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Reducing the RF Voltage Requirement by Blowing up the Initial Emittance

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Experience with protons showed that increasing the initial ε_x from $\varepsilon_x = 10$ to $\varepsilon_x = 20$ reduced RF voltage required by about 60%.

H. Hahn suggestion to try increasing ε_x for Au at $\gamma = 100$ to reduce V_{RF} required.

Theoretical Basis (Valid at high γ)

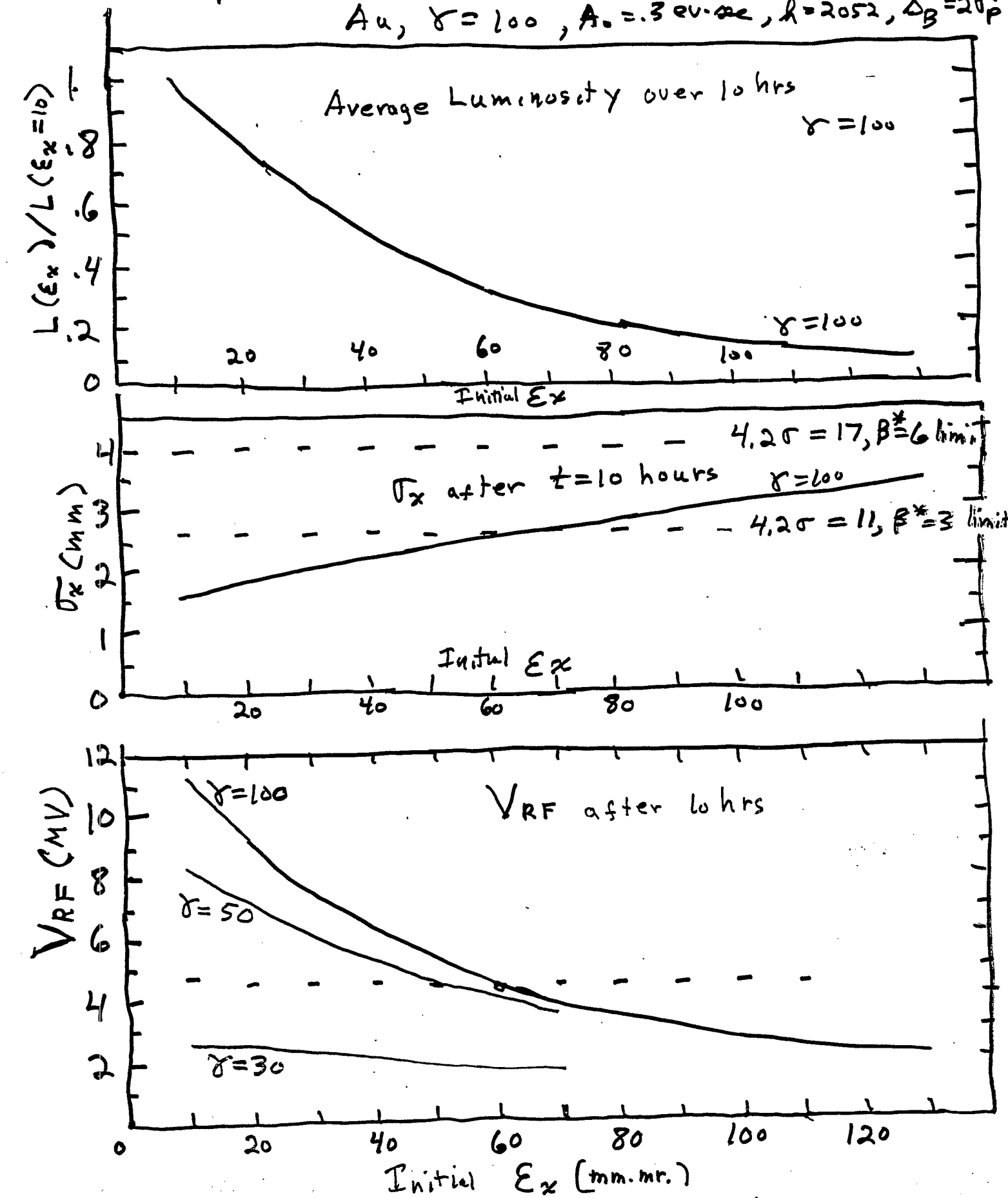
1) Phase space density indicates that σ_p growth rate, due to intrabeam scattering, decreases like $1/\sigma_x^4 \sim 1/\varepsilon_x^2$

2) Partition Rule, $\sigma_E \simeq \sqrt{2}\,\sigma_x$ indicates that σ_p growth rate increases like $(\sigma_x/\sigma_E)^2$

Phase space density factor should dominate and σ_p growth should decrease when ε_x is increased.

Dependence on Initial ε_x; V_{RF}, σ_x, L after 10 hours

Au, $\gamma = 100$, $A_0 = .3$ ev-sec, $h = 2052$, $\Delta_B = 2\sigma_p$



γ dependence of initial ϵ_x, σ_x, Lum.