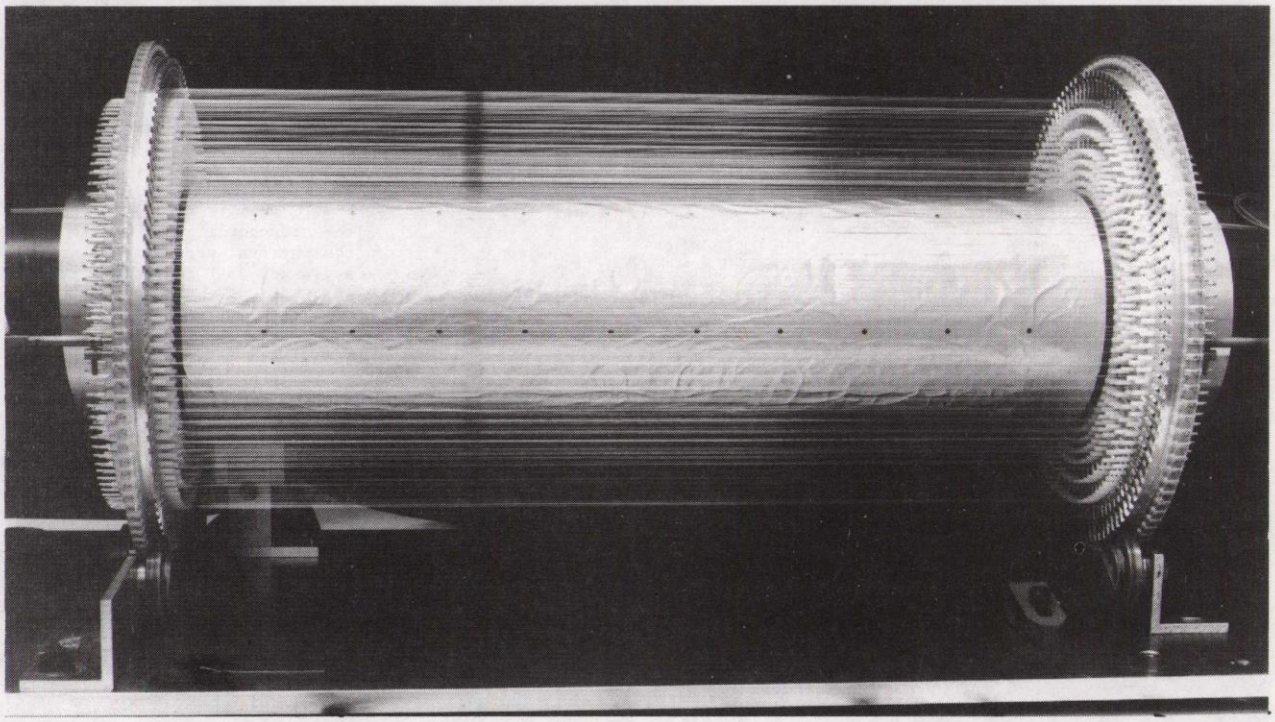
Bulletin
of the Rutherford Appleton Laboratory 4 Oct 1982 No.15

New Detector for TASSO



(Photo: Imperial College)

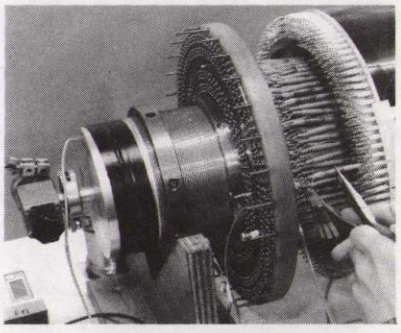
The TASSO (Two-Arm Spectrometer Solenoid) experiment has been running at the PETRA electron-position storage -ring at DESY, Hamburg since 1978. Physicists, technicians, engineers and craftsmen from RAL have been working with colleagues from Imperial College, London and Oxford University, and from Aachen, Bonn,DESY, Hamburg University and Siegen in Germany, from Israel and from the University of Wisconsin, and a wealth of new information has been acquired, most notably on three - jet events and electroweak interference.

