STARLAB: AN ULTRAVIOLET/OPTICAL SPACE TELESCOPE*

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Abstract. Mount Stromlo and Siding Spring Observatories are actively developing large format photon counting detectors suitable for operation in space over a broad wavelength range. It is intended that these detectors be used in the Scientific Instrument Package of the STARLAB telescope. A description is given of the STARLAB facility, with emphasis on the contribution being made by Australia.

1. Introduction

STARLAB is conceived as a one metre class, UV-optical space telescope intended to be placed in orbit for missions of 6–12 months duration. The principal capabilities of the proposed facility are high resolution imaging over a wide (30 arc min diameter) field of view, and spatially-resolved spectroscopy of extended objects in both long-slit and Echelle modes. The scientific rationale driving the STARLAB project is very great, and is discussed at length in the report of the Joint Science Working Group entitled 'STARLAB: An Australia–Canada–U.S.A. Orbiting Telescope'. Amongst the many astrophysical problems which would be addressed are: the early evolution of galaxies, clusters of galaxies, super-clusters, and quasars; calibration and extension of distance scales; ultraviolet surveys and stellar physics in other galaxies; spatial structure of supernova remnant shock-waves; and the physical conditions within extended plasmas associated with H II regions, planetary nebulae, supernova remnants, and galaxies.

Even though the faint-object sensitivity of STARLAB ($m_v \sim 25$) will be $\sim 10 \times$ less than that of Space Telescope, STARLAB promises to be a far more efficient facility for conducting multicolour survey observations of large regions of sky (e.g., the Magellanic Clouds), and for long-slit spectroscopy of extended objects. STARLAB, therefore, both complements the capabilities of Space Telescope, while at the same time being an exceedingly powerful research tool in its own right.

The STARLAB project became a tripartite undertaking in 1980 between three countries, namely the U.S.A., Canada, and Australia. The original division of responsibility, as defined in a Letter of Intent between the three countries, is as follows: provision of the telescope and fine guidance system (Canada); provision of the scientific instrument package (Australia); and provision of launch, a space platform, and in-orbit operations (U.S.A.). Observing time is to be shared equally between the participating countries. This report presents an overview of the STARLAB facility and current status, with principal emphasis on Australia’s contribution to the project.

2. The Starlab Facility

2.1. Telescope

An $f/15$ Ritchey–Chrétien telescope with a primary mirror diameter of 1 m is planned. The total unvignetted field of view will be 0.8°, with the central 0.5° reserved for science, and the outer annulus used for fine guidance purposes. The overall image quality of the complete telescope system (including fine guidance), is specified as 0.16 arc sec FWHM at 6330 Å, with 70% of the energy enclosed by a circle of diameter 0.3 arc sec. The bandpass of the optics will be 1150 to 12000 Å, but this is extensible down to ~900 Å by appropriate recoating of surfaces.

2.2. Scientific Instrument Package (SIP)

2.2.1. Direct Imager and Spectrograph

The STARLAB Scientific Instrument Package (SIP) is being designed to accommodate two major instruments, a Direct Imager and a Spectrograph. These are shown

![Conceptual layout of the STARLAB telescope showing the Scientific Instrument Package located behind the primary mirror. The Fine Guidance Sensor components are also indicated.](image)

Fig. 1.