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Dear Gerry,

Thank you for your recent letter. Minutes or summaries of any meetings and decisions on the physics programme for Nimrod would be gratefully received. After all we may be potential customers and apart from being very interested, we may have some comments to make from our limited experience.

I thought when I came here that I might get away from p-p scattering. Perhaps p-p scattering is only half way there, but alas I didn't make it. For here I am deeply involved in p-p scattering again. Our programme, or at least that part of it I submitted to the Electronics Experiments Committee, involves pushing the  $\text{CH}_2\text{-C}$  internal target technique to the limit and doing the small angle scattering with big H targets in an external beam. So far we have been able to measure p-p elastic scattering at 28 GeV and 60 mr scattering angle. Already this is slightly more than the position of the 2nd diffraction minimum for a black disc and the  $\frac{d\sigma}{d\omega}$  does not appear to be falling as fast as at small momentum transfer.  $\frac{d\sigma}{d\omega}$  We hope to repeat some of the measurements at 110 mr. The divergence of the  $\frac{d\sigma}{d\omega}$  from the black phase scattering seems to suggest the possibility of measuring nuclear form factors for the proton. At the 28 GeV and 60 mr conditions, we are unable to see the detailed structure in the inelastic scattering which we saw at lower energies. However it is going to be interesting to see how far we can follow the elastic scattering, for this recent measurement gave  $(\frac{d\sigma}{d\omega}) \sim 1\text{pb/ster.}$

Technically we have seen certain improvements. The main field of the PS has been stabilised to something better than 1 in  $10^3$  (probably few parts in  $10^4$ ). A multiple head target assembly has been used to put our different targets (C,  $\text{CH}_2$  and  $\text{CD}_2$ ) at exactly the same position (necessary because of frequency fields). Target operation and spiralling have been more carefully controlled so that we can get 10-20 ms bursts from thick targets. Incidentally by introducing a phase jump in the accelerating voltage just before target operation, it is possible to increase the radial extent of the beam. This is bad for us where we need minimum energy spread but is ideal for secondary beams as it increases the burst length. The other evening a burst  $\sim 150$  ms was achieved by this means with a 200 ms flat top operation.

Odd piece of information which comes to mind. The internal beam of the PS was stored for 30 secs without loss last week. The loss was caused by magnet ripple rather than gas scattering. Perhaps you have heard something of the storage rings proposal. Along with Cocconi, before he left, I attended some informal discussions on the uses to which storage rings could be put. It didn't seem as attractive as first imagined. Most people would plump for higher intensity PS ( $\times 10^2$ ) or 300 GeV machine. If money is limited, an alternative might be to build higher intensity and higher energy injector and make better experimental facilities round the present PS.

Be warned. There are never enough generators, magnets and quadrupoles. At the weekly schedule meetings a constant battle goes on because not all beams

can run simultaneously. On one occasion it got quite bitter when a 3rd priority experiment was using 23 of the available 30 generators, to the exclusion of other users who only wanted 2 or 3. Simultaneous running has its disadvantages as well as its advantages but no one would vote for exclusive use at infrequent intervals.

A PS handbook is being brought out and if I can obtain an additional copy I will get one sent to you.

Since Cocconi has left and I have taken charge of the group, I have to think a little more ahead. Our very limited programme will stretch into mid 1962 and if Gordon Walker stays with us to see it through, it might be September '62 before he returns. How do you react to this. Of course I have to get an extension from A.E.R.E., of about 6 months to do this. As Dr. Bretscher is paying us a visit in early August, I hope I can raise this topic.

Bill Galbraith was wanting information on beams. This should be available fairly soon as all groups have been asked to compile a list of the beams they have used so that the information can be included in the PS hand-book. The only recent change in measurement was that of the 600 MeV/c  $\bar{p}$  beam (separated beam) which gave 6-8  $\bar{p}$ /pulse for  $2 \times 10^{11}$  p/pulse from a point source Al target.

I suggested to Ralph Thomas that a definite request should be put in for shielding studies. Although we shall be operating at 12 GeV during some of our runs, the conditions would be changing in the primary beam and it doesn't seem possible to do a parasitic measurement. Recently a shielding measurement was made for Panofsky at 24 GeV, the result of which might be of interest if you can extrapolate between 6 and 24 GeV.

Apropos my first paragraph, I might want to continue or develop the same kind of measurements as our present ones when Nimrod gets going. At the moment they seem the only ones making use of the high energy aspect of the machine. (The neutrino is gasping and everyone else hopes will not be resurrected for some time)

All for now,

Yours

Eric Taylor.