Bulletin
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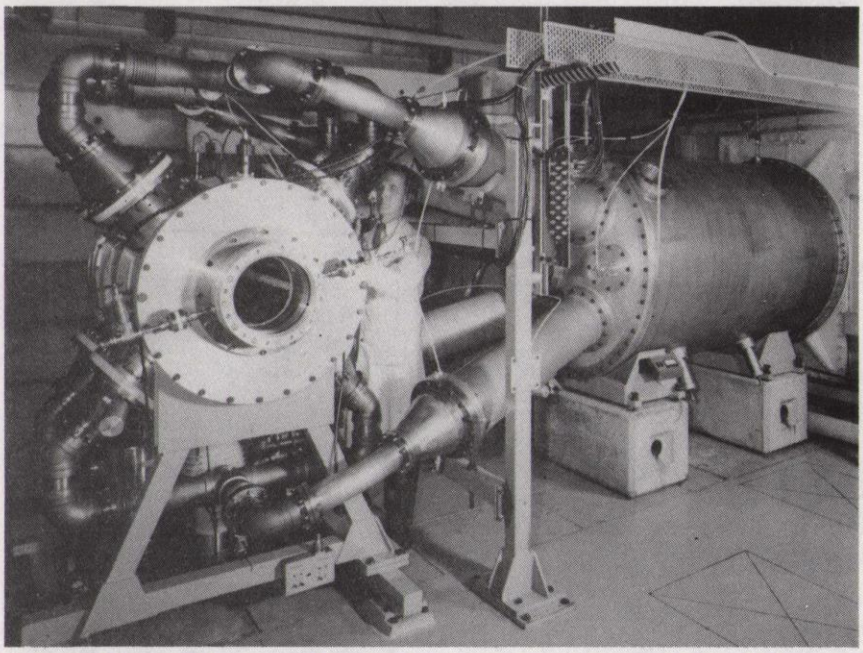
RAL's New Laser Duo

SPRITE - Most Powerful of its Type



Sprite - the new high power electron-beam-pumped 249 nannometer krypton fluoride gas laser. *82FC1673*

On 26 May 1982 the Laboratory's new gas laser Sprite, came into operation for the first time and produced a laser pulse of 160J. Two and a half years of development and construction work by laser division scientists and engineers, has produced a machine that is already the most powerful krypton fluoride (KrF) laser of its type in the world. Machine improvements, which will be carried out in the next few months, are expected to boost the laser output further. Sprite is well on its way to achieving its full original design specifications of 200J.

Important features of the design include a high overall laser efficiency (1 to 2%) and good beam uniformity. Designed to provide an energy output of 200 Joules in a 60 nannosecond pulse in a beam of 26 centimetre diameter; to date it has achieved an output of 160 Joules in a 40 nsec pulse for an overall laser efficiency of 0.75%. The improvements are expected to boost this to 300 Joules in a 60nsec pulse for an efficiency of 1.5%.

In operation, the high pressure cylindrical laser cell (100 cms long x 25 cms diameter) is pumped from four sides by four 450 keV, 90 kA large area electron beams. These beams are generated in cold cathode field emission diodes which are pulsed by water-filled co-axial pulse forming lines (PFLs). The PFLs are pulse charged to a voltage of 1 MV using the ELF Marx bank (see Bulletin No 11. 30 June 1981) and an intermediate water capacitor (the large cylinder in the photograph). De-ionised water is used extensively in Sprite as a high voltage insulating medium a role to which it is well suited because of the short duration of the voltage pulses generated by the machine. An added advantage is that the high dielectric constant of water results in a high electrical energy storage density and therefore a very compact laser system. For comparison and to stress the point, our original ELF KrF laser is almost the same size as Sprite and yet - Sprite produces ten times more energetic laser pulses.

In order to achieve a sufficiently high resistance for efficient operation, the water is de-ionised and de-oxygenated by constant flow through a water precipitation and treatment system. Pure, de-ionised water is surprisingly corrosive and so an important aspect of machine design is the consideration of materials compatibility. All aluminium components need to be chemically treated to reduce their solubility to an acceptable level.

For the future, a new plan to build, within the next 2 to 3 years, a 12 - beam KrF laser facility for use in laser-driven compression experiments, includes the use of the improved Sprite as the final power amplifier for the new system.

(We thank Fergus O'Neill for news of this latest success).

and by Popular Request

In response to the increasing demand from university research groups to use the sophisticated ultra-violet laser and diagnostic systems in the Laser Development Group, a high powered UV radiation facility has recently been created. Pulsed excimer lasers operating in the ultra-violet spectral region are the primary wavelength sources of this facility. By means of stimulated Raman scattering of the output of these lasers almost any wavelength in the ultra-violet can be generated (with powers up to 50MW in pulses lasting 20nsec) for the user's requirements.

