

THE ACCELERATION OF POLARIZED PROTONS IN THE C.P.S.

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During the course of acceleration in the C.P.S. several resonances between the spin precession frequency and Fourier components of the magnetic field are crossed. According to theoretical calculations ¹⁾ these resonances would completely destroy any polarization of the injected protons, but it has been suggested that it would be possible to arrange to cross these resonances so rapidly that the depolarization would be reduced to a tolerable level.

To study this possibility and decide whether or not it can be relied upon to work we estimate would require one year's full time work by two theoretical applied physicists, one of whom should be a very experienced accelerator theorist. They would require some computer time, but this cannot be estimated until they have begun their studies.

If the result should turn out favourably one can make the following estimates about the physical realisation of such a project:

1. Extrapolating a little present-day polarized sources one would estimate that 10^7 polarized protons per pulse would be accelerated.
2. The cost of the source and pre-injector modifications would be of the order of 1 M.S.F., excluding building modifications.
3. Our present pre-injector building is almost certainly too small to accommodate a polarized source. There are therefore three possibilities:
 - (a) A rather long shut-down, to modify this building.
 - (b) A decision, at the time that we are designing the pre-injector building for a new linac, to make it big enough for such a source.
 - (c) Modification of the present pre-injector building and conversion of the 50 MeV linac to polarized protons after the new linac comes into service.

One would probably still like to make the pre-injector building of the 200 MeV linac big enough for the polarized source, in order to have the possibility of abandoning the 50 MeV linac later, and transferring the source without a major shut-down.

Conclusion

The question to which a fairly early answer is required is the following: should we attempt to do the necessary theoretical studies soon enough to base a decision about the size of the new pre-injector building on their result?

Reference

- 1) E.D.Courant ; Acceleration of Polarized Protons to Relativistic Energies.
Jan. 1962 (BNC) EDC-45.

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