

Science in Church

During the "Science Festival Weekend" organised by the Rev. Norman Russell, Vicar of Harwell and Chilton, the Rutherford Laboratory will be staging a display in St Matthews Church, as part of an exhibition built around the themes of "The origins of Man, Medical Technology and Health and Safety", in which all the scientific establishments of the Parish will be taking part.

The Rutherford Laboratory exhibit will deal with the medical applications of techniques developed in the field of High Energy Physics.

The Festival takes place on 16, 17 June.

OVERSEAS VISITS

A G D Payne & J Moir to CERN from 4 - 7 June to work on Proposal 210. H H Hurst and W Walkinshaw to CERN from 5 - 8 June for discussions with computer users.

G Stirling to Germany from 5 - 12 June to attend seminars and Spallation target workshop. M Edwards and J C Thompson to Wuppertal from 6 - 9 June to attend EMC collaboration meeting.

L C W Hobbs, T A Broome, F Atchison, A Carne, A D Taylor & R Wimblett to Julich from 10 - 12 June to attend Spallation target workshop.

C J Battay to Paris & CERN from 10 - 16 June to attend medium energy factory co-ordination committee and proposal 210.

J Barlow to Prague from 10 - 18 June to visit Institute of Physics.

J L Gooding & C Grindrod to CERN from 10 June - 8 Sept. for installation of RMS expt.

S F J Cox to CERN from 10 - 20 June for installation of RMS target.

R G Roberts to Zakapane, Poland from 11 - 17 June to attend Summer School. R N Newport, B W H Edwards, T G Coleman A W Eastwood to CERN from 11 - 13 June to attend RCBC construction and installation meetings.

A Astbury to SLAC & TRIUMF from 16 - 25 June to attend Exp. Evaluation committee and discussions.

Rutherford Wives

The next Rutherford Wives Coffee Morning will be on Tuesday, 12 June from 10.30 am to 12 noon, at The Coseners House, Abingdon. So, do come along, bring the children, and have a pleasant morning away from the household chores.

For further information please contact Gillian Litt (Abingdon) or Dorothy Gibson (Abingdon).

Christian Fellowship

7 June Our June prayer meeting will be led by Eric Greenslade of WRPB. If you have requests for prayer please contact a member of the Fellowship or ring Ext 6616 (F Smith) or Ext 585 (R Powell)

14 and 21 June: The meetings on these dates will be led by Chris Biddlecombe and Jimmy Darius. Why not come along for a half hour of Christian fellowship, discussion and praise? You will be very welcome.

All meetings will be held in the R2 Conference Room at 12.30 p.m.

Thanks

The Editor would like to express her thanks to Brenda Groves of the Typing Pool who has for the last eight months put up with her vagaries, changes of mind and diabolical writing! Brenda is leaving us to work nearer home - we wish her well.

Amateur Dramatic Soc

The AERE Amateur Dramatic Society, to which many Rutherford staff devote their considerable talent, is now following up its last great success - The Rape of the Belt - with a racy farce -

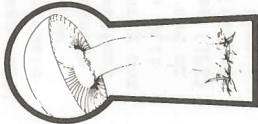
"What the Butler Saw"

Each performance is conveniently presented at the AERE Social Club: tickets are almost given away.

The Society limits itself to three plays a year, which should not strain the resources of anyone who would like to join in: come along to the Social Club any Thursday around 8 or 9 in the evening.

AERE DRAMATIC SOCIETY

presents



WHAT THE BUTLER SAW

An adult comedy by

Joe Orton

AERE Social Club

7.45 pm 7, 8, 9th June

Tickets 60 p

from Pam Coulthard

SRC 6622

Table Tennis

The Table Tennis Club will hold its AGM on Tuesday 12 June in R27 Conference Room at 1230 p.m.

Please make every effort to attend as details of the new facilities should be available and contingency plans (if necessary) will be discussed.

Cricket

The Rutherford Laboratory Cricket Team, is again competing in the Berkshire Downs League this season. So far the results have been close, but unfortunately also unfavourable. A team is also competing in the AERE League, where the results have been better.