Already this facility has created a great deal of interest among many university researchers. Experiments currently in progress, and planned for the next six months, involve groups from seven universities and are in areas as diverse as laser photochemistry (of both large and small molecules), plasma diagnostics using Thomson light scattering, UV laser annealing of semi-conductors, investigations of optical saturable absorbers in the ultra-violet and the application of optical phase conjugation to photolithography.

Clearly the physicists, chemist and engineers who wish to use these unique sources of high power ultra-violet light, will keep us busy for a long time into the future.
For more information contact Malcolm Gower Ext. 3161.

INTERNAL Events

HEP SEMINARS
R61 CONF.ROOM - 1100hrs

30 June Dr John Wheater/Oxford

8 July R Oakes/Northwestern
'Constraints on Charge 2/3 Quark Masses'

14 July Dr M Ibbotson/Manchester
'New Evidence for Photo-production of F Mesons'

COMPUTING DIVISION SEMINAR
COLLOQUIUM - ATLAS CENTRE - 1515hrs

13 July Prof Peter J Brown/Kent
'Designing VLSI Chips to Improve Software Performance'

NIMROD LECTURES
LECTURE THEATRE - 1400hrs

28 June Dr Elliot Bloom/SLAC
'QCD in the Charm Region and Gluonium-Experimental Results at SLAC'

12 July Prof S Ellis/Seattle
'Strings, Correlations and e^+e^- Physics'

CONDENSED MATTER SCIENCE SEMINARS
R3 CONF.RM - 0930hrs

29 June E P Wohlfarth/I.C.
'Metallic Magnetism Under High Pressure'

6 July T J Sluckin/Southampton
'Ordering in Fluids at Interfaces'

REMOTE SOUNDING SEMINARS
LECTURE THEATRE - 1400hrs

30 June Dr R L de Zafra/State Univ. of N.Y.
'Ground Based Mm Wave Observations of Chloro-fluorocarbon Byproducts in the Stratosphere'

R61 CONF.RM - 3.30pm

20 July Dr P H Moffatt/RAL
'Results from the LIMS Experiment on NIMBUS-7'

EXTERNAL Events

THEO.PHYS.SEMINARS
TPD - HARWELL - 1400hrs

29 June Dr M Watkins/JET
'Predicting the Behaviour of JET'

6 July Prof P W Jacobs/Western Ontario
'Entropy of Formation of Frenkel Defects in Fluoride Crystals'

13 July Sir Rudolph Peierls/Oxford
'The Interpretation of Quantum Mechanics; Is There a Problem?'

PART PHYS DISC GP MEETINGS
BIRMINGHAM - 1615hrs

2 July Dr I Aitchison/Oxford
'Gauge Theories for Experimentalists'

Found

The following items have been found:

A Ladies Watch
1982 BBC Diary
3 sums of money

Claimants should contact Personnel Group, R20, Room 70, Ext 495.

Film Badge Notice

It is PERIOD 7 Colour strip PURPLE
Please check that you are wearing the correct badge, and return all old ones.

Next Film Change

Monday 19 July

Obituary

We regret to announce the death of Alan Bishop in Vancouver on 9 May 1982. Alan joined the Laboratory from AEA Winfrith in 1965 and worked on bubble chambers and hydrogen targets until he emigrated to Canada in 1974 to work on the TRIUMF project at the University of British Columbia.

The many friends he made at the Laboratory mourn the loss of their well respected colleague and will always remember him with affection.

Our deepest sympathy is extended to his wife Anne, who also worked at the Laboratory and to his sons Steven and Darrel.

Acknowledgement

Mrs Ann Nelson and family would like to thank all friends and colleagues of her late husband for their expressions of sympathy in their sad loss.

Trade Exhibition

There will be a one-day exhibition of a new range of British vacuum measuring equipment by Vacutech Ltd on Wednesday 7 July in R12 Conference Room from 1000 - 1600hrs.
All are welcome.

Sales to Employees

The sale of scrap metal and plastics as set out in RLN 12/73 will take place on 9 and 23 July in the R40 Scrap Compound from 1200-1230hrs.

'Guinea Pigs' at RAL

RAL had the honour of playing host to about 100 members of the Guinea Pig Club on Saturday 5 June.

Members of the Club are all ex-RAF or Allied airmen, who as a result of burns had at least two plastic surgery operations from the team led by Sir Archibald McIndoe at East Grinstead.

