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**Subject**

COMMENTS ON THE BUBBLE CHAMBER-SPARK CHAMBER DETECTOR  
PROPOSED BY T. FIELDS ET. AL.

This is meant to be a set of random comments on the bubble chamber-spark detector proposed by T. Fields et al in NAL Report A. 3-68-12. It is by no means exhaustive and the limitations of the system rather than its merits will be emphasized.

The desirability of a system with high momentum and angle resolution, capable of doing most 1C fits, cannot be denied but one might question whether the 1 m bubble chamber proposed in the above report could not be replaced by a streamer chamber. One might conceive of a tube of hydrogen gas at modest pressure (six atmospheres?) as small as 1 cm in diameter to contain the beam. This tube would be surrounded by a streamer chamber. Since the ratio of liquid hydrogen density to gaseous hydrogen at STP is about 600 to 1, the probability of interaction per beam track is only 1/100 of the bubble chamber, but there is no problem in putting 100 times more beam particles through the detector per pulse and still having time resolution sufficiently good to see only one interaction. Let me list some arguments for and against such a scheme.

FOR

1. It is truly a triggerable detector.
2. One does away with the thick bubble chamber windows which provide considerable material for the interaction of secondaries. The streamer

chamber, operating at atmospheric pressure can have very thin windows. The tube containing the hydrogen target can also be very thin.

3. It will be easier to detect  $\gamma$ -rays in such a device since the  $\gamma$ -detector placement is easier and more flexible.
4. It is cheaper than a bubble chamber.

#### AGAINST

1. The vertex will not be visible although it can be reconstructed.
2. Ionization will not be as useful for particle determination.
3. The accuracy of event reconstruction is not known but may be worse than in a large bubble chamber. This should be studied.

Clearly the role of the streamer chamber should be studied in much more detail for this application.

It is interesting to note that there is a class of interactions that a 1 m bubble chamber followed by a spectrometer is at a disadvantage to investigate as compared to a very large bubble chamber. These are antiproton induced reactions where an antihyperon is produced at the upper vertex. It is essential to see the kink for these events and a small chamber would probably not contain these fast antihyperons. It is conceivable they could be detected by a spark chamber array but it would be difficult.