The bad weather is, as usual, hampering the programme and the establishment of a settled side would help. A few more dedicated players wouldn't come amiss, either!

The SRC Team play the next round of the Curtis Bennett Shield at Wargrave on 12 June against "Groviains".

Art & Craft Exhibition

The Exhibition will be held in Conference Room 12 from 12 noon to 2 pm on 3, 4 and 5 July 1979.

Will anyone interested in exhibiting please make sure that your application form is sent to Myra Gilbert, in building R20 by 19 June. Please phone Ext 6143 for application forms.

Film Badge Notice

It is Period 6. Colour strip RED. Please check that you are wearing the correct film and that all old ones are returned. Next film change Monday 18 June.

Please Note

The FILM SERVICE has now moved to R12 (in Safety Section) phone number Ext 430.

Sales to Employees

Sales of scrap metal/plastics as set out in RLN 12/73 will be made on June 1, 15 and 29 at the scrap compound, rear of R40 from 1200 - 1230 hrs.

Welcome to IRAS

A new silhouette will soon be adding interest to the skyline of the Chilton site - IRAS is coming!

The network of trenches across the site intriguing everyone for the last couple of months is now explained in this issue of the Bulletin.

We thank Dr Barry Martin, IRAS UK Project Manager, for the article which follows, answering all our enquiries.

Introduction

The Appleton Laboratory has had a long history of association with the UK Scientific Space Research Programme.

In recent years the Laboratory has designed and built the Satellite

Control Centre for the X-ray Astronomy Satellite, Ariel 5, which was launched in October 1974, and has just completed a similar project for UK-6 (launch

date 24 May 1979). In January 1978

the International Ultra-Violet

Explorer Satellite (IUE) was launched,

which was an SRC/European Space Agency

(ESA)/USA collaborative project for

which the SRC (Appleton Laboratory

and University College London) provided

the prime detectors. The major

portion of the image processing data

reduction software was also written

at Slough by means of data links to

the Rutherford Laboratory IBM 360/195

computer.

Three years ago the SRC was invited

to join the Infra-Red Astronomical

Satellite (IRAS) project. This had

been originally conceived as a

collaborative project between the

Netherlands and the United States.

Satellite projects are extremely

expensive; IRAS will eventually cost

of the order of £60 million. In

order to reduce their share of the

cost, the Netherlands suggested that

the UK should provide the satellite

tracking station, the satellite control

centre and a quick-look scientific

data analysis facility. In exchange

for this contribution, a small number

of UK scientists would be invited to

join the IRAS science team and

participate in planning the overall

scientific programme.

The experience gained at Appleton

Laboratory in providing the ground

support for the UK satellite programmes

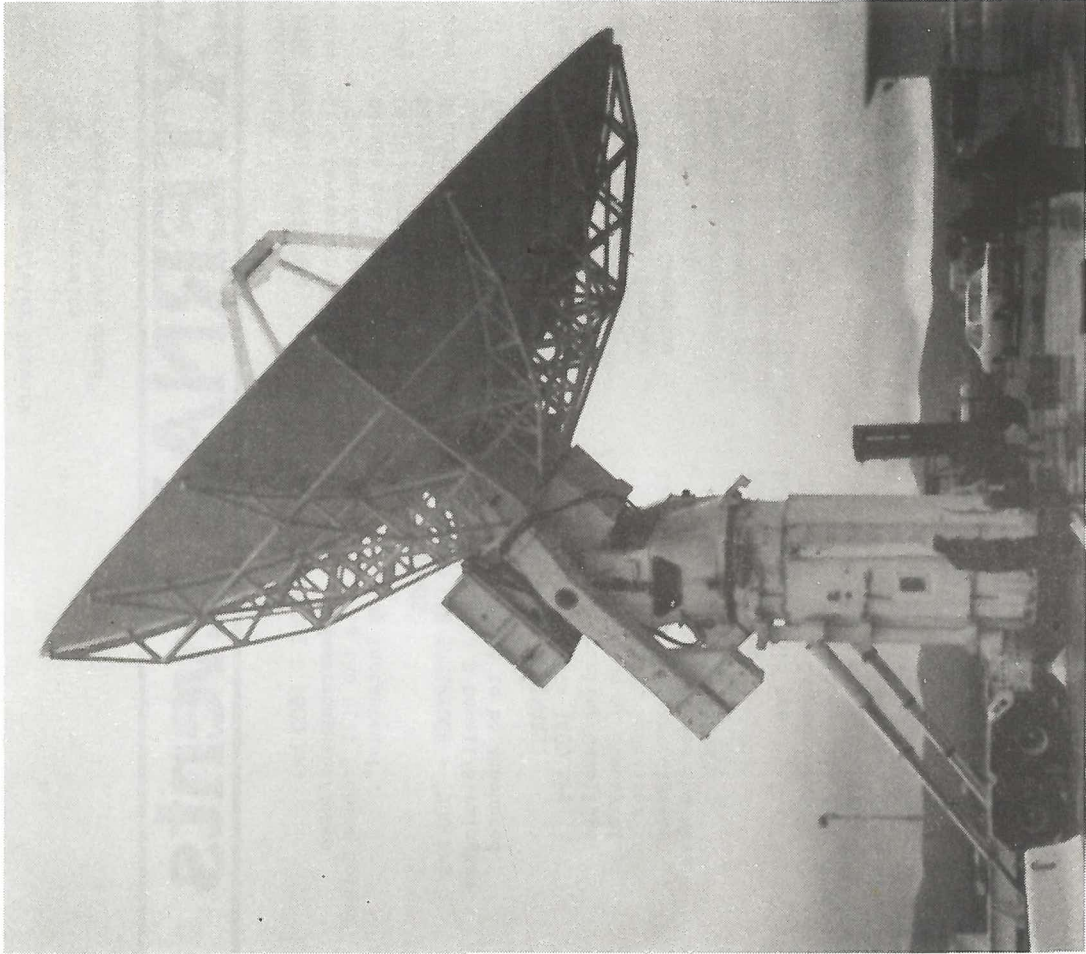
and the astronomical data analysis

experience acquired with the IUE

project are ideally suited to the UK

contribution to the project. A formal

Memorandum of Understanding was signed



The 12 metre aerial dish of the IRAS telescope as it will appear when assembled at the Chilton site.

The Mission

IRAS will be launched in August 1981 from the Western Test Range in California into a 900 km near polar orbit. The primary objective of the scientists is to carry out a complete sky survey at infra-red wavelengths.

The satellite will carry a cooled space telescope equipped with 62 detectors, which will be used to measure the infra-red flux in 4 wavelength bands centred at 10, 20, 50 and 100 microns. The main output of this mission will be the first ever complete and reliable astronomical catalogue of the sky in the infra-red.

The survey will occupy about 60% of the IRAS mission time. The remaining

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INTERNAL Events

RUTHERFORD LABORATORY LECTURE

LECTURE THEATRE - 1515 hrs

- 14 June: Mr Bryan Wilson/Plessey Research Ltd.
"Integrated Circuit Technology".

COMPUTING SEMINARS

COLLOQUIUM R27 - 1400 hrs

- 5 June: Dr R J Gurd/Manchester
"Parallel Data - Flow Computers".

- 19 June: Dr R A Rosner/Joint Network Team.
"SRC and University Networks - The Way Ahead".

HEP SEMINARS

CONF.RM. R61 - 1100 hrs

- 13 June: K Kawarabayashi/Tokyo
"Is the U(1) Problem Solved by Instantons?".
- 20 June: M Caifoloni/Pisa
"Structure of Final States in QCD Jets".

NIMROD LECTURE SERIES

LECTURE THEATRE - 1130 hrs

- 4 June: Dr D Websdale/I.C.
Title to be Agreed.

- 11 June: Dr A Sanda/Rockefeller & RL.
"A Story of α_s , Quark Charges and Moments of Neutrinos in QCD".

- 18 June: Dr R Turnbull/Glasgow
"Baryonium".

EXTERNAL Events

HEP SEMINARS

DAMTP.CAMBRIDGE - 1500 hrs

- 15 June: K Kawarabayashi/Tokyo
"Is the U(1) Problem Solved by Instantons?".

HEP SEMINARS

CAVENDISH LAB CAMBRIDGE - 1500 hrs

- 6 June: Dr J D Dowell/Birmingham
Title to be announced.

ELEM.PART PHYS SEMINARS.

WESTFIELD COLLEGE - 1400 hrs

- 6 June: J Stirling/Cambridge
"Status of Theory of Large P_T Reactions".
- 13 June: C D Froggatt/Glasgow
"Quark Masses and Weak Mixing Angles".

PART.PHYS.DIS.GP.

BIRMINGHAM - 1615 hrs

- 8 June: Dr R Cashmore/Oxford
"Recent Results from PETRA".
- 15 June: Dr M Chase/Cambridge
"Quantum Number Correlations in Large P_T Events".

THEO.PHYS.SEMINARS

SCHUSTER LAB.MANCHESTER - 1430 hrs

- 6 June: Prof S Kooniu (Cal.Tech)
"TDHF Nuclear Collective Motion".

- 13 June: Prof S Drell/Stanford
"The Concept of the Elementary Particle".

THIS LECTURE WILL BE HELD AT 1615 hrs in the BRAGG.I.L.TH.

circuits in the world. He has also been concerned with gallium arsenide and gallium phosphide light emitters and with the gallium arsenide*field effect transistor. He is a graduate of Cambridge University and a member of the Institute of Physics and Chairman of the SRC Solid-State Devices Sub-Committee.

In this lecture he will describe some modern integrated circuit processes, emphasizing the reasons why they lead to a low cost reliable product, susceptible to computer aided design. Silicon has a number of virtues which make it the ideal material for most applications but the

Rutherford Laboratory Lecture

This months speaker Bryan Wilson is a Director and Chief Scientist at Plessey Research (Caswell) Ltd, and has spent most of his working life in semiconductors. He was engaged in the development of integrated circuits in the early 1960's when such techniques as diffused resistors, flip chip bonding, and p-n junction isolation were first being considered. The group developed the first linear amplifier with feedback in integrated

IRAS

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40% of the time will be devoted to non-survey observations of pre-selected objects of special interest. These observations will be made with the telescope and also with some additional Dutch instrumentation consisting of a low resolution spectrometer, a short wavelength channel and two chopped photometric channels.

Allocation of Responsibilities

The Americans are responsible for building the telescope (Ball Aerospace at Boulder in Colorado), providing the main scientific data analysis centre that will produce the IRAS catalogue (the Jet Propulsion Laboratories in Pasadena), and launching the satellite. The Dutch are responsible for building the spacecraft (an Industrial Consortium headed by Fokker), and the SRC, as stated earlier, is responsible for the provision of the major part of the IRAS Ground Operations System and the Preliminary Scientific Analysis System.

Eighteen principal scientists are associated with IRAS; 9 American, 6 Dutch and 3 British, and this team will monitor the production of the catalogue from the scientific viewpoint. In addition, panels of guest observers will be formed to exploit the IRAS non-survey time. The British team is Professor Jennings from University College London, who is the UK Project Scientist, Dr Clegg from Queen Mary College and Professor Marsden from Leeds. Professor Jennings will take the initiative in establishing the panel of UK guest observers. This panel will be entitled to 15 complete days of observations during the one-year lifetime of the mission.

The Project Structure

There are seven main groups currently working on IRAS in the UK. The first and largest of these is managed by Alan Rogers (AL) and is concerned with the construction of the tracking station and the control centre real-time hardware. The second group comes from Holland and is lead by Richard van Holtz from the Netherlands Aerospace Laboratories. This group designs and writes software for satellite observation planning and also the on-board computer software. Mr van Holtz is also the IRAS Ground Operations Manager and Mr Rogers his deputy; after launch their roles are reversed.

Dick Holdaway (AL) is in charge of the software group which is concerned with post-pass analysis of spacecraft engineering data, orbit and attitude calculations, orbit prediction, and science data pre-processing. Alan Buck (AL) is responsible for the real-time software that will be used for control and data reception.

