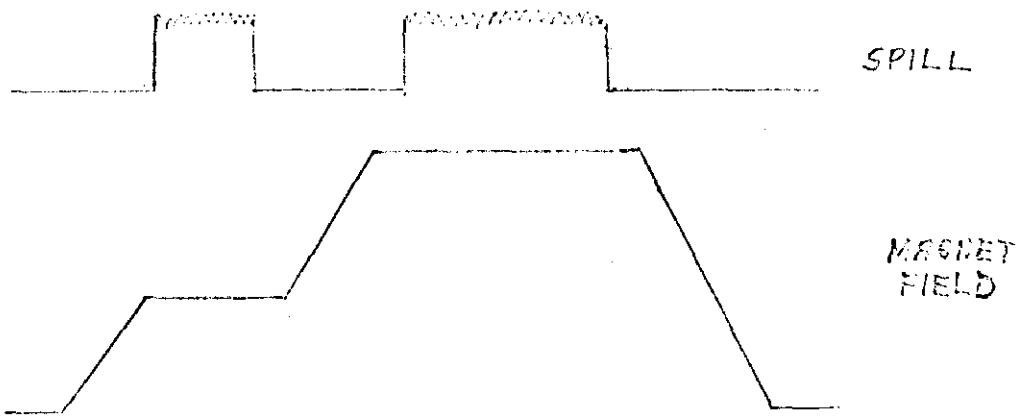
NOTE ON "FRONT PORCH"

A. D. Krisch

University of Michigan

August 21, 1967

From the viewpoint of a user there are several significant advantages to having a "front porch" on the 200 GeV accelerator. By a "front porch" we mean a flat top at a lower energy, coming either before or after (back porch) the main flat top as shown.



There are two levels at which a front porch can be implemented.

a) Front porch on the ring magnets

b) Front porch on the ring magnets and some of extraction magnets

It seems clear that case b would be the most useful. This is because it is expected that most experiments will be set up in a single extracted proton beam. Thus if the extraction magnets do not track up to the first point where the EPB branches, there will be no advantage in having a front

porch on the ring magnets; everyone will still have to run at the same energy.

There are probably two broad types of experiments for which the front porch will be useful.

a) Experiments on proton proton collisions using EPB protons as the incident particles; e. g. p-p elastic scattering, p+p $\rightarrow$ p+n*, particle production.

b) Experiments using secondary beams which would like to cut down background due to high energy π's from the 200 GeV protons; e. g. bubble chambers, ν experiments.

In the case of p-p experiments there are many advantages to a front porch.

1) In the early stages of operation, experimenters may not be able to handle the very high energy particles emerging from 200 GeV p-p collisions. Some improvements may be required on analyzing magnets, Cherenkov counters and time of flight techniques for example.

2) At large angles the cross sections will be very small at 200 GeV and it may be desirable to study some complete angular distributions at $\sim$100 GeV.

3) It may be interesting to study the energy dependence of some cross sections in detail.

I believe that planning to run experiments such as these by lowering the energy

of the single flat top is a very poor policy.

1) Many of these experiments will need no more than 10% of full beam.

2) It is advantageous to always have several experiments running simultaneously so that if one experimenter's equipment fails the machine need not be turned off. Turn on time for an alternate experiment on the 200 GeV accelerator is likely to be fairly long.

3) If the other users were required to run at the energy chosen by the p-p experimenter they would become rather unhappy in an energy dependence experiment in which the energy was changed every few hours.

Finally, I would like to stress the importance of proton proton collision experiments at 200 GeV. They are the experiments which will fully utilize the capabilities of the accelerator. Care should be taken that they are feasibly on the 200 GeV accelerator.

In the case of the low background secondary experiments, there are also several advantages, however they are of a less compelling nature.

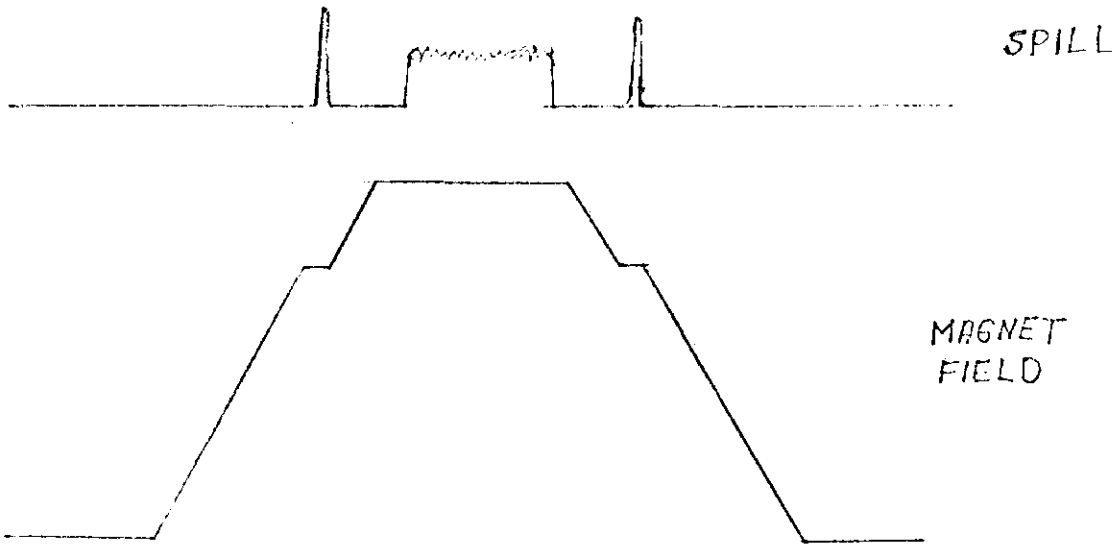
1) With facilities such as a large bubble chamber or a large ν detector it will be desireable not to have a large number of background particles passing throught the detector. There are two techniques for eliminating the μ-mesons which will probably be the most serious problem.

a) Shielding: either massive shielding surrounding the detector or possibly shielding close to the target to stop the pions before they decay.

b) Lower the machine energy during the time that the detector is alive so that there are no very high energy μ-mesons.

To obtain very low background rates it will probably be necessary to employ both techniques.

2) It will save time on the flat top (or reduce the repetition rate) if the bubble chamber fast-slow spill can occur on front and back porches as shown.



This will be true if there is a time period (perhaps 30 miliseconds) necessary to manipulate targets and beams between targeting on different spills.

CONCLUSION

It is felt that a front porch on both the ring magnets and the early part of the extraction system would be extremely valuable. Eliminating this front porch would effectively exclude a large class of experiments in addition to reducing the flexibility of the accelerator.