

# Andrew F. Heckler

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## Professional preparation

Ohio State University	Physics	B.S., 1986
University of Washington	Physics	Ph.D., 1994
Fermi National Accelerator Lab	Cosmology/Astrophysics	Post-doc 1994-96
Ohio State University	Cosmology/Astrophysics	Post-doc 1996-99

## Appointments

Assistant Dean, College of Mathematical and Physical Sciences, Ohio State Univ. 1998-2005.  
Assistant Professor, Department of Physics, Ohio State University. 2005-present.

## Grant Funding:

### Current:

“Scientific Misconceptions: From Cognitive Underpinnings to Educational Treatment”  
PI: A. Heckler; Co-PI: V. Sloutsky. Funded by the Institute of Education Sciences, U.S.  
Department of Education. 9/1/2005-8/31/2010, \$933,397.

“Center for Emergent Materials”, P.I.: N. Padture. Funded by NSF MRSEC program. I am a  
Senior Investigator, researching misconceptions in materials science as part of the ‘broad impact’  
portion of the grant. 9/1/2008-8/31/2013, \$10,800,000.

### Previous:

“Modeling instruction for Physical Science in Ohio”, PI: A. Heckler; Co-PI: K. Harper. Funded by  
Ohio Board of Regents Grant for Improving Teacher Quality. (2004-2006) \$114,790. Renewal: PI:  
K. Harper; Co PI: A. Heckler (2006-2009), \$363,756.

## Publications in Peer-reviewed Journals

### Education and Cognition Research

- 1) T. M. Scaife & A. F. Heckler, “Student understanding of the direction of the magnetic force on a charged particle”, *American Journal of Physics*, (in press) (2010).
- 2) A. F. Heckler, “Some consequences of prompting novice students to construct force diagrams”, *International Journal of Science Education*, (in press) (2009).
- 3) E.C. Sayre & A. F. Heckler, “Peaks and decays of student knowledge in an introductory E&M course”. *Physical Review Special Topics—Physics Education Research*, 5, 013101 (2009).
- 4) J.A. Kaminski, V.M. Sloutsky, & A.F. Heckler, “The Advantage of Learning Abstract Examples in Learning Math”. *Science*, 320, 454-455 (2008).
- 5) V.M. Sloutsky, J. Kaminski, & A.F. Heckler, “The advantage of simple symbols for learning and transfer,” *Psychonomic Bulletin & Review* 12 (3), 508-513 (2005).

### Astrophysics and Cosmology

- 1) R. Lopez, S. Dodelson, A.F. Heckler, and M.S. Turner, “Precision Detection of the Cosmic Neutrino Background”, *Physical Review Letters* 82, 3952 (1999)
- 2) A.F. Heckler “Formation of a Hawking-radiation photosphere around microscopic black holes” *Physical Review D* 55, 480 (1997)
- 3) A.F. Heckler “Calculation of the emergent spectrum and observation of primordial black holes” *Physical Review Letters*, 78, 3430 (1997)
- 4) M. Gleiser, A.F. Heckler, and E.W. Kolb, “Modeling Thermal Fluctuations: Phase Mixing and Percolation”, *Physics Letters B*, 405, 121 (1997)

- 5) M. Gleiser and A.F. Heckler, "Non-perturbative effects on nucleation", *Physical Review Letters* 76, 180 (1996)
- 6) A.F. Heckler and E.W. Kolb, "Searching for stellar mass black holes in the solar neighborhood", *Astrophysical Journal Letters* 472, L85 (1996).
- 7) A.F. Heckler, "The effects of electro-weak phase transition dynamics on baryogenesis and primordial nucleosynthesis", *Physical Review D* 51, 405 (1995).
- 8) A.F. Heckler, "Astrophysical applications of quantum corrections to the equation of state of a plasma", *Physical Review D* 49, 611 (1994).
- 9) A.F. Heckler and C.J. Hogan, "Neutrino heat conduction and inhomogeneities in the early universe", *Physical Review D* 47, 4256 (1993).

## **Publications in Peer-Reviewed Conference Proceedings**

Total of 12, including following selected articles:

- A.F. Heckler, J.A. Kaminski, & V.M. Sloutsky (2008). Learning Associations That Run Counter to Biases in Learning: Overcoming Overshadowing and Learned Inattention. *Proceedings of the XXX Annual Conference of the Cognitive Science Society*, 511-516. Austin, TX: Cognitive Science Society.
- E.C. Sayre, & A.F. Heckler (2008). Evolution of student knowledge in a traditional introductory physics classroom. *Proceedings of 2008 Physics Education Research Conference*. Melville, New York: AIP Conference Proceedings.
- A.F. Heckler, J. Kaminski, & V.M. Sloutsky (2006). Differential Cue Salience, Blocking and Learned Inattention. *Proceedings of the XXVIII Annual Conference of the Cognitive Science Society*, 1167-1172. Mahwah, NJ: Erlbaum.

## **Invited Presentations (Education and Cognition Research)**

Total of 14, including following selected presentations:

- "What happens to student performance between the pre and post-test?" Invited Session, Summer Conference of the American Association of Physics Teachers, Ann Arbor, MI. July 2009.
- "Understanding fundamental causes of student difficulties: Towards a first-principles design of instruction", Plenary Session, Frontiers and Foundations of Physics Education Research Biennial Conference, Bar Harbor, Maine, June 2009. "Learning biases: Overcoming scientific misconceptions", Human Factors Interest Group seminar, University of Manchester, U.K. July 19, 2008.
- "Concrete vs. Abstract: Is a little knowledge a bad thing?" Invited Session, Physics Education Research Conference, Greensboro, NC, August 2007.
- "Abstract or Concrete: Which is better for learning and transfer?", American Physical Society Conference, Invited session on Physics Education Research, Jacksonville, FL. April 2007.

## **Peer-Reviewed Conference Presentations**

Total of 4, including following selected presentations:

- "Concrete vs. Abstract: is a little knowledge a bad thing?" National Association of Research in Science Teaching, 2009 National Conference, Garden Grove, CA, April 2009
- "How diagrams Help and Hinder Problem Solving", American Educational Research Association, 2007 National Conference, April 2007.