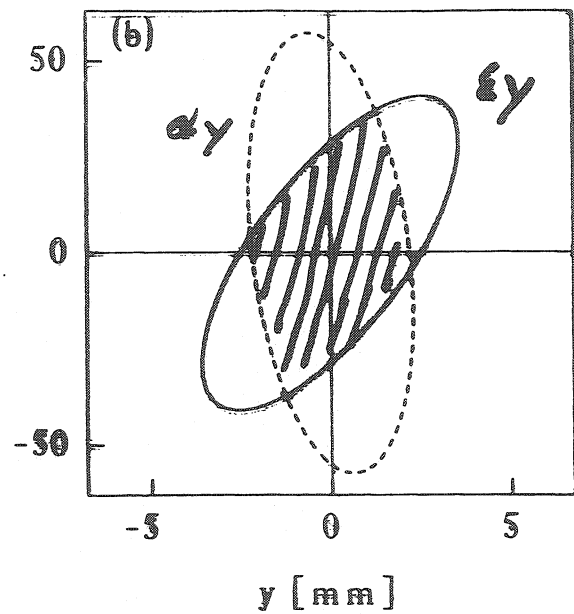
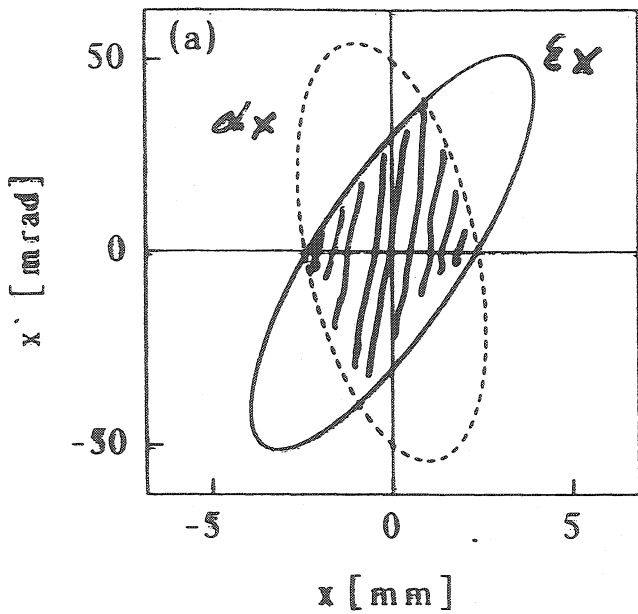


EHF - 88 - 23

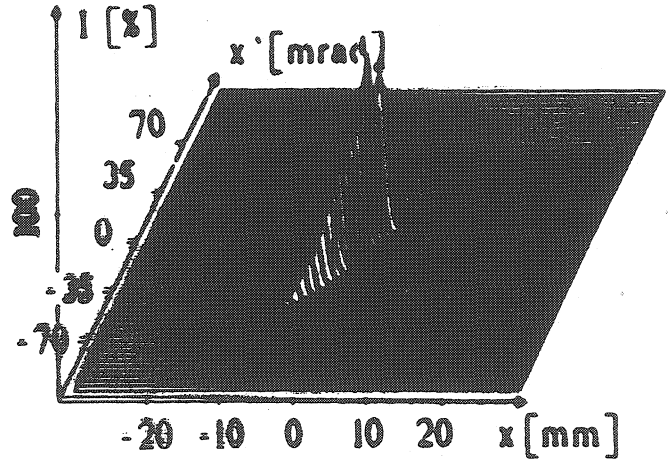
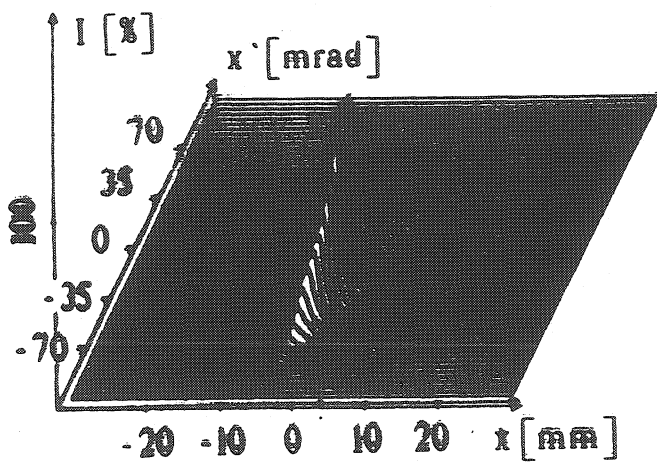
A. LOMBARDI

The Side-Coupled Structure



Calculated acceptances of RFQ2 (α_x, α_y) and emittances behind RFQ1 (ϵ_x, ϵ_y).
 Calculated Transmission : 60%

Output

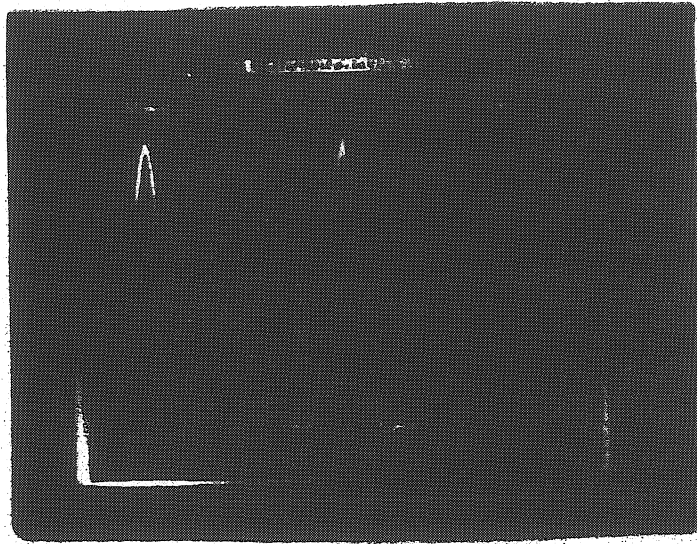


$x x'$ - Emittance RFQ1
 $\epsilon_x (90\%) = 120 \text{ mm} \cdot \text{mrad}$
 $I_{RFQ1} = 3.6 \text{ nA}$

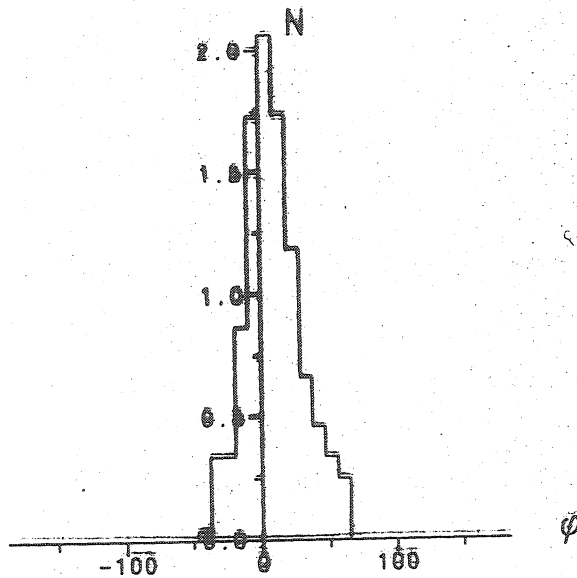
$x x'$ - Emittance RFQ2
 $\epsilon_x (90\%) = 65 \text{ mm} \cdot \text{mrad}$
 $I_{RFQ2} = 1.6 \text{ nA}$

50 MHz micro bunch - structure

bunch length: $\Delta\varphi = 5\text{ns}$ (FWHM) $\hat{=} