Black Holes: Mysteries Unsolved

Ramesh Narayan

Thomas Dudley Cabot Professor of the Natural Sciences, Department of Astronomy

CURRENT RESEARCH

Investigating the paradoxes of black holes

The year 2015 marks the centenary of Einstein's general relativity, the remarkable theory he came up with in 1915 to merge relativity and gravity. Over the last 100 years, general relativity has been tested with many experiments, and it has passed every test convincingly. Nevertheless, one area remains unproven: black holes, those mysterious objects that have event horizons -- surfaces through which things can fall in, but from inside which nothing, not even light, can escape. Black holes are a direct prediction of Einstein's theory of general relativity, but they are so strange and bizarre that Einstein himself doubted their existence. Yet, astronomers have found countless objects in the universe that they believe to be black holes. But believing is not the same as proving, and it is very difficult -- nearly impossible -- to prove that a candidate object is truly a black hole. Dr. Ramesh Narayan, Thomas Dudley Cabot Professor of the Natural Sciences at Harvard University, uses astrophysical and computational techniques to study this and other fundamental questions surrounding the paradox of black holes. Just as any basic science research can potentially find practical applications down the road, the understanding that Dr. Narayan brings to black hole astrophysics may be foundational to how we perceive the world in the future.

Dr. Narayan is a theoretical astrophysicist who has worked in many areas of research within astronomy, astrophysics, and cosmology. He has worked on topics as diverse as astronomical image processing, gamma-ray bursts, gravitational lensing, pulsars, quasars, and X-ray binaries. For the last two decades, however, he has focused almost exclusively on black holes, with much of his work...

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AFFILIATION

Harvard University

EDUCATION

- Ph.D. in 1979, Bangalore University, India
- M.Sc. in 1973, Bangalore University, India
- B.Sc. in 1971, Madras University, India

AWARDS

- Presidential Young Investigator Award, National Science Foundation, 1989
- George Darwin Lecturer, Royal Astronomical Society (London), 2002
- Elected Fellow of the Royal Society (London), 2006
- Elected Member of the U.S. National Academy of Sciences, 2013
- Robert M. Walker Distinguished Lecturer, Washington University, St. Louis, 2014

RESEARCH AREAS

Technology, Space, Computational Sciences / Mathematics, Materials Science / Physics

FUNDING REQUEST

Your contributions will support the continued research of Dr. Ramesh Narayan at Harvard University as he delves deeper into the field of black holes, straddling the interface between astronomy and physics. A one-time award of $150K will enable him to purchase a dedicated computer cluster for his group which will greatly facilitate his heavily computational research. $200K/year will be sufficient to support all personnel in his group. Partner with Dr. Narayan as he seeks a deeper understanding of the world we live in!