



复旦大学物理系 物质科学报告

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Cosmic Missing Baryon Problem

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One of the triumphs of the Big Bang Nucleosynthesis (BBN) theory is that its predicted abundances of primordial isotopes agree with the measured values. Moreover, the predicted baryonic mass is accounted for at high redshifts (i.e., in the early universe) observationally. Going towards low redshifts, however, only a fraction of the BBN baryons are detected; this is often referred to as the “missing baryon” problem. The common wisdom is that those baryons are not missing, but are hidden in some hot gas of very low density, which is difficult to detect; cosmological simulations support this view. Such gas may be “seen” through the emission or absorption lines of its highly ionized constituents. For that, an imaging X-ray spectrometer of high throughput and high resolution would be required. I will describe the development of microcalorimeters for X-ray spectroscopy. I will also briefly discuss the design of a satellite experiment that employs microcalorimeters to probe hot baryons in the universe, addressing a wide range of important issues in astrophysics, including the “missing baryon” problem.



Prof. Wei Cui obtained B.S. from University of Science and Technology of China in 1987 and Ph.D. from University of Wisconsin-Madison in 1994. After working in Center for Space Research at MIT as a research scientist (1994-2000), he joined Dept. of Physics, Purdue University in 2000 and was promoted to professor in 2009. In 2016, he joined Department of Physics, Tsinghua Center for Astrophysics, Tsinghua University and also serves as a Guest Research Scientist at National Astronomical Observatory of China. His main research interests include microquasars, active galactic nuclei, supernova remnants, cosmic rays, interstellar and intergalactic medium, diffuse X-ray background, instrumentation for X-ray astrophysics. Prof. Wei Cui has published 214 refereed papers, with an H-index of 58. He has received numerous honors and rewards, including Purdue Seed for Success Awards (between 2006 and 2013), Purdue University Faculty Scholar (2006{2011), NASA Group Award for the development, fabrication, and launch of the first X-ray microcalorimeter experiment (1996), NASA Group Award for the successful integration and test of the Rossi X-ray Timing Explorer(1995), CUSPEA Fellow (1987).