The day was very hot; too hot perhaps for a guided tour of the Laboratory. But, as the festivities started at the 'White Hart', Harwell, where RAL guides and demonstrators had been kindly invited to join the Club for lunch, everyone was well set-up for what turned out to be a very pleasant afternoon in the company of a delightful group of people.

On arrival at RAL the guests were welcomed by Geoff Manning, who gave a brief introductory talk about the exhibits and the Laboratory and presented a commemorative glass plate, made by the EBL Facility, to Tom Gleave, Chief Guinea Pig. Tom responded by presenting a Guinea Pig plaque to the Laboratory.

A group photograph followed and the party was then split into groups to tour the Laser Facility, Millimetre Wave Telescope, Bio-Medical Facility, SNS Remote Handling, IRAS Control, Electron Beam Lithography Facility, Computer Terminal Room and last but by no means least the Coffee Lounge.

At 5.30 the whole party assembled at the end of the eastern runway of the old airfield to join the D-day commemoration service conducted by the Rector of Harwell at which Tom Gleave laid a wreath on behalf of the Guinea Pig Club.

At a reunion meal at the Royal British Legion Harwell Club, Cyril Balderson, who had earlier in the day demonstrated some of the wonders of the computer room, was presented with a "Friend of the Guinea Pig Club" badge.

A letter of thanks from the Club ends "Thankyou all so very much for such a magnificent day - IT WAS GREAT!"

We enjoyed it too.

A GUIDE

Annual Report 1981

Copies for staff who have not already received one are now available in the Library.

Will Ye No Come Back Again?

High winds, horizontal rain, barren hills with bracken covered peat bogs broken by lakes and rocky outcrops. Sea birds and sheep mingle with camouflaged vehicles along the sandy coastal strip. A heavy explosive thump sends a missile careering into the sky and out over the Atlantic Ocean. This may conjure up visions of the South Atlantic but also fits a certain Scottish Island in the North Atlantic.

The end of May brought a final note to the SERC rocket launching facility in South Uist. The rocket range is located at the north-west end of the island in the Outer Hebrides. A visit was made to empty the main telemetry building for occupation by the British Army upon whose range it is sited. The use of the range dates back to 1967, the first Petrel being launched on the 1st June followed by the first Skua on the 8th July. Since those exploratory rockets some 200 Petrels and 50 Skuas have been launched involving about 20 universities and other scientific establishments of international origin. Parallel with this activity the Meteorological Office were launching a program of Skuas until 1980 providing necessary wind information and radar tracking in support of Petrel launches. For scientific support the SRC provided an ionosonde for regular ionospheric observations and records. This is continuing for the present. Manning of the range facilities over the years has been a joint effort on the part of AWRE, IAL, the Army, Met. Office, and SRC. With a change in policy on the part of the Radio and Space Research Station towards university services, more direct involvement came from SRC personnel.

Accommodation has varied a great deal depending upon how adventurous participants were. The Officers' Mess in Balivanich was favoured by many and for a time the Ben Mhor guest house, a converted school house that sometimes shows its age. For convenience the Creagorry Hotel has the edge as it is handy for the range and also possesses a bar featured (it is rumoured) in the Guinness Book of Records over Whisky sales. The islanders show a hospitality that has been enjoyed and remembered with affection by members of the teams. Relaxation usually involved stamina and a certain amount of fitness whether dancing, hill walking or "just going down the pub".

The past few years has seen a run down of scientific activity for a variety of reasons. The range was updated and improved during 1981 but events overtook the progress and the final countdown occurred on March 23rd of this year. This was possibly the most ambitious campaign held at South Uist considering the circumstances. Three launch pads, two telemetry stations and three radars being used in launching seven Petrels over a two and a half hour period. Experiments were conducted by establishments from Northern Ireland, Wales, England, Sweden and Canada on a Scottish location. A very successful and enjoyable campaign as befitted a facility that has given good service to many scientists over the years. It remains only to thank the Army for being such co-operative genial hosts. Slainte Mhath.

Use of RAL RecSoc Playing Fields

The RAL playing fields lie between the RAL staff car park, Frome Road and Fermi Avenue, and are leased by the RAL Rec. Soc.

Due to the inconsiderate use of the RAL playing fields by some individuals, it is necessary to remind all staff of some basic and obvious rules:

1. RAL playing fields are only available to RAL Rec. Soc. members (Harwell Rec. Soc. membership does not count!).
2. NO golfers are allowed to play on the RAL playing fields.
3. Cars must not be parked on the fields, verges, or surrounding roads, but must be parked in the staff car parks. Under no circumstances may cars be driven across the fields.
4. Cricket practice nets and hockey nets may not be used by footballers as goal areas.

