

# Unlocking the Unknown 95% of the Universe's Energy Budget



Bharat Ratra  
Professor, Physics

## CURRENT RESEARCH

### Combining theory and data analysis to shift paradigms within cosmology

Despite centuries of research, there still is much to know about the nature of the Universe. In fact, current understanding comprises less than 5% of the cosmological energy budget. Dr. Bharat Ratra, of Kansas State University, is a physical cosmology theorist working to find out what makes up the unknown 95% of the Universe's energy budget. His 1988 discovery, with Dr. Jim Peebles, of Princeton University, of dynamical dark energy models set him on a quarter century odyssey of using observational data to judge dark energy models. Fantastic improvements over the last decade in the quality and quantity of observational data indicate that this process is culminating. In addition, he uses novel techniques to analyze large data sets to extract reliable measures of cosmological parameters such as the Hubble constant, and has also studied the generation, evolution and consequences of a large-scale cosmological magnetic field. His research holds promise for shifting the ways in which cosmology is understood.

The implications of the dark energy research Dr. Ratra is involved in are revolutionary within physics. Understanding dark energy and dark matter will lead to a factor of 20 increase of our physical world, measured in terms of the energy budget, which would be unprecedented in the modern era. In addition, the late 1990's discovery of accelerated cosmological expansion, which strongly hints at the need to improve upon either quantum mechanics or general relativity or both, will likely prove to be the beginning of another paradigm-shifting revolution in physics.

Dr. Ratra has written over 90 scholarly publications, which have been cited more than 10,000 times in scientific literature. As a theorist...

## AFFILIATION



Kansas State University

## EDUCATION

- Ph.D. in Physics, 1986  
Stanford University

## AWARDS

- National Science Foundation CAREER Award Winner, 1999
- Fellow of the American Physical Society, 2002
- Fellow of the American Association for the Advancement of Science, 2005
- Commerce Bank Distinguished Graduate Faculty Award, Kansas State University, 2012-2013

## RESEARCH AREAS

Environment, Atmospheric / Space, Clean Energy, Space

## FUNDING REQUEST

Your contributions will support the continued research of Dr. Bharat Ratra, of Kansas State University, as he works to find out what makes up the unknown 95% of the Universe's energy budget. Donations will support the necessary \$60K for a postdoc and \$25-30K for Ph.D. students each year. In choosing to support his research, you will play a role in expanding fundamental knowledge that may one day lead to paradigm shifts within particle physics and cosmology.

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