Short-lived Particles

Recently there has been increasing interest in detecting very short-lived particles, such as the taulepton and D-mesons, which travel under a millimetre before they decay. The key to identifying these is to make very accurate measurements of the tracks of the particles coming from the decay. In fixed - target experiments, for example at the SPS, techniques such as holographic bubble chambers and CCD solid-state detectors can be used, as reported in previous issues of the *Bulletin*. At a storage ring, the problem is the more difficult, as the interactions take place within a vacuum pipe, and one cannot get closer than about 8cm to the production point. To extrapolate backwards to the interaction and reconstruct separately the production and decay vertices, which are usually within a millimetre separation requires great precision of measurement. In fact the accumulation of all errors on measurements from mechanical tolerances on the end plates; wire location, gaseous diffusion, particle scattering and electronics performance must be less than 50 microns.

The High Precision Vertex Detector

A new cylindrical drift chamber has been designed and constructed to satisfy these stringent requirements and the large photograph shows the



Installation work in progress on the decoupling capacitors (one for each wire). Emitter follower boards have since been mounted on the other side of the pressure flange. (Photo: DESY)

chamber after wiring was completed and before it was was inserted into the pressure vessel. The chamber is 60 centimetres long with eight sensitive layers. Along the centre the beam pipe forms the mechanical support. It is made of beryllium to minimise particle scattering. The

(continued over)

INTERNAL Events

NIMROD LECTURES
R61 CONF. RM. - 1400 hrs

Oct 11 Prof O Nachtmann/Heidelberg
'Tests of the Gluon Self-coupling in QCD'

18 Oct Prof. L. K. Resvania/Athens
'High Mass Dimuon Production from Antiprotons at Fermilab'

HEP SEMINARS
R61 CONF. RM. - 1100 hrs

6 Oct Prof Halzen/Wisconsin
'Heavy Quarks'

19 Oct Dr P Goddard/Cambridge
Tuesday 'Magnetic Monopoles'
1400 hrs

27 Oct Dr K Green/RAL
'An Experimental Search for $n-\bar{n}$ Oscillations'

EXTERNAL Events

PART PHYS DISC. GP. MTGS
BIRMINGHAM - 1615 hrs

8 Oct Prof D C Colley
Drs J Gunson, & T McMahon/ Birmingham
'Reports from the Paris Conference'

15 Oct Prof C Michael/Liverpool
'Results from Lattice Gauge Theories'

22 Oct Dr P Woodworth/RAL
'Two Photon Results from TASSO'

NPD COLLOQUIUM
CONF. RM 8 - 1500 hrs

14 Oct Dr JAM McDonnell/Kent
'Meteoroid Impacts in Space'

21 Oct Dr J Plant/Inst. of Geological Sciences
'Distribution of Radio-elements in Scotland'

RAL Colours

PREHISTORIC REACTORS AND THE CONSTANTS OF PHYSICS

by
Dr J M Irvine

Dept of Theoretical Physics,
Manchester University

Lecture Theatre

Thursday 7 October

3.15 pm

The discipline of physics only came into being because of the existence in nature of accurately conserved quantities. Much of modern science assumes that these conservation laws are truly universal in space and time. This is clearly necessary if the astrophysicist hopes to explain the physical processes occurring in a distant star or the geologist the evolution of the Earth. Since this assumption is so basic to modern science it should be tested as rigorously as possible. The talk will review the current status of the assumption that the basic interactions of physics do not change with time and will discuss how a nuclear reactor two thousand million years old can be used to set new limits on the constancy of the constants of physics.

New Detector *(cont'd from p1)*

beryllium sleeve is surrounded by a "sleeve" of Xenon gas retained by an aluminium foil. The Xenon serves to reduce background from X-rays and can be pumped in and out as required.

A Novel Technique

The end plates were made at Imperial College, London, using a novel technique to locate the sensing wires accurately to within about 0.001cm. The wires are mounted in eccentric bushings, which are rotated to bring them into the required location after assembly (720 times at each end!).

In order not to waste this mechnical precision, a new generation of electronics was required.
Dave White of Technology division designed an exceptionally fast, sensitive and stable pre-amplifier-discriminator with outstanding performance over a wide range of pulse heights, (less than 0.2 nanoseconds slewing over 40 db attenuation of input,) and Electronics group and Physics Apparatus group have manufactured and installed these.

Team Effort

All this had to be brought together and tested and proved by prototypes. On-chamber electronics were devised and tested and assembled on a test rig, where the operating team of Jackie Blissett, Brian Foster, Gerry Parham and Brian Payne with Dr David Binnie of Imperial College achieved (at a pressure of 4 atmospheres) a measuring accuracy of 40 microns, something of a record for drift chambers!