Failure to comply with these basic rules will result in individuals, teams, and even entire clubs being excluded from using the RAL Rec. Soc. playing fields.

Mike Courthold
Hon. Sec.
RAL Rec. Soc.

Golfers

Would all golfers please note that no one at all is allowed to play golf on the RAL playing fields, which are currently designated for cricket, hockey, and football use only.

RAL Golf Club do, however, have a Pitch and Putt green, for use by members of their club, near the R25 mound. Anyone interested in joining the RAL Golf Club should contact Mr R Bell, R25, Ext 6137.

Members of the Harwell Golfing Society are allowed to practice on the Harwell Rec. Soc. playing fields around the South Rugby pitch, but are only allowed to drive off from the area near the bungalows towards Harwell.

Persons who are not members of either golf club are not allowed to play golf on any of the playing fields.

Mike Courthold
Hon. Sec.
RAL Rec. Soc.

Thank You All

From left to right, Bill Allen, Dennis Wilde, Clyde Medhurst, John Houghton, Doug Roberts and seated, Marie Ray, Betty Carroll, and Margaret Waite. 82FC2658

On Friday 30 April a special Farewell ceremony was held in the Lecture Theatre to mark the departure of the last seven retiring members of staff based at Ditton Park.

Clyde Medhurst, Betty Carroll, Doug Roberts, Dennis Wild, Bill Allen, Marie Ray and Margaret Waite were given a rousing send off by all their ex-Ditton Park Colleagues, led by their Director, Professor John Houghton.

It was he who voiced the sadness of everyone present, in a farewell tribute to them all, thanking them for the specific contribution each had made to the happy and efficient running of the Appleton Laboratory in its Ditton Park days. With 108 years of service between them, their worth to the Lab. had been great.

Space precludes us reporting all the complimentary things said about our colleagues; we give here but a flavour, to indicate the high esteem in which they were held.

Of 'Med' Medhurst, John Houghton said, "his knowledge of the problems of communicating with earth orbiting satellites is probably unsurpassed at RAL."

Of Betty Carroll, "What can one say about the incomparable?"

Doug Roberts was decribed as, "the very essence of diplomacy, good manners and efficiency."

Dennis Wild was said to, "drive anything anywhere, anytime, quietly, with good humour and considerable courtesy."

Bill Allen was described as, "a craftsman beyond compare, always ready with some ingenious device."

Marie Ray - "kept us in good order with humour and concern for others" and Margaret Waite, "full of quiet commonsense - yet another ideal colleague."

It is very obvious, they will all be sorely missed.

Volleyball Anyone?

Sunny summer days are here and I intend to start a volleyball club associated with RAL Rec.Soc. specifically for playing outdoors during the summer months (a thriving indoor club already exists at AERE Harwell). Permission has been obtained to mark out a court on the grass area behind transport section and I envisage playing at lunchtimes (12.30 - 1.30) once or twice a week (Mondays and Wednesdays?) whenever weather permits. Superstars and beginners equally welcome. I hope the first session can be on Monday June 28th. If you are interested please contact me on Ext 6662 or Room 2, R16.

John Macdougall

Sports Chairman Retires

After six years as Chairman of the Council's Sports and Social Association, Harry Cook has been succeeded by Gordon Rowe (also of Central Office) pending Harry's retirement later this year. To mark Harry's long association with the SSA, he was presented by his committee with a cut glass rose bowl to which all constituent clubs had donated - including RAL. The presentation was made at the recent annual delegate meeting held at Daresbury.

Handing the bowl to Harry, Professor Leslie L Green (Director, Daresbury) said that Harry had joined the Admiralty in 1939 after success in the open competition. During the war, he served in the Royal Air Force on Spitfires and, afterwards during the Berlin air-lift, he switched to Vampires.

He returned to the Admiralty in civilian life and went, on promotion to EO, to Herstmonceux at the time RGO was moving there. It was at RGO that he met a Varityper, Janet, whom he married. They went for three years to the Cape Observatory and Harry and Mrs Cook will be going out to South Africa soon after he retires to visit old friends there.

There has hardly been a year since his return that Harry has not held some office in a sports and social club, first at RGO and later at Central Office. He encouraged constituent clubs within SERC to exchange information on facilities provided at each site and, in this way, showed where improvements were needed. Perhaps his best legacy to his colleagues is Indoor Sports Day: it was Harry Cook who ensured that management supported the Association's request for such an event and it is Harry who has ensured that the standards set in the early days have been maintained.

Bulletin

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Deadline for insertions: