Dark energy and the fate of the universe

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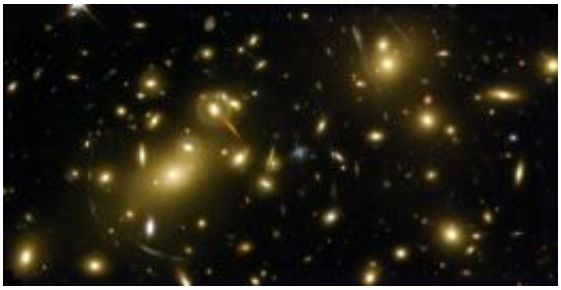

Light from distant galaxies is stretched by foreground matter in this Hubble image. Similar distortions - called weak lensing - are less obvious, but their widespread nature can help reveal the nature of dark energy. Credit: NASA, Andrew Fruchter and the ERO Team [Sylvia Baggett (STScI), Richard Hook (ST-ECF), Zoltan Levay (STScI)] (STScI)

New research on dark energy is helping scientists understand the potential fate of the Universe.

Dark energy makes up about 70 percent of the current content of the Universe and thus holds the ultimate fate of our Universe. Several possible scenarios are possible depending on the properties of dark energy; one is that the Universe will end in a so-called big rip. This interesting topic was recently explored by five researchers from the University of Science and Technology of China, the Institute of Theoretical Physics at the Chinese Academy of Sciences, Northeastern University, and Peking University. Their work, entitled "Dark energy and fate of the Universe", was published in *Sci China-Phys Mech Astron.*

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For millennia, human beings have been pondering two ultimate questions: "Where do we come from?" and "Where are we going?" Over that time, these questions have spurred theological and philosophical debate. Thanks to the rapid development of modern cosmology in the past three decades, scientists nowadays have obtained some important clues to answer these questions. The standard "inflation + hot big bang" framework has been developed to explain the origin of the Universe. However, to forecast the destiny of the Universe, researchers have realized that the nature of dark energy is key.

In the absence of a consensus on what dark energy is, a phenomenological description of the equation-of-state parameter w—the ratio of pressure and density of dark energy—provides an important means for investigating dark energy dynamics. Properties of dark energy will decide the ultimate fate of the Universe. In particular, if w