During the summer shutdown the vertex detector has been installed in the TASSO detector in Hamburg. This has been a very complicated operation involving unthreading the existing beam pipe from the very centre of the 400-ton detector, and inserting the new assembly, without dismantling the rest of the apparatus. Because of the limited space, this was rather like shunting fragile railway wagons up and down a siding suspended in mid-air. Our colleagues from Aachen, Bonn, DESY and Wisconsin have made vital contributions to the whole exercise.

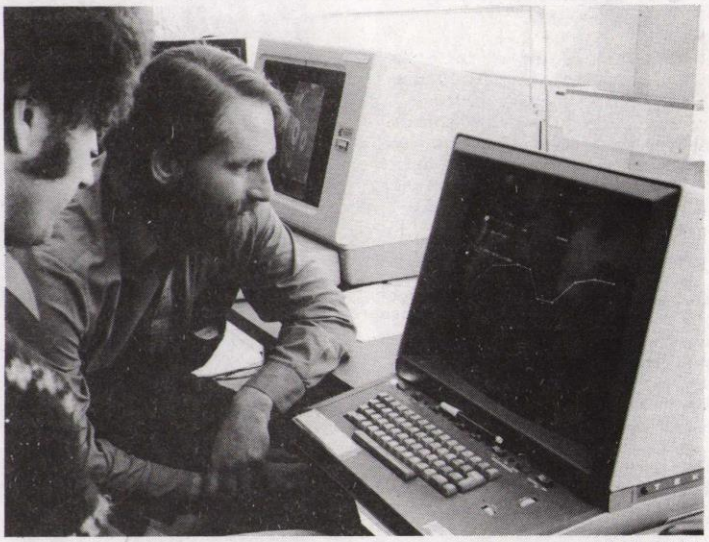
Operating in earnest begins in November, when PETRA comes on after its energy upgrade, and we look forward to seeing new physics, including, if nature is kind, the expected but as yet elusive "top" particles.

(We are indebted to David Saxon for information on this new development).

Armchair Astronomy?

An historic experiment took place on 6 Sept when the UK Infra-red telescope UKIRT on Hawaii was operated by remote control from a computer terminal at the Royal Observatory Edinburgh.

This bare statement of fact is here given flesh in an account seen from a personal view-point by Paul Bryant.



The first results. *(Photo:ROE)*

I was first approached by Peter Thanisch of UKIRT early this year when he started making enquiries about how it might be possible to obtain computer communications between Hawaii and astronomers in the UK. Sensing a trip to those sun soaked shores I sent him every scrap of information I had and encouraged him to think in terms of using the public packet switched networks. The advantage of this approach is that links could be established relatively quickly with almost no capital expenditure and only modest running costs. At that time the interconnection of these networks was just starting and, of course, the SERCNET had been connected to the UK packet network for a long time.

The next important event was the very useful meeting at RGO to discuss the remote operation of telescopes. I found the meeting absorbingly interesting and it was very clear that there were substantial economies in not making astronomers travel to the telescopes. It is extremely frustrating to travel half way round the world for your night's observation only to be confronted with cloud and to come home empty handed. However, astronomers seem to be a fatalistic lot and not too many leap from the mountain top in frustration. The only disappointing feature was my trip to Hawaii sinking like a sunset.

The message from the meeting was clear. It was now technically possible to observe remotely, and several pilot projects were being set up in various countries. It was also clear that the astronomers needed a little help from the network gurus.

Peter was at the meeting and we sorted out the next stage of the UKIRT link, which was to obtain a TELENET connection for the Observatory.

A couple of months later the telex arrived telling me that the first try would be at 8pm that night. 8pm came and went. The apologetic phone call was to tell me that unfortunately TELENET had not given him permission to make international calls, could we try calling him? This was successful and we spent a happy couple of hours seeing how it rattled. The connection at UKIRT is a little primitive, being merely a terminal into TELENET. A lot of funny things happened due to the differing standards in TELENET and SERCNET. For example, everything I typed came out on the same line and data from UKIRT was forwarded a character at a time (cost us a fortune as traffic is charged per 64 characters or part thereof). None the less some deft fiddling about got matters sorted out more or less satisfactorily. Perhaps the most remarkable fact was the high reliability of the connection.

When at last UKIRT obtained permission to make international calls, Peter tried to make a call to one of the machines on SERCNET. Again there were a few minor problems, also due to TELENET forwarding a character at a time rather than a line at a time. This prevented him getting from PSS into SERCNET without a little more help.

The last test was to connect his terminal link into his PDP11 after a connection had been made. Needless to say a bit more fiddling and all was well.

