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## Beam size measurements at ISABELLE intensity; $4 \times 10^{12}$ /pulse

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Date 1/31/77 Time 1100-1245 Experimenters E. Raka

Subject Beam Size Measurements at ISABELLE Intensity;  $4 \times 10^{12}$ /Pulse

OBSERVATIONS AND CONCLUSION

1) Setup: The AGS was retuned to give  $4 \times 10^{12}$  with 45-50  $\mu$ sec of an 80 ma beam from the linac. Changes were made in the RF amplitude and frequency programs; injection peaker; the bump coil timing; Nu-quads, and the transition phase jump and timing in order to pass transition with no phase space dilution.

2) Procedure: The J-19 vertical targets were flipped so as to produce a 2% beam loss at five different times. (Due to a calibration error of 5, it was the 2% not the 10% size that was obtained.) There was not enough time available to make measurements at lower or higher  $\beta\gamma$ .

| 3) <u>Results</u> : | <u>Time</u> | <u><math>\beta\gamma</math></u> | <u>Size</u> | <u>Normalized E/<math>\pi</math></u> | <u>95% Value (E/<math>\pi \div 1.3</math>)</u> |                      |
|---------------------|-------------|---------------------------------|-------------|--------------------------------------|--|----------------------|
|                     | 115         | 2.05                            | 1.55"       | 36 $\mu$ rad M                       | 27.7   |                      |
|                     | 172         | 5.6                             | 1"          | 40.7 "                               | 31.3   | $\beta_{J19} = 22$ M |
|                     | 205         | 7.87                            | .847"       | 41.4 "                               | 31.8   |                      |
|                     | 255         | 11.16                           | .626        | 32 "                                 | 24.6   |                      |
|                     | 370         | 18.4                            | .526        | 37 "                                 | 28.5   |                      |

4) Comments: The principal effect seen here is that there was no dilution present after the transition energy of  $\approx 8.5$  GeV is passed ( $t \approx 214$  msec). This is in contrast with the results obtained at high intensity ( $8-10 \times 10^{12}$ ). Unfortunately, there was not time enough to check the rather low value observed at 255 msec. However, it seems clear that there are intensity dependent effects taking place in the range of  $\beta\gamma = 6-11$  that are not significant at ISA intensities.

The beam size at high intensity was measured several times during SEB operation for intensities of  $8.5-9 \times 10^{12}$  with the following results. (95% values averaged.)

| <u>Time</u> | <u><math>\beta\gamma</math></u> | <u>Size</u> | <u>E/<math>\pi</math></u> | <u>Time</u> | <u><math>\beta\gamma</math></u> | <u>Size</u> | <u>E/<math>\pi</math></u> |
|-------------|---------------------------------|-------------|---------------------------|-------------|---------------------------------|-------------|---------------------------|
| 105         | 1.6                             | 1.67"       | 33                        | 255         | 11.16                           | .77         | 48.7                      |
| 115         | 2.05                            | 1.6"        | 38                        | 370         | 18.4                            | .61         | 50                        |
| 172         | 5.6                             | .965"       | 38                        |             |                                 |             |                           |
| 205         | 7.87                            | .817        | 38.5                      |             |                                 |             |                           |