ray quantum calorimetry experiment." *Phys. Rev. D* **76**, 042007 (2007). [arXiv:0704.0794]
- Takeshi Chiba, Tristan L. Smith, and Adrienne L. Erickcek. "Solar System constraints to general *f*(*R*) gravity." *Phys. Rev. D* **75**, 124014 (2007). [arXiv:astro-ph/0611867]
- Adrienne L. Erickcek, Tristan L. Smith, and Marc Kamionkowski. "Solar System tests *do* rule out *1/R* gravity." *Phys. Rev. D* 74, 121501(R) (2006). [arXiv:astro-ph/0610483]
- Adrienne L. Erickcek, Marc Kamionkowski, and Andrew J. Benson. "Supermassive black hole merger rates: uncertainties from halo merger theory." *Mon. Not. Roy. Ast. Soc.* 371, 1992 (2006). [arXiv:astro-ph/0604281]
- Mark A. Scheel, Adrienne L. Erickcek, Lior M. Burko, Lawrence E. Kidder, Harald P. Pfeiffer, and Saul A. Teukolsky. "3D simulations of linearized scalar fields in Kerr spacetimes." *Phys. Rev. D* 69, 104006 (2004). [arXiv:gr-qc/0305027]