Most of my involvement was from my terminal at home, with one eye on Miss UK and the other on UKIRT! Of course, once I can use a terminal to UKIRT then anyone else on SERCNET can also get at them, and the astronomers themselves can observe from the comfort of their own fireside on a cold winters evening.

It is very encouraging that even at this early primitive state of the connection useful work can be done. The next stage is to mount sophisticated network software on the UKIRT PDP11, which will allow file transfers and also several channels of interactive traffic. In the distant future, when the data rates of such connections have improved, I hope we can put in slow scan TV and perhaps voice over these networks.

In fact, I believe that the results so far are just the beginning and I expect to see even more exciting developments in the future.

Lastly I must pay tribute to Andrew Dunn and Phillip Gladstone who wrote most of the network software on the GEC computers to make it all possible.

Sales to Employees

The sale of scrap metal and plastics as set out in RLN 12/73 will take place on Fridays 15 and 29 October in the R40 Scrap Compound from 1200-1230 hrs.

Trade Exhibition

Spectrum Scientific and CVT will be holding a one-day exhibition on

-Quadropole mass spectrometers
-Microprocessor controlled quadrupoles
-UVH components
-UVH fabrications
-Surface science systems

in R20 Conference Room on Monday 18 October from 10.00 to 16.00 hrs.

Missing

Would anyone knowing the whereabouts of an AVOmeter Model 8, serial number 71237 please contact P Gottfeldt, Ext 5300.

Found

Have you lost a good quality ball point pen?
If so, please contact Henry Vinall Ext 6607, and give details.
You may be in luck!

Do 'ee Barn Dance ?

It is often interesting to tell the story of how a particular club came into being. One, such as table-tennis, is fairly clear cut because the members more often than not were dedicated table-tennis players before they joined. Not so with the members of the Barn Dancing Club. It all happened like this:

Back in September last year Derek Cragg was at his annual dance teacher's conference and got involved in a session called "Country and Western Dancing." This turned out to be a mixture of English Folk and American Square Dancing and rekindled memories of doing something similar during his college days back in nineteen-umpty-ump. D C went away thinking that if the chance arose he would get back with it again.

The chance came sooner than later when someone said "How do we get people to mix at our Christmas party -we seem to get eighty blokes in the bar, forty women as wall flowers and no one really enjoying themselves." The answer would you believe? You've got it - a couple of Country and Western Dances. But it would need a few people who knew what they were doing.

A small class met in R20 Conference room and were taught what to do, then came the day of the party. Brother did we mix them up - we had a ball! (Plus a few encores and a hoarse caller at the end of it all). By popular demand we continued the classes and have outgrown R20 and R12 Conference rooms and now operate in R58 on Tuesday at lunchtime. The Club specialises in people who have not done any dancing before, unlike a lot of outside clubs who seem to cater for experts only. The result is that the club has built up a repertoire of dances and the members can now do them sufficiently well to be considered dancers when they go to other clubs and functions. In fact there is a case of a chain reaction shambles at one club where our lot were the only ones still dancing when a halt had to be called.

So, if you're interested, join us any week. We'll be happy to see you and help you, so that you can enjoy the dancing.

82RB 4725

We are Sailing

The Sailing club was formed this year by former Appleton staff who brought two club dinghies with them from Slough which are now owned by the Rec Soc. Interest has steadily increased throughout the summer and to cope with the demand several members' dinghies have also been used frequently for club sailing and training. Regular evenings sessions have been held almost every Tuesday and Thursday, for training, with good support from both pupils and instructors. There has been a strong emphasis on family sailing with wives and children, which has provided a good atmosphere.

The boats used include two Fireball racing dinghies, a Graduate, Enterprise, and a Mirror, providing interest at all levels of skill. Exciting incidents, including a near sinking, mast breakage, and many capsizes, have not deterred the enthusiasm.

Some statistics for the season so far include over 60 launchings providing about 150 outings for over 30 different members and their guests.

Weekend sailing on Saturdays and Sundays will continue now until Christmas, then start again in the Spring, so new members are still welcome. Joining and crewing arrangements are through the Secretary Geoff Douglas Ext 6559 or Treasurer, Mike Courthold, 6462.

82RB 4709

Badminton

Didcot Nomads Badminton Club needs additional players, come along and join us, we meet on Thursday evenings at the Didcot Civic Centre from 7pm until 10.30pm. Further details from K A Knight, Ext 5123 or Blewbury 850927.

Bulletin

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Deadline for insertions: