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Estimate Of Intrabeam Scattering For The Lattice: $\beta = 40\text{m}$, $\sigma = 2.0\text{m}$

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ESTIMATE OF INTRABEAM SCATTERING
FOR
THE LATTICE: $\beta = 40\text{m}$, $\bar{\eta} = 2.0\text{m}$

A. G. RUGGIERO

(BNL - December 6, 1983)

J. Claus lattice

Contribution from Regular Cell only

$$\bar{\beta} = 39.18424 \text{ m} \Rightarrow 40. \text{ m}$$

$$\bar{\eta} = 2.023605 \text{ m} \Rightarrow 2. \text{ m}$$

This corresponds to case # 82

The numbers in the following Tables correspond to

Gold : $A = 197$, $Z = 79$

Bunched Beam

Peak Current = 1. Amp-electric

ϵ_N is normalized emittance
 σ_E/E r.m.s. energy spread

τ^{-1} are growth rates in hour⁻¹

$$\gamma = 100$$

$$E_N = 10\pi \text{ mm}\cdot\text{mrad}$$

σ_E/E	τ_E^{-1}	τ_H^{-1}	τ_V^{-1}
$.5 \times 10^{-3}$.3471	1.0204	-.0208
.8	.0923	.6946	-.0142
1.0	.0483	.5681	-.0116
1.2	.0283	.4793	-.0098

