



APPLETON LABORATORY NEWSLETTER

No. 167

EXCITING RESULTS FROM ARIEL 5 EXPERIMENTS

Six months have elapsed since Ariel 5, Britain's first X-ray astronomy satellite, was launched with a NASA rocket and the first results have become available from the six experiments which it carries. All of the experiments are functioning and have produced scientific data on the X-ray sources that have been viewed so far. There have, however, been some outstanding new results.

The scientists report that a new X-ray source was discovered just before Christmas in the constellation of Centaurus which is found to flash on and off with a period of nearly 6.8 minutes. This kind of behaviour is common in X-ray stars - but usually the period is that of the rotation of the star about its polar axis, when it is only a few seconds, or it is that of its orbital rotation about a companion star, when it is a few hours. A period of a few minutes implies either very slow rotation or fast orbiting: compare the orbit of the Earth about the Sun, with a period of a year. If orbiting, a period of the order of 5 minutes implies a very small orbit, smaller than the size of a normal star, so that a system consisting of, perhaps, a neutron star and a dwarf star must be involved.

A second new source reported by Ariel 5 investigators was found in February. It rapidly became the second brightest source in the sky for a time, after which it faded gradually. This source is in the direction of the centre of the galaxy and is probably actually in the galactic nucleus. It is possible that it coincides with a remarkable radio and infra-red source at the galactic centre, though other measurements at different wavelengths will be required to confirm this. The scientists believe this could be a new kind of object.

Finally, it is believed that X-ray emission lines have been detected from the Cassiopeia and Tycho Supernova remnants. These are clouds of debris which results from the explosion which shatters many or all stars when their nuclear fuel is exhausted. If the observations are confirmed it will be possible to determine the amount of iron and silicon in the stellar debris. This will be important because it is believed that all the heavy elements in stars and on planets such as Earth have been manufactured in nuclear reactions in Supernovae.

S.R.C. Press Office

DATCHET RESERVOIR BEGINS TO FILL

Since November 1969, travellers flying into Heathrow or motoring along the M4 have watched the 5.4 km-long embankment around Datchet reservoir rising to its maximum 20 m above the surrounding ground.

Last week, after more than five years construction, the inlet valves at the UK's biggest continuous clay wall reservoir were opened and Thames water began to flow into the 37 million cu. m reservoir.

Built by W. and C. French, at a cost to the Thames Water Authority of over £4 m, Datchet's capacity is sufficient to meet all London's water needs for 20 days. It will also provide the capital with another 192 ha of water surface for sailing and other recreational activities. One embankment has an internal 1 in 8 slope to provide a launching ramp, and there is dry space for about 800 dinghies.

Datchet was designed by the engineering staff of the Metropolitan Water Board, under its Chief Engineer, Mr. E. C. Reed, now Director of Operations of Thames Water Authority.

The embankments are built from ballast won from the 10 million cu. m muck-shift. They have a clay core reaching a height of 18.5 m above the surrounding ground, and a 6 m-deep cut-off trench forming a key 3 m into the London Clay. As the core was built, 6000 sand drains were installed by Soil Mechanics, to dissipate pore pressures below the embankment.

An important feature of the design was the provision for forced circulation, to prevent stagnation of the stored water and inhibit algal blooms. Inlet jets will disperse the flow from up to five 450 Ml/day pumping units to different levels, and induce vertical circulation of the water.

The pumps, the largest so far used by Thames Water Authority, also feed the nearby Wraysbury reservoir, 35 million cu m in size. Completed in 1971, Wraysbury pioneered the use of deep tunnels instead of traditional surface mains. Wraysbury and Datchet share 12.5 km of inlet, outlet and intake tunnels, up to 40 m below ground level.

Thanks to Mr. McGivney for drawing attention to this item of local interest which appeared in the New Engineer, journal of the Institution of Civil Engineers, earlier this year.

We are grateful to the Institution for permission to reproduce it here.

STAFF NEWS

Congratulations to :

Sue and John Adam on the birth of their daughter, Rachel Louise on 14th March
(A.R.D. News)

Jeff Payne and Angela Hart who were married on 15th March (A.R.D. News)

Martin Clowes on his marriage to Kerry Waters at Whitchurch on 26th April.

Welcome to :

P. F. Shutie	H.S.O.
M. S. Hargreaves	S.C.S.
R. H. Lancaster	S.C.S.

Resignations :

Mrs. E. A. Thomas	C.O.
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Other Changes :

B. E. Patchett	H.S.O. transferred from R.G.O. to A.R.D. Culham
M. A. Johnson	H.S.O. changed from G.1 to G.2A in Div. II
A. J. G. Moorat	S.S.O. changed from D.2 G.4 to R.D. G.1 (Satellite Project)
P. G. Davies	S.S.O. changed from D.5 G.2 to R.D. G.2 (" ")
M. I. Dick	H.S.O. changed from D.2 G.4 to D.4 G.3
Miss A. M. Wasik	H.S.O. changed from D.2 G.4 to D.5 G.2
G. P. Harris	H.S.O. changed from D.5 G.1 to D.6 G.4
A. M. Zavody	H.S.O. changed from G.1 to G.3 in Div. 5
L. D. J. Harris	S.O. changed from G.2 to G.3 in Div. 5
P. A. Vaughan	P.S.O. (IUE) on detached duty at Portsmouth
V. A. W. Harrison	S.S.O. (IUE) " " " " "
R. J. Cathrew	H.S.O. changed from D.5 G.2 to D.1 IUE (detached duty UCL)
U. M. Yilmaz	H.S.O. changed from D.4 G.1 to D.1 IUE (detached duty UCL)
P. A. Eggett	A.S.O. changed from D.5 G.3 to D.1 IUE (detached duty UCL)
Mrs. E. M. Morgan	H.S.O. changed from G.1 to G.4 in D.2

Correction :

Dr. Bryant's Group is now in Div. IV G. 5 not Div. III as shown in last months Newsletter.

Professor R. Wilson

Professor R. Wilson, of University College, London, has been appointed Project Director for the I.U.E. Satellite. For this purpose he has become, for the time being, a part-time member of the Staff and will be spending a substantial part of his time at the Laboratory.

LABORATORY NEWS

Dr. Horner will attend an E.M.C. Symposium and Technical Exhibition, to be held in Switzerland from May 20th to 22nd, in order to give a lecture on Interference to Radio Astronomy.

The General Assembly of the International Union of Radio Scientists (URSI) will be held in Lima, Peru from August 11th to 19th. Dr. Saxton will lead the U.K. delegation and will be accompanied by Dr. Horner, Dr. King and Dr. L. Thomas.

Mr. Dalziel, Dr. King and Dr. Dickinson will attend the XVIII Plenary Meeting of COSPAR, which will be held at Varna, Bulgaria, from May 29th to June 7th.

A Planning Committee is meeting to discuss plans for new buildings. These will be used to provide extra technical facilities and will enable Culham staff to move to the Laboratory.

On Tuesday 9th and Wednesday 10th June, a meeting of the Astronomy I Committee of the Astronomy Space and Radio Board will take place at Slough. Examples of some of the Laboratory's work will be on show to the Committee on Tuesday.

X-Ray Polychromator Project for SMM (ARD News)

During the recent visit to the U.S.A. for discussions on the Solar Maximum Mission collaborative XRP experiment, NASA's programme plans for the proposal satellite were obtained. The plan for the launch of the satellite is to use the third shuttle test flight scheduled for the last quarter of 1979 with a Delta launch vehicle as the back up. The main programme details are as follows :

<u>Phase 1</u>	Detailed definition and preliminary design Conceptual design review Final selection of experiments	May-Sept. 1975 Sept. or Oct. 1975 Nov. 1975
<u>Phase 2</u>	Advanced definition and detailed design Confirmation of inclusion of SMM in 1977 new start programmes.	Jan.-Sept. 1976 Sept. or Oct. 1976
<u>Phase 3</u>	Hardware manufacture Delivery to NASA Launch	starts Oct. 1976 Sept.-Dec. 1978 1979

MSSL and Lockheed have interchanged some of their contributions to the instruments. MSSL will now provide the BCS (bent crystal spectrometer) and LMSC will provide the collimator. There is no change in the Appleton Laboratory contribution. The collaborating teams are now starting the main Phase 1 activities; they plan to review the design concepts at Culham at the end of May and to complete the phase 1 reports and proposals for the next phases at the end of August.

CIVIL SERVICE BENEVOLENT FUND

"GIVE A HOME" APPEAL

The organisers of the above collection would like to thank the staff for contributing so generously to the recent appeal. The donations totalled £19.54p almost double that collected for a similar appeal in 1972.

As the Civil Service Department match this amount £1 for £1 our effort will benefit the Fund by almost £40. Grateful thanks to all concerned.

REPRINTS APRIL 1975

- A.1057 W. C. Bain Ionospheric solar flare effects J.A.T.P. 1975 pp 573-574
E. Hammond observations Vol. 37
- A. 989 M. P. M. Hall Gain degradation of a 25 m Proc. IEE 1975 pp 358-360
P. Misme paraboloidal aerial on 2 GHz Vol. 122
transhorizon radio paths No. 4

INTERNAL MEMORANDA

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