Eric Dunford (AL) leads the Preliminary Scientific Analysis Team and works closely with the Ground Operations team and all the IRAS astronomers.

Mick Reid (AL) is looking after the implementation of the ICL 2960 computer.

Finally, the Rutherford Laboratory effort required in establishing the project on the Chilton site is coordinated by Mac Snowden.

IRAS Ground Operations

The Operations Control Centre (OCC) will be located in the old IBM room in the R1 building and the associated staff in R32 and RL6. The Tracking Station will make use of a 12 metre transportable antenna which has been loaned by NASA to the SRC for the duration of the project. Early in June the antenna will arrive at the Chilton site; its impressive appearance will certainly herald the arrival of the project.

Although a large engineering effort will go into setting up the Ground Operations system, an even larger effort will be put into software production and will make considerable demands on computer power. To meet these demands, and those of the Preliminary Analysis Facility, the new Chilton OCC has already been equipped with an ICL 2960 computer and the first of two PDP 11/34 computers, both of which are now commissioned. In January 1980 the second PDP 11 will be installed, and the two minis, which are primarily used for real-time work, will be equipped with an AP 120B Array Processor on a common bus. To complete the configuration, a Phillips 856 computer will be installed later in 1980, to house the on-board computer simulator software.

After launch, the Ground Station will be in contact with the satellite for about 15 minutes at roughly 12-hourly intervals. In spite of these "brief encounters" the OCC will be fully active for 24 hours per day, 7 days per week. Prior to each pass the observation planning software will play a dominant role. This software which will reside on the ICL 2960 contains a large interactive module and, in addition to the observations planned by the OCC staff to carry out the survey, computer terminals will be available, both at Chilton and at the Jet Propulsion Laboratories (JPL) in Pasadena, for planning additional observations. Because of the time difference between Oxfordshire and California it can be seen that observation planning will be a round-the-clock activity.

The output of the planning system is a set of satellite commands, and at the beginning of a pass, these commands will be relayed to the satellite from one of the PDP 11s and stored in the

on-board computer for use during the next 12 hours. Also, during a pass, the scientific data, which have been stored on a tape recorder on board the satellite during the previous 12 hours, will be dumped to the ground at a rate of 1 Mbit/sec. In addition to the science data, engineering data are also transmitted to the ground at 4 kbit/sec throughout the pass.

The science data are stored on video tape and the engineering data on digital tape and, after the pass, the digital tape is sent for further analysis on the ICL 2960, while the video tape is digitised on a PDP 11. After the science data have been digitised (enough to fill two 1600 b.p.i. 9-track tapes) they are again passed through the PDP 11 computer, and the array processor is used to extract infra-red point sources. When all the analysis is complete the raw science data and auxiliary data extracted from the engineering data stream will be transmitted to JPL via Goonhilly using a 50 kbit/sec data link. The same data are also given to the Preliminary Analysis Group, together with a tape of IRAS point source detections.

The Preliminary Analysis Facility

The prime objectives of this group is to ensure, before the next pass, that the telescope is performing correctly from a scientific point of view. To this end the software has to check the point source detections against a data bank of known infra-red sources. Software will also be prepared to carry out point source detection confirmation, and to provide graphical output to aid astronomers with planning additional observations. Finally, a preliminary data base of infra-red detections will be compiled on the ICL 2960 and a number of interactive graphics tools provided to aid astronomers in preliminary analysis.

Throughout the operational phase of the mission a Joint Operations Science Team, consisting of some of the 18 principal investigators, will be resident at Chilton and working closely with the Science Analysis team.

The Move to Chilton

Moving IRAS to Chilton is clearly a traumatic experience for many of the Appleton Laboratory IRAS team. We believe however that this is an excellent and demanding project which we hope will create new areas of interest on the Chilton site. We could not have carried out this move without the excellent support that we have received from Dr. Stafford, and the great interest that the Rutherford Laboratory staff who are helping us have shown in the project. We are confident that the UK contribution to IRAS will be a highly successful one.