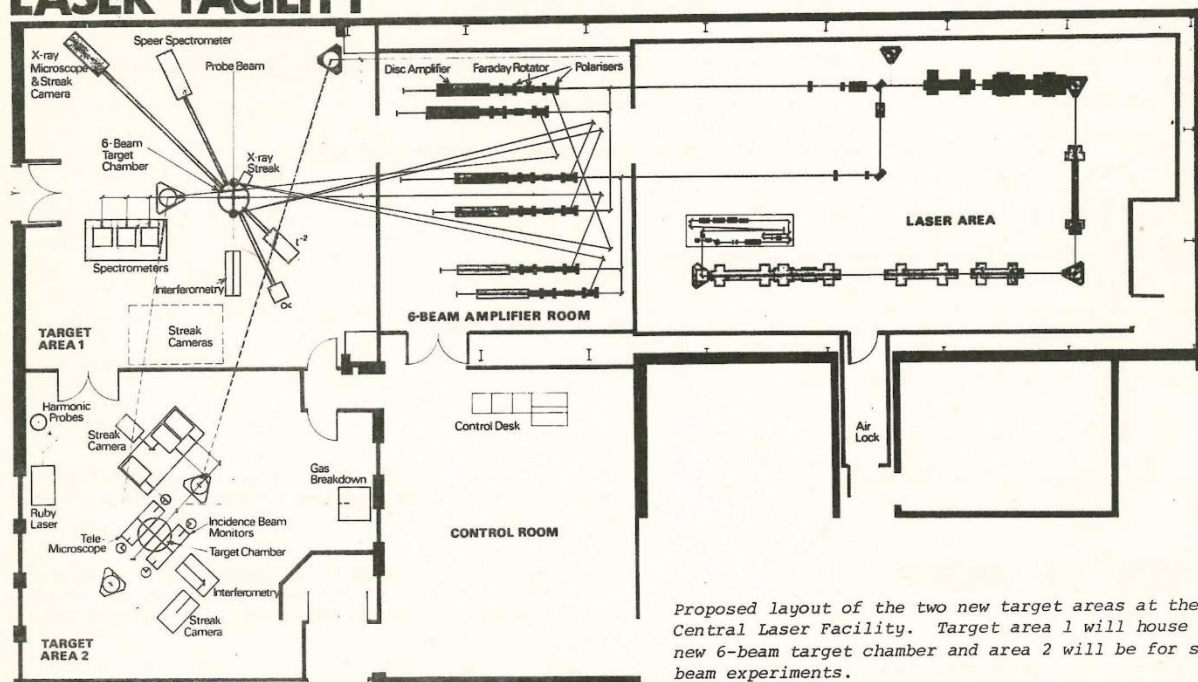


17 - 31 July 1978

UPGRADE OF THE CENTRAL

LASER FACILITY



Proposed layout of the two new target areas at the Central Laser Facility. Target area 1 will house the new 6-beam target chamber and area 2 will be for single-beam experiments.

The Government has recently approved the sum of £758,000 to upgrade the performance of the neodymium glass laser at the Laboratory's Central Laser Facility.

The enhancement of the laser was envisaged when the project was first approved in July 1975. Up to now the laser has provided one or two beams which have been directed into a single target chamber. Broadly speaking, the research programme has been concerned with compression studies using both beams and studies of the interaction of laser radiation with matter using a single beam. The facility has supported a full programme of varied research involving about 80 scientists from 19 institutions. At present the maximum peak power per beam is 400 gigawatts (4×10^{11} watts) for a pulse duration of 100 picoseconds (i.e. the laser light burst is about 3 centimetres long!)

Recently an extension has been built onto the laser laboratory to expand the research area to allow the generation of up to six separate beams from the laser. These six beams will be brought into a single target chamber to give a more symmetric illumination of the target. The building extension also allows a separate area for single-beam experiments.

In the six-beam arrangement, the beams will be mutually orthogonal in pairs with one pair of beams in the horizontal plane and the remaining two pairs at 45° to that plane. This arrangement provides for the location of suitable in-

strumentation in the horizontal plane. One requirement is to adjust the path length in each beam so that the 3 cm-long bursts of light in all six beams strike the target at exactly the same time. This is achieved by the fine adjustment of the lengths of light paths using plane mirrors, in a manner similar to "tuning a trombone".

The newly approved funds will be used to purchase laser amplifiers and associated equipment to increase the power from the laser by about a factor of ten. This will involve the purchase of 5 amplifiers, Faraday isolators, power supplies, controls and switching equipment. The upgrading programme will be spread over a 2 year period, aiming to provide six beams each of 1 terawatt (10^{12} watts) for compression studies in 1979 and a single 1 terawatt beam for interaction studies in 1980.

The enhancements will broaden the area of plasma physics research at the facility, especially in the following topics:

- the study of "ablatively driven" compression for the production of very high density plasmas;
- the achievement of higher ion temperatures in "exploding-pusher" experiments;
- the study of laser plasma interactions at high power densities (up to 10^{17} watts cm^{-2}), and
- the extension of current experimental investigations of potential XUV lasers.

