Title: Concept for an orbiting wide-field x-ray imaging spectrometer (WFXIS)

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We present a concept study for a mission to provide wide field x-ray imaging spectroscopy. Many astrophysical studies in the x ray regime demand both high energy resolution (approximately 5 eV) as well as high angular resolution (approximately 10'). Examples of such studies are: clusters of galaxies, from those with sub-clumps to those at the edge of the universe (minimum radii approximately 15'); individual galaxies (nearby ones are easily resolvable on the 10' scale); deep sky surveys for clusters and QSO/AGN, which necessitate optimal sky coverage with the avoidance of source confusion for long exposures (approximately 2 multiplied by 10^5 sec); supernova remnants (SNRs) in galaxies such as the LMC, SMC and Andromeda; knots in galactic SNRs such as Cas-A; and fine structure in the interstellar medium (ISM). Other studies that require a wide FOV and high energy resolution are studies of the large scale structure of the ISM, nearby clusters of galaxies, and large SNRs, such as the Cygnus loop and the Vela/Puppis region. The instrument concept we propose, the Wide Field X-ray Imaging Spectrometer (WFXIS), will combine the critical characteristics of wide-field, high-resolution x-ray imaging with high energy resolution, and thus provide unique capabilities not available on any single current or planned mission in which NASA is participating. Our preliminary design consists of ROSAT-sized zerodur mirrors with a Ritchey-Chretien figure; approximately 2.5 meter foal length; and a single focal plane detector made up of a 500 multiplied by 500 pixel array of either microcalorimeters or superconducting tunnel junctions. The energy range covered by this system will be approximately 0.1 - 2.5 keV. The main points of this work are: the science is outstanding; the technology for mirror production and design is in hand; and detector technology has reached the stage that it makes sense to begin planning for the ability to make 500 multiplied by 500 pixel arrays with a factor of 10 improvement in energy resolution over available CCDs.

Full paper found at http://adsabs.harvard.edu/abs/1995SPIE.2515..280U