$$\gamma = 100$$

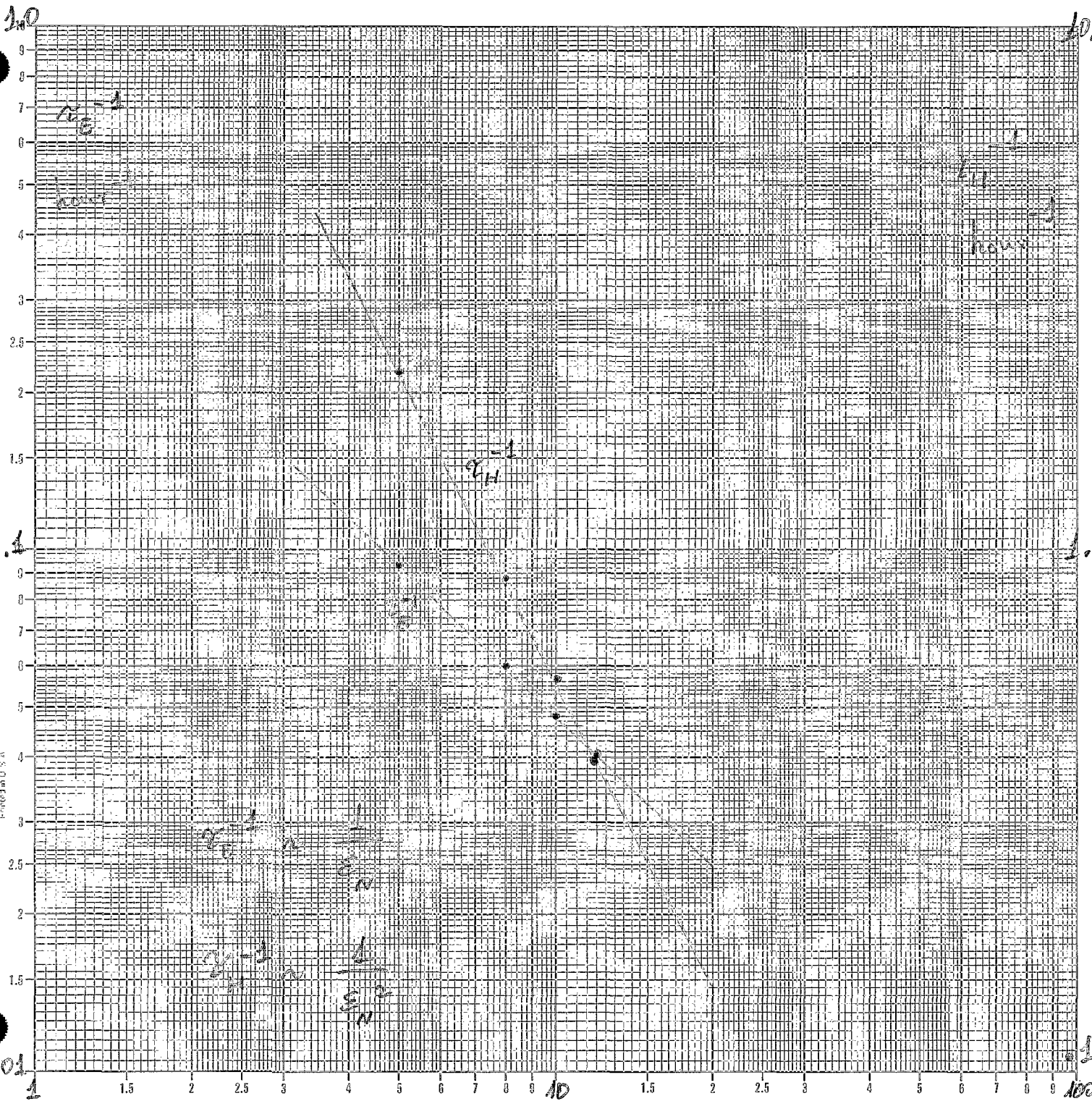
$$\sigma_E/E = 0.1\%$$

E_N	τ_E^{-1}	τ_H^{-1}	τ_V^{-1}
5. π mm·mrad	.0931	2.1901	-.0447
8.	.0598	.8788	-.0179
10.	.0483	.5681	-.0116
12.	.0405	.3971	-.0081

Variation of Diffusion Rates with emittance and energy spread -

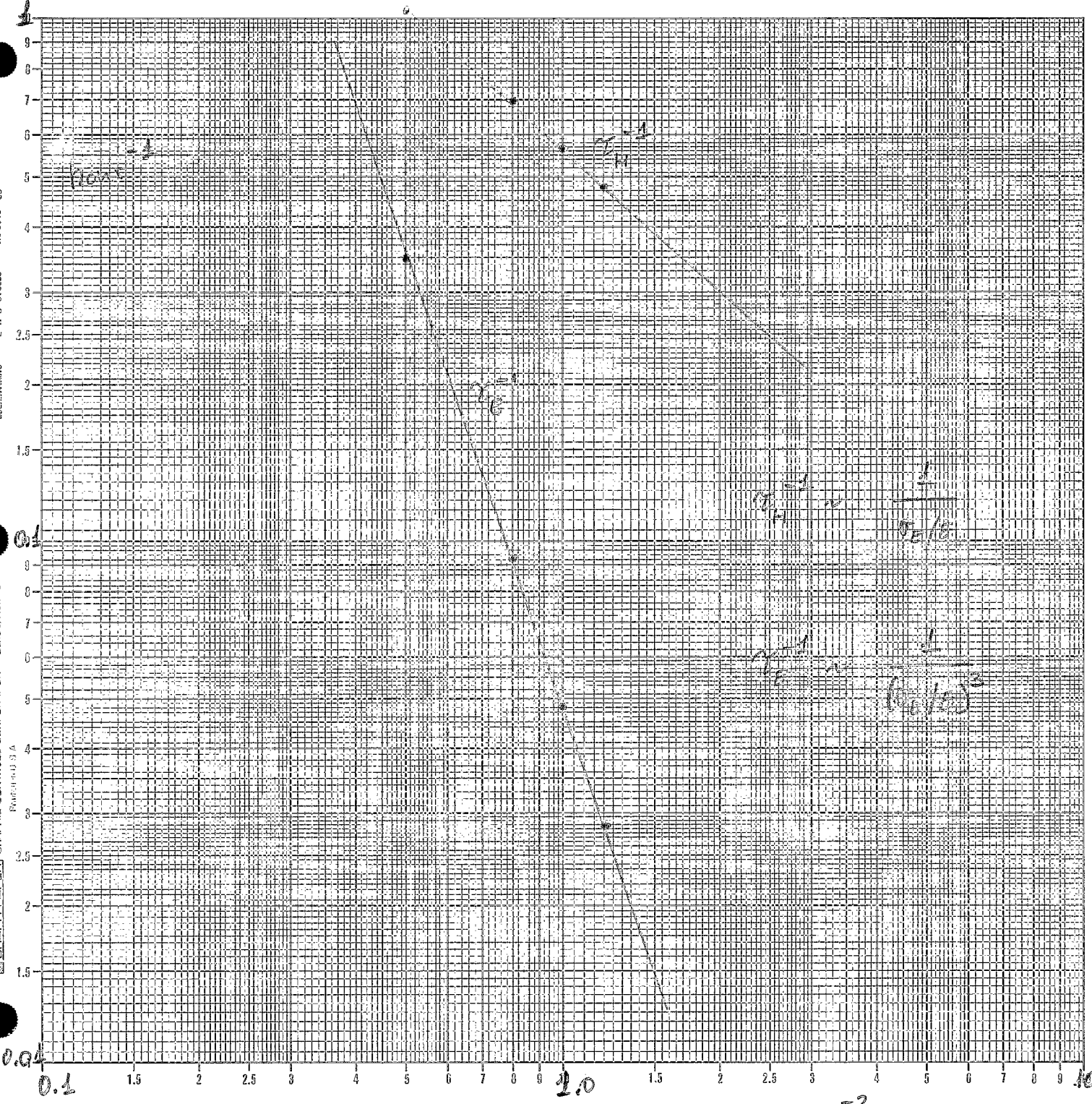
LOGARITHMIC 2 X 2 GRID 14-000-00

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mm.mrad

E_N



σ_e / ϵ

$\times 10^{-3}$

$$E_N = 10\pi \text{ mm. mrad.}$$

$$\sigma_E/E = 10^{-3}$$

γ	τ_E^{-1}	τ_H^{-1}	τ_V^{-1}
5	-2.9269	12.0445	13.7651
10	-.3359	.4011	.8022
12	-.0946	.0528	.1885
20	.1725	.2068	-.2068
40	.1480	.6214	-.0888
60	.0969	.6590	-.0388
80	.0667	.6198	-.0200
100	.0483	.5681	-.0116

Variation of Diffusion Rates with γ

Comparison with neighbouring lattices

$\gamma = 100$

$\delta E/E = 10^{-3}$

$\epsilon_N = 10\pi \text{ mm} \cdot \text{mrad}$

$\bar{\beta}$ \ / \ $\bar{\eta}$	1.5 m	2.0 m	2.5 m	
35 m	.0589 .4423 -.0124	.0515 .6951 -.0108	.0451 .9579 -.0095	E H V
40 m	.0543 .3537 -.0130	.0483 .5681 -.0116	.0429 .7936 -.0103	E H V
45 m	.0502 .2875 -.0135	.0454 .4717 -.0123	.0407 .6580 -.0110	E H V

For a comparison with the lattice

$\bar{\beta} = 30 \text{ m}$ and $\bar{\eta} = 0.5 \text{ m}$ see RHIC-PG-10

Comparison Between two lattices

$\frac{\beta}{\eta}$	30. m 0.5 m	40. m 2. m
α_E^{-1}	.0816 h^{-1}	.0483 h^{-1}
α_H^{-1}	.0669	.5681
α_V^{-1}	-.0147	-.0116

$\gamma = 100$
 $\sigma_E/E = 1 \times 10^{-3}$
 $E_N = 10\pi \text{ mm.mrad}$

"Gold"