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# Effects of Transition on Debunching and Spill Observations and Conclusions

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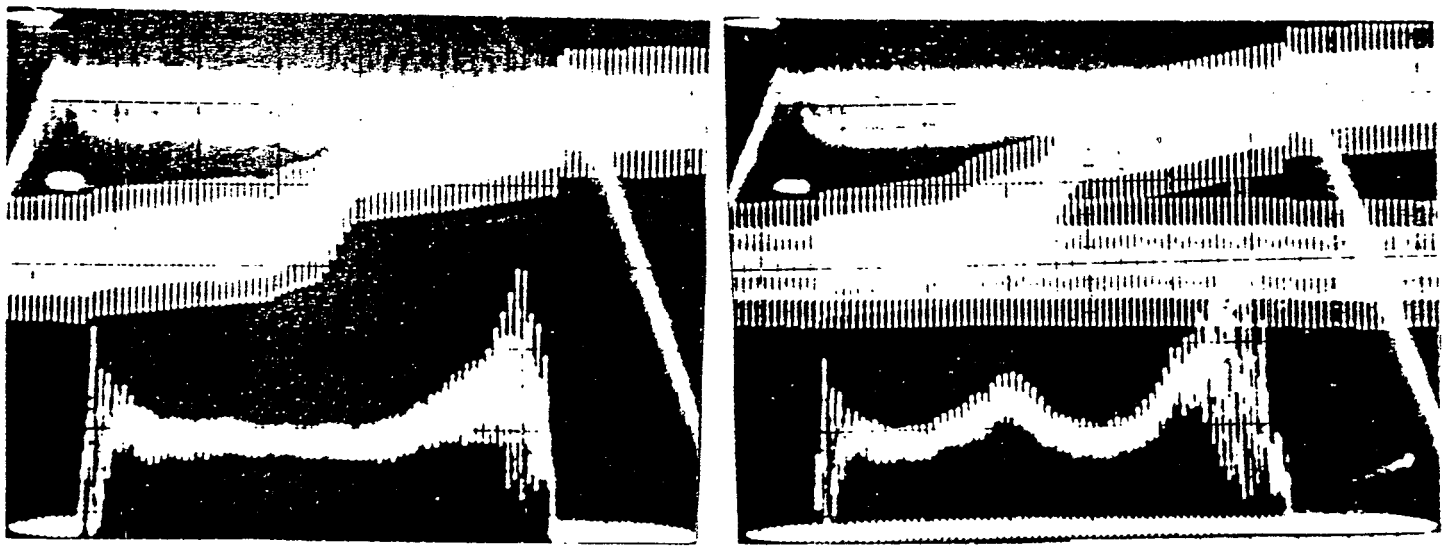
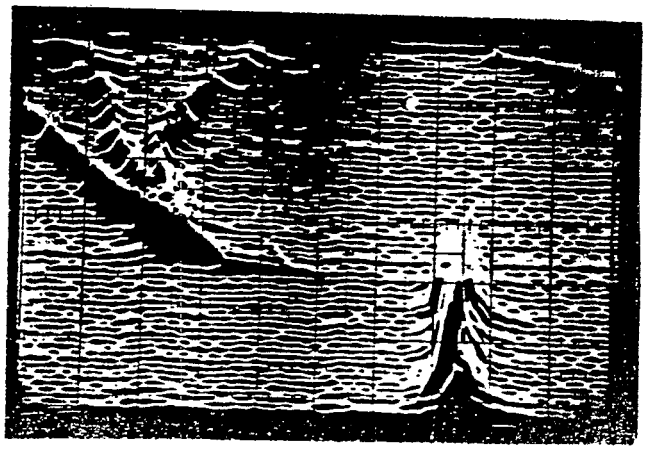
Observations and Conclusions

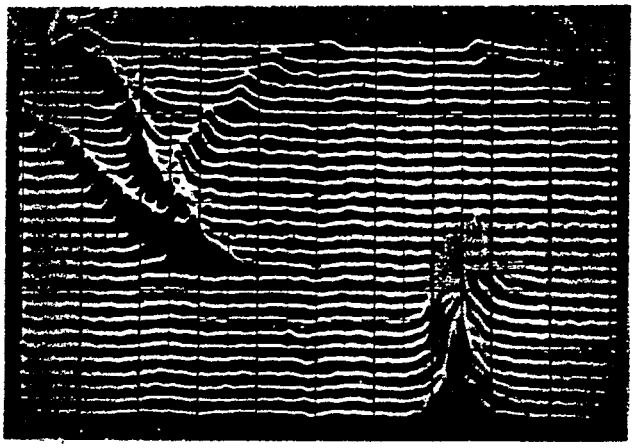
On December 17th, we were running silicon at 14 GeV and had an intensity of about 8.0 $\times 10^9$ charges extracted beam. The spill was very erratic and had large variations in the intensity over the length of the spill. The below two pictures demonstrate how the spill looked. The time scale is 200 msec's per division.



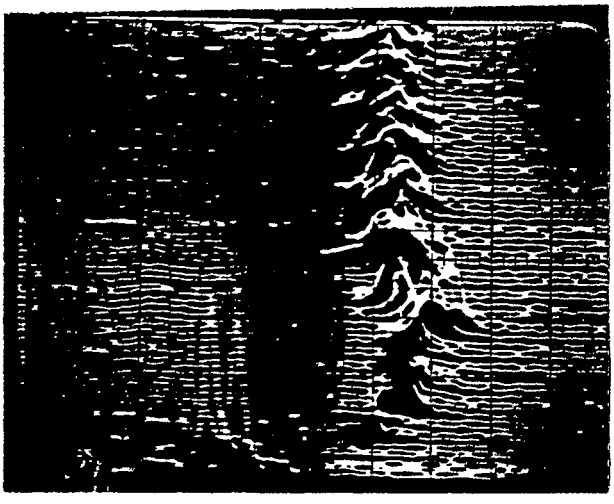
The traces, as they appear in order from the top, are; spill servo output, main magnet current, RLM sum (long loss monitor), and the C 10 SEC monitor (the spill).

Looking at the debunching on the wall monitor it is seen that the beam is not being debunched smoothly. The below two pictures demonstrate the debunching process during the conditions for the above spills. The time scale is 20 nsec's per division. On the left picture the time between traces is 100 $\mu$sec's. On the right picture the time between traces is 200 $\mu$sec's.

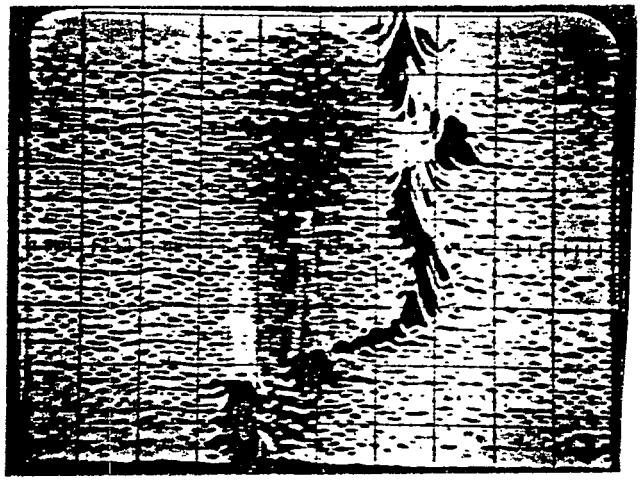


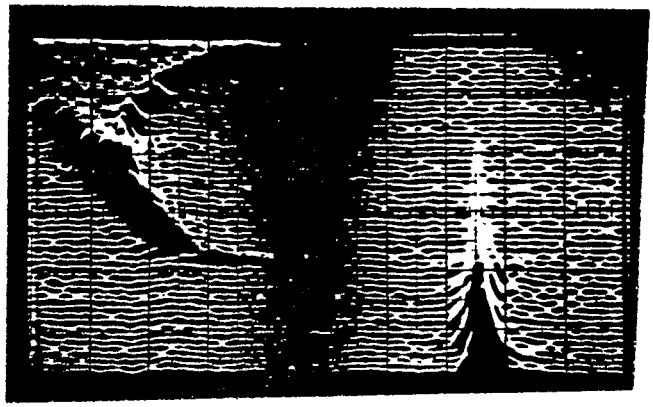


The next pair of pictures shows the wall monitor image of transition. On the left picture the time between traces is 1 msec and the entire trace covers 100 msec's. The times in the right picture are, respectively, 500 $\mu$sec's and 50 msec's.

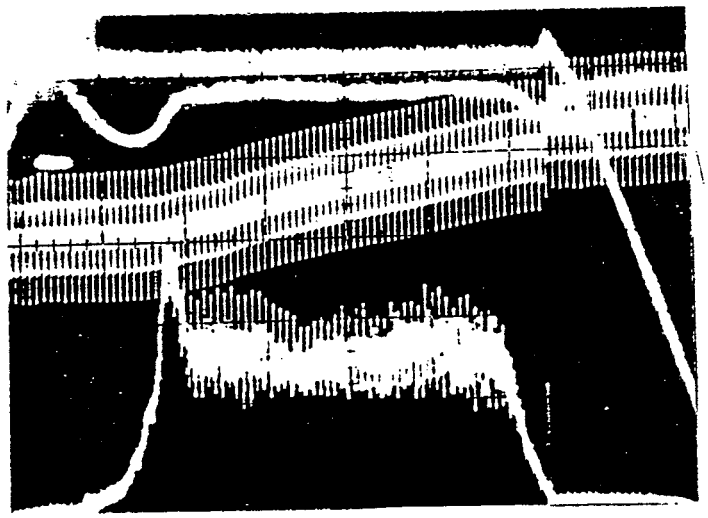


After tuning transition phase and time, as well as the radius at transition time, the spill was made much smoother. The next set of pictures shows debunching and transition (transitions time between traces is 500 $\mu$sec's, debunchings time between traces is 100 $\mu$sec's). The phase shift is approximately 160 degrees for debunching.



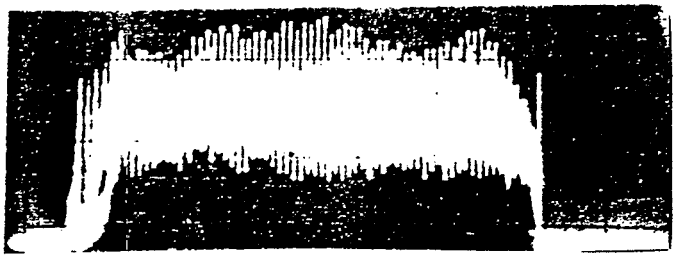


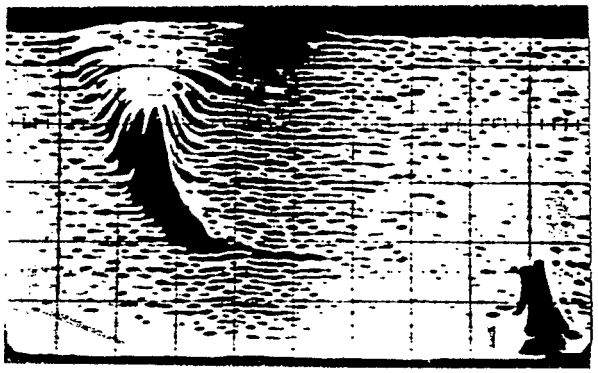
Although the spill was now greatly improved, it was still not perfect. It was much smoother, but it was starting late and at the beginning had a slight spike. The picture below shows how it appeared at this point.



The final adjustments made to get a proper looking spill were now all spill parameters. The radius at extraction was moved further to the outside (RS7A was changed from -135 to -120), phaseback was increased (from 1600 to 1800), and a few minor adjustments were made to suppress a fast spike at the beginning of the spill and get its length correct.

The below two pictures show how the spill looked and how debunching looked (time between traces in the debunching picture is 100 $\mu$sec). Note that the change in phase for the debunching is now around 190 degrees.





The final two photographs show how the debunching looked going into the flattop. The mountain range display is synchronized on a fixed frequency to allow the display to continue after the RF turns off.

In the picture on the left the time between traces is 100 $\mu$secs and the total sweep is about 10 msecs. For the picture on the right the time between traces is 500 $\mu$secs and the total sweep is about 50 msecs.