NASA Selects Advanced Dark Energy Physics Telescope for Concept Development

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A Johns Hopkins astrophysicist is principal investigator of a proposal, accepted today by NASA, to design a space mission to determine the properties of the mysterious dark energy that is causing the expansion rate of the universe to speed up.

Called the Advanced Dark Energy Physics Telescope (ADEPT), the mission promises to determine the location of 100 million galaxies. It would be the most comprehensive survey of the universe ever undertaken, according to Charles L. Bennett, professor in the Henry A. Rowland Department of Physics and Astronomy at the Krieger School of Arts and Sciences. In addition, ADEPT promises to discover about 1,000 new supernovae.

"We are delighted the reviewers recognized that the ADEPT approach is important and very powerful," said Bennett. "It is based on experimental breakthroughs that have occurred in just the last three years. The reviewers also recognized that the mission is practical, and that we have a top-notch and highly experienced team. We believe that ADEPT's results are likely to be of extraordinary importance to science."

"Dark energy" is the term used to describe a new form of energy that is thought to permeate all of space. Unlike ordinary gravity, which consists of an "attractive" or inward-pulling force, dark energy is repulsive, or outward- pushing. Cosmologists know that something is driving an accelerated expansion of the universe, and is acting like an anti-gravity force. Because this energy has never been directly seen and its identity is

as of yet unknown, it is called "dark energy."

"Is the physical nature of dark energy constant, or does it evolve with time? To answer this question, we must look back in time, and for astronomers, that means looking at distant objects," explains Bennett.

The original discovery of dark energy came from observing a special kind of exploding star, or supernova. Adam Riess, also a professor of physics and astronomy at Johns Hopkins and a member of the ADEPT team, first discovered dark energy in this way with his colleagues.

"ADEPT will measure these supernovae, but its real advance lies in a new, more powerful technique. Patterns in temperature of the very young universe provide a 'standard ruler' that is imprinted on the pattern of galaxies across the sky. ADEPT aims to map these through space and time," according to Bennett

ADEPT promises to provide the galaxy positions needed to follow the historical development of the universe, so that astronomers can determine the role played by the dark energy. Bennett says that the ADEPT mission will help answer many questions about the role played by dark energy in both fundamental physics and cosmology. Jonathan Bagger, chair of the Johns Hopkins physics and astronomy department, agreed. "Twenty-first century physics is at a crossroads," he said. "Our fundamental theories of gravity and quantum mechanics are in conflict. Dark energy might point the way out."

"The Krieger School of Arts and Sciences has a long and proud history of space science accomplishments," according to Adam Falk, dean of the Krieger School of Arts and Sciences. "We look forward to addressing one of the most important scientific problems of our day."

The NASA Goddard Space Flight Center in Greenbelt, Md., with its

science and engineering expertise, will be Johns Hopkins' partner on ADEPT.

Bennett has extensive experience as a principal investigator. He leads the Wilkinson Microwave Anisotropy Probe, a highly successful NASA space mission that has been determining precisely the age, composition and curvature of the universe. WMAP measures the temperature of cosmic background radiation, the oldest light in the universe. In March, Bennett and his team made international news with their announcement that the universe bears signs that it expanded from quantum fluctuations to astronomical scales within its first trillionth of a second. The finding, based on data from WMAP, supports a 20-year old theory known as "inflation," that describes how the cosmos grew from subatomic in size to a vast expanse of stars and galaxies over 13.7 billion years.

Other science team institutions that will be involved in the project include: the University of Hawaii; Princeton University and the Institute for Advanced Study in Princeton, NJ; the Space Telescope Science Institute; the University of Arizona; the University of British Columbia; and the University of Pennsylvania. Lockheed-Martin and ITT are industrial partners.

Source: Johns Hopkins University