RAL
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SCIENCE AND ENGINEERING RESEARCH COUNCIL

ROSAT - Wide Field Camera

Introduction

The X-ray astronomy satellite, ROSAT, is carrying a telescope system known as the Wide Field Camera (WFC). It will be used to look at celestial sources emitting radiation in the extreme ultraviolet (XUV) region of the electromagnetic spectrum.

Involvement

The WFC has been built by a Consortium of 5 institutes: Leicester University, (the leading UK institute), Rutherford Appleton Laboratory, Birmingham University, Mullard Space Science Laboratory and Imperial College. RAL's main contributions to the programme are overall project management within the UK, development and production of the star tracker, filters and filter assemblies, and provision of the UK Data Centre, where data from the WFC will first be processed before being distributed to the Consortium Institutes.

The Instrument

The WFC uses a set of three nested Wolter Schwarzschild mirrors to focus the XUV radiation onto the focal plane detectors. The mirrors have super- polished aluminium surfaces coated with gold to give maximum reflectance. The outer diameter is 600nm and the diameter of the circular field of view is 5 degrees.

A forward closure door is used to protect the mirror aperture before launch and is opened once the spacecraft is in orbit. Solar radiation is excluded from the mirrors by a baffle assembly mounted in front of them.

The focal plane assembly (FPA) supports two sets of microchannel plate detectors on a carousel. The detector assemblies were moved into the field of view when the satellte was in orbit.

In front of the FPA is a filter wheel holding 8 filters, used to admit radiation of specific wavelengths. The smaller filters are used for the pointed phase of operations and have a reduced field of view of 2.5 degrees. The survey filters are based on Lexan (a plastic), aluminium and carbon. The designs of the filters are a compromise between strength, to survive the launch, and the required transmission characteristics. They are about 400 times thinner than a human hair.

The star tracker, mounted on the outside of the WFC, is coaligned with the optical axis of the mirrors, and is used to accurately locate the positions of known visible stars. From this, the position of the WFC is known and the position of sources can be accurately determined.

Scientific Objectives

Only a small number of XUV sources have been discovered from early space missions. They cannot be detected from the ground as the earth's atmosphere blocks out the radiation at those particular wavelengths. The WFC's all-sky survey, the first to be performed at these wavelengths, is expected to reveal over one hundred times as many. The most numerous sources are those objects whose temperatures are in the range between 200,000 and 2,000,000K, including stars like the Sun. White dwarfs, binary systems, cataclysmic variables and flare stars are some of the objects which will be observed. The diffuse XUV background will be mapped in great detail and some extragalactic sources may also be found.

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