Internal Events

NIMROD LECTURE SERIES

Monday 17 July
1130
R22 Lecture Theatre

The Phenomenology of Top and Bottom Quarks.

Prof H Harari - Weizmann Institute.

Monday 24 July
1130
R22 Lecture Theatre

Please watch "Today" notices, title to be announced.

Monday 31 July
1130
R22 Lecture Theatre

Quarkonia and Q.C.D.

Prof R G Moorhouse - Glasgow.

HEP DISCUSSION GROUP
Wednesday 19 July
1100
R61 Conference Room

Gauge Fixing Ambiguities

J Koplik - L'Ecole Normale Supérieure

Wednesday 26 July
1100
R61 Conference Room

Prospects for the Detection of Ultra High Energy Extra-Terrestrial Neutrinos.

U J Stenger - University of Hawaii

C & A DIVISION
Thursday 20 July
0930
R22 Lecture Theatre

Virtual Machine Operating System Introductory Course.

IBM

There will be no seminars during the month of August.

FILM BADGE NOTICE

Period 8 Commences Monday,
17 July. Colour Strip

BROWN for beta-gamma films. Please return all neutron
packs as they are no longer necessary.

THANKS RECEIVED

Ted Starr would like to thank his colleagues and friends
at Rutherford for his retirement present and to wish them
all "Cheers and good health" for the future.

PHYSICS AT WORK

Each year, the Institute of Physics promotes a special exhibition for the interest of school children to encourage careers in science. The aim is to catch the childrens' imagination with demonstrations of physics applications in everyday life. This year the exhibition was held at the University of Surrey from 4-6 July. There were ten main exhibitors ranging from the physics applications of archaeological dating, echo sounding, gyroscopes, uses of static electricity and automatic tracking radar - to fibre optics in communications, ultrasonic photographs and the detection of radiant heat by weather satellites. The Rutherford Laboratory exhibit demonstrated the use of particle detectors in high energy physics and in medicine. Although the children enjoyed viewing cosmic rays in an optical spark chamber, they were even more fascinated in the use of proportional chambers to obtain views of bones, thyroid glands and other anatomical bits and pieces. A special feature of the exhibition was the way in which the visitors were divided into "tutorial groups" of about 15 students, who then toured the exhibits in an organised manner. In this way the demonstrators at any one exhibit were sure of the undivided attention of a captivated audience (every 20 minutes!) so as to maximise the interaction. In all, about a thousand children attended the "Physics at Work" exhibition and the occasion, although rather exhausting, provided a most worthwhile venture for the interests of our future scientists.

Gordon Fry wishes to convey his thanks to all those who so kindly contributed to his retirement gift, and to send his apologies to those he was unable to see before leaving.



Eddie Bateman explains the medical application of proportional chambers to students attending the "Physics at Work" exhibition.

External Events

THEORY GROUP SEMINAR
Monday, 17 July
1400
Daresbury Lab

Rotational Energy Transfer and Spin Exchange in Molecular Collisions.

D R D Field/Bristol

RETIREMENT OF GORDON HEWITT

Mr A Gordon Hewitt retired from the Laboratory on 30 June after about 45 years of varied engineering experience. He was one of those rounded practical and theoretical engineers bred by the old Technical College system. Gordon began work as an apprentice electrician at the age of 15 with a glass factory in St. Helens and combined practical indoctrination with a part-time technical education - eventually leading to an honours degree at Liverpool University. Gordon's graduate experience eventually led him to Harwell and then on to Rutherford Laboratory at its inception. Initially he was responsible for all Electrical Services and then became project engineer on the Variable Energy Cyclotron. After a variety of special investigations he has recently been one of three responsible for overseeing the design, construction and management of the SRC-NERC offices at Swindon. On the personal side, Gordon is known for his thorough and down-to-earth approach and for his great sense of humour.

At a farewell celebration at the Lab on 7 July, Percy Bowles presented Gordon with a barometer. Since Gordon is well-known as one of the outstanding "tappers of barometers" in the area, the gift was well received.

In conclusion, Percy Bowles quoted:

"If you run into stormy periods, may it just be hot air,
And may the most of retirement, your course be set fair"
We all join in wishing Gordon a happy retirement.



OVERSEAS VISITS Dr C J S Damerell to CERN, 3 - 6 July and 31 July - 12 August, to work on experiments WA3 and NA11.

Mr L Phillips to CERN and DESY, 10 - 21 July, to work on Omega and JADE equipment.

Mr B H Glossop to CNRS and ILL at Grenoble, 15 - 18 July, for commissioning of high pressure rig on neutron beams.

Dr A Astbury to CERN, 17 - 18 July, to attend Collider Steering Group and collaboration meeting.

Dr T P Shah to CERN, 17 - 20 July, to attend discussions on pp collider experiment.

Mr R Croucher to DESY, 17 - 21 July, for preparation work on the JADE experiment.

Dr R W Newport, Messrs W Turner and A E Thorp to CERN, 26 - 28 July, to attend meetings of the European Hybrid Spectrometer.

