

Reducing the RF voltage swing by
blowing up the initial energy spread

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7/16/88

BNL

Introduction

The high frequency rf system can have a large range in voltage requirements; e.g. from $V = 1.2$ to $V = 11$ MV.

This large range can be reduced by blowing up the initial energy spread, Γ_{p_0} . However, this increase in Γ_{p_0} is limited by the following effects due to intrabeam scattering

- 1) increase in the final emittance
- 2) increase in the final energy spread
- 3) increase in the final voltage required.

The following IBS results show that by blowing up Γ_{p_0} one can get by with a KF voltage swing of $V = 1.5$ to $V = 12$ MV.

(1)

Blow up of σ_{p_0} by raising voltage V .

- 1) Prepare beam in low frequency RF as if transferring to high frequency bucket such that

$$A_0 = .3 \text{ ev, sec}$$

$$\sigma_{e_0} = 31 \text{ cm}$$

σ_{p_0} determined by σ_{e_0} , A_0

$$V \text{ gives } \Delta_B = 2\sigma_p$$

(2)

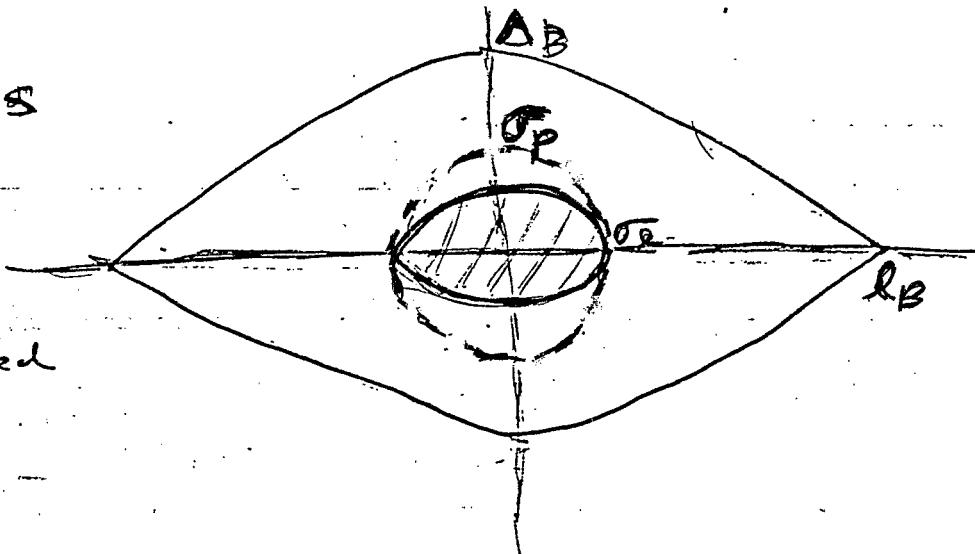
Raise V

Δ_B increases

σ_p increases

$$\sigma_p = \Delta_B \sin \frac{\phi}{2}$$

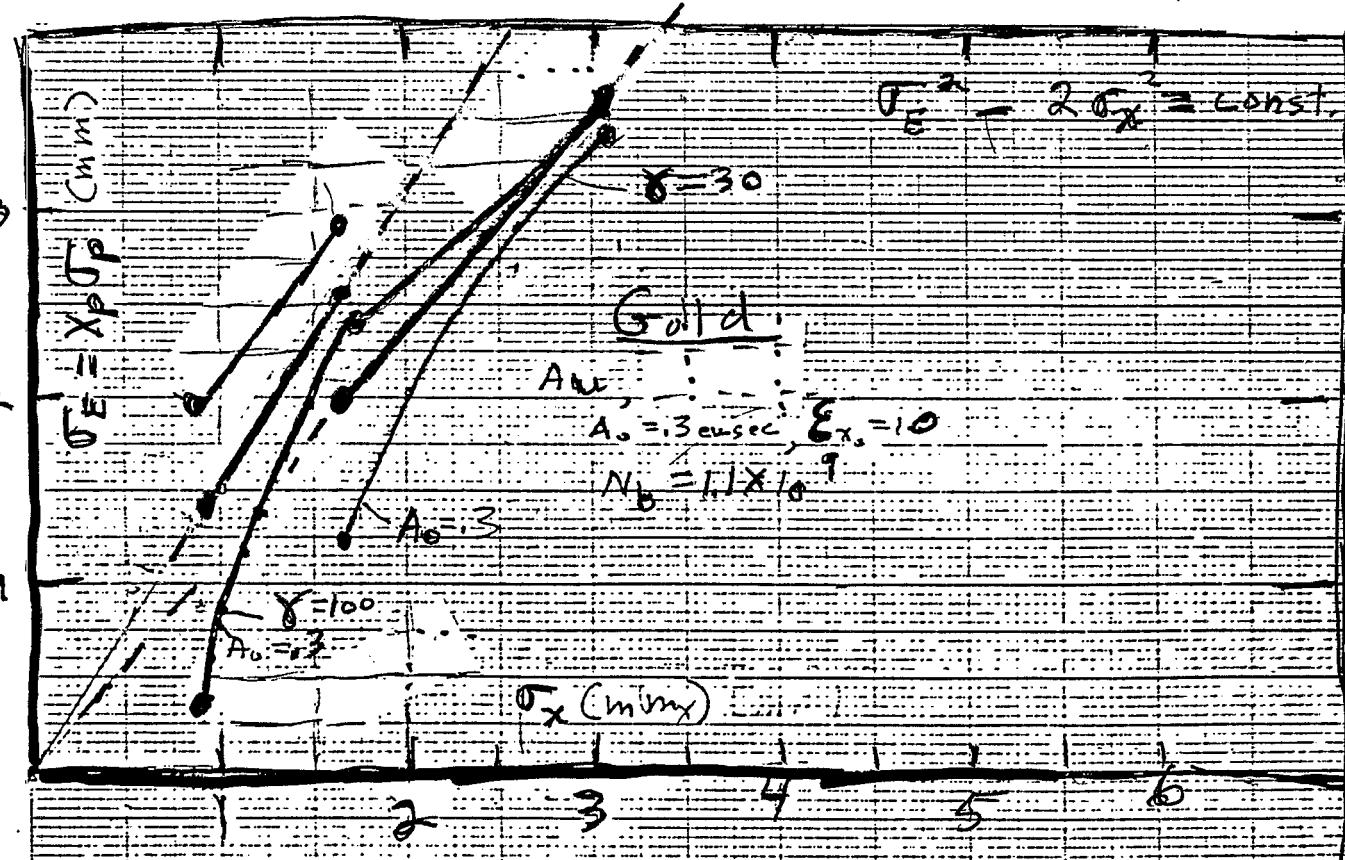
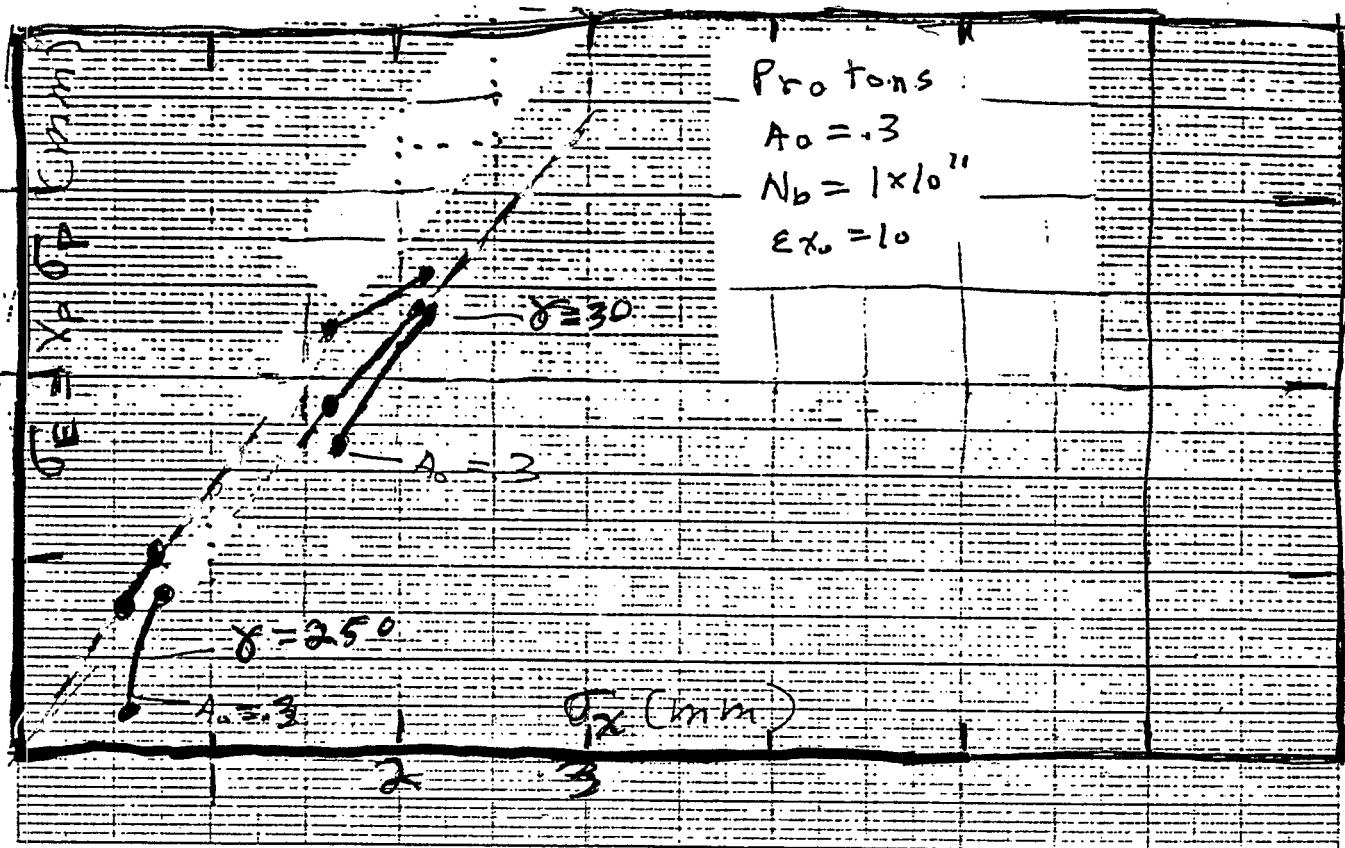
σ_e unchanged



What happens to final V after 10 hours,
final σ_p , final E_x ?

TBS Results for blowup of Ω_{p_0} .

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IBS Results for blow up of σ_{p_0} G. Porzen
7/13/88