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Measure Vertical Emittance of FEB in Test Beam

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DISCLAIMER

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FEB Commissioning Study Wed. May 16, 1973

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Objective: Measure the vertical emittance of the bunched, high intensity FEB

Result: Success. We obtained numerous (~20) profiles from the array of 24 insulated plates in the test beam instrument box for each of about 15 settings of the external quadrupole UQ2. The late CBM was about $3.5\ 10^{12}$ ppp and we were extracting about 20% of it. The U16 current transformer indicated that we were extracting parts of 6 bunches, although there was no clear evidence that we were extracting any one bunch completely — in contrast to previous observations that we could extract 4 complete bunches from a $1.5\ 10^{12}$ internal beam.

The radial instability, previously noted at $1.5\ 10^{12}$, re-appeared intermittantly. The symptom is a radial inward excursion immediately after FEB, with complete loss of the beam on the inside of the ring at about 3 msec after t_{FEB}. At lower CBM we previously suspected that removal of entire beam from ~50% of azimuth left too little beam in machine for adequate signal for radial position servo. Tonight's result puts that explanation in question. We were able to elliminate loss by a compensating outward radius shift. This effect will therefore probably not be an operational problem. We should, however, study the radial signal after t_{FEB} and also investigate accuracy of the CBM after multi-bunch extraction.