SALES TO EMPLOYEES

Sale of Scrap metal/plastics as set out in RLN 12/75 will be made on 21 July.

LIBRARY NOTICES

NEUTRINO CONFERENCE PAPERS

The transparencies of the Neutrino Conference are now available in the Library, R61. Please apply to the desk if you wish to see them.

PARTICLE PHYSICS DATA BOOKS

We have just received stocks of the Particle Physics Data Books and Pocket Books, which are available from the loans desk.

Yoga



To many, the word Yoga conjures up an image of people tied up in knots, meditating in the foothills of the Himalayas. This is partly true, because Yoga (the Sanskrit for "union") is the Hindu system of abstract meditation as a means of attaining union with the Supreme Spirit. However, in recent decades it has been "Westernised" and is an extremely popular method for keeping your body in peak physical condition. Physical, or Hatha Yoga, is a series of carefully considered postures that aim at improving every part of the human body. It does not rely on energetic repetitive exercises but is rather a series of gentle stretches that

form the Yoga movements. Whether you practise for 3 minutes or 30 minutes per day, the experience will leave you feeling refreshed, relaxed and revitalised! Why not try it yourself? Rutherford has a Yoga Club which (starting from 17 July) will meet regularly on Mondays in the R61 Conference room at 12.30. It is a "mixed" class in every sense of the word - having ladies and gents of all standards, shapes and ages!! If you are interested, please contact Mrs Lee Cooke (R1) on extension 443.

* Sports Day

TUESDAY 18th JULY at CHISWICK

EVENTS	ORGANISERS
FOOTBALL (7-a-side)	- L Patton Ext.6115
TENNIS (mixed)	- Mrs L Claringbold Ext.214
TENNIS (mens doubles)	- P Craske Ext.232
BOWLS	- R E Smith Ext.334
CRICKET (6-a-side)	- M E Claringbold Ext.272
HOCKEY (mixed 3 & 3)	- P Craske Ext.232
ANGLING	- Mrs Goodchild Ext.429
NETBALL	

Personnel wishing to go as SPECTATORS contact P CRASKE

* Angling

1. RUTHERFORD v BRITISH RAIL (Didcot)
Saturday 29 July at Didcot PT fishing from 8 am till 1 pm.
2. RUTHERFORD CHAMPIONSHIP
Saturday 30 September at Clifton Hampden (River Thames) fishing from 8 am till 1 pm.
3. CIVIL SERVICE NATIONAL CHAMPIONSHIP (Individual)
Friday 6 October, River Thames (Tilehurst to Sonning) fishing from 11 am till 4 pm.
4. CIVIL SERVICE (Southern area) TEAM CHAMPIONSHIP
Sunday 5 November River Stour, Christchurch, fishing from 10 am till 3 pm.

Anyone interested in competing in any of the above, please contact P Craske, Bldg.R2, Ext.232.



THE PLAYHOUSE OXFORD: Tel 47133
4-22 July Hobson's Choice by Harold Brighouse.
7.00 pm 1st night, other nights 8.00 pm.
Tickets: 1st night £1.25, £2.00, other nights £1.25, £2.00, £2.75, £3.00.
Matinee 5 pm 8.15 pm Saturdays only.
25 July - 12 August Time of Life - Play - 8.00 pm.
Tickets: £1.25, £2.00, £2.75, £3.00.
Friday and Saturday 5 pm and 8.15 pm.

Upgrade of the Central Laser Facility (cont'd)

THE WORLD LEAGUE OF LASERS

Most of the world's large laser facilities are planning or building high powered multi-beam systems:

Lawrence Livermore Laboratory (USA) The building of a 20-beam glass laser system, known as SHIVA, is complete and a new 40-beam system (SHIVA NOVA) is planned.

Los Alamos Scientific Laboratory (USA) This lab operates a 2-beam CO₂ laser and has recently completed the construction of an 8-beam system. A CO₂ system of power comparable with SHIVA NOVA is planned.

University of Rochester (USA) A relatively low power 4-beam system is to be replaced by a 24-beam system.

Osaka (Japan) A 4-beam glass laser and 2-beam CO₂ laser are in operation. A 12-beam glass laser is being constructed.

Lebedev Institute Moscow (USSR) A 9-beam system is in operation and a 216-beam glass laser, using relatively small aperture beams, is under construction.

Garching (West Germany) A single beam 1 terawatt iodine laser is in operation.

Ecole Polytechnique (France) A single beam 100 gigawatt glass laser is operating and 2-beam operation is planned for this year.

CEA Limeil (France) A 500 gigawatt single beam glass laser and 4-beam glass laser are in operation.

Academy of Sciences Warsaw (Poland) A 6-beam glass laser is in operation.

Thus, the proposed enhancement of the glass laser at the Rutherford Laboratory Central Laser Facility will maintain its position in the world league and continue to provide excellent facilities to enable UK physicists to advance their international reputation in this highly competitive field.

(We thank members of Laser Division for providing the information contained in this report)

RUTHERFORD LABORATORY BULLETIN

Acting Editor John Litt

Deadline for Insertions

1000 Tuesday 1 August

Please mail or phone-in contributions to:

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