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Title

MEETING XII -- BEVATRON RESEARCH CONFERENCE -- BEVATRON OPERATION

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Bruce Cork: Bevatron Operation

INJECTION PARAMETERS

On February 2, the first 10 Mev proton beam was injected from the linear accelerator. Injection parameters were varied to study first turn beams with the magnet excited by a d-c generator. A few minutes after the magnetic field had been adjusted to the value calculated from magnetic measurements, the 180° beam was observed on fluorescent flags and measured with Faraday cups. During the remainder of the week several radio frequency components were installed and operated. Ground current signals in various pieces of equipment were a limitation in detecting.

ACCELERATION

The week of February 12, sufficient components had been assembled to allow beam acceleration with normal magnet pulsing. A peak current of 1 μ amp was accelerated for 20 milliseconds (\sim 25 Mev). Beam loss was large due to poor oscillator tracking. By February 15, the crystal frequency marker was operating and an error curve was displayed from which tracking corrections could be more easily ascertained. By using the 30-point curve corrector and comparing the tracking frequency with the values calculated from magnetic field measurements, beam acceleration was pushed to successively higher values without an attempt to maximize beam. Continuous improvement of existing electronics, reduction of ground loop signals, and improvement of measuring techniques resulted in a small beam accelerated to 5 Bev by March 12.

BEAM DETECTION

Accelerated beams were detected on inner and outer radius Faraday cups and also with scintillators coupled to 6199 photomultipliers. The beam signal level dropped so low after the first 40 milliseconds, due to beam spillout, that it was necessary to change to photomultiplier detection. At 5 Bev, the beam amplitude was still 10 times the noise level. The envelope of the beam at the end of the acceleration cycle was approximately 1 millisecond wide and gaussian in shape. The induction electrodes could be used for the first 100 milliseconds of acceleration cycle, at which time the signal to noise ratio became unity.

BEAM LOSSES

Emphasis has now shifted to improving the magnitude of trapped beam and reducing low energy beam losses. The magnet generators have been synchronized and ignitron firing now starts on a fixed phase. Ripple current frequency modulation of the oscillator has been reduced. Starting frequency and slope control are being adjusted to minimize beam losses. An air ram driven probe is being assembled to detect peak energy beams.

MISCELLANEOUS

Assembly of the first swing target is under way. The mechanism will be installed the next time the Bevatron is down to air. Pole-face winding data are being assembled in preparation for use in increasing the high field aperture of the magnet. Several

pieces of electronic equipment are still operating breadboard. New components and chassis are arriving daily to replace these units. Operation as a laboratory accelerator is still in the future.

Summaries: Harry Heard
Marjorie Hirsch