

RAL

DESIGN & DISCOVERY

Open Days July 1990

RUTHERFORD APPLETON LABORATORY
SCIENCE AND ENGINEERING RESEARCH COUNCIL

JAMES CLERK MAXWELL TELESCOPE

THE TELESCOPE

The James Clerk Maxwell Telescope (JCMT) is situated 4200 metres high on the volcanic mountain of Mauna Kea on the island of Hawaii, and is the largest instrument in the world for observations in the submillimetre region of the electromagnetic spectrum. The telescope, which was built under the overall direction of RAL, is operated jointly by the UK, Netherlands and Canada, and is of a classical Cassegrain design with a 15 metres diameter paraboloidal primary reflector and a 75 centimetres hyperboloidal secondary reflector. The primary surface consists of 276 lightweight aluminium panels (developed and manufactured at RAL) and has an overall surface accuracy of less than 50 microns, ensuring useful operation at frequencies up to 600 GHz. Receivers in this frequency range are not normally commercially available, and are being developed by a number of laboratories in the participating countries, including RAL.



The group is involved in a wide variety of projects in collaboration with a number of university groups, UK industry and Government establishments. Recent programme highlights include:

- the successful development of 'space qualified' millimetre Schottky diode mixers and frequency multipliers for the Upper Atmosphere Research Satellite Microwave Limb Sounder experiment (designed to measure water vapour and ozone in the upper atmosphere);
- development of a state-of-the-art receiver (which utilizes a superconducting tunnel junction as the non-linear mixing element) for the James Clerk Maxwell Telescope;
- development of a novel double diode 'balanced' mixer structure which is particularly well suited for aerospace applications.

In all examples, the main aim of this technology development is to increase the opportunities available for the UK scientific community to participate in, and influence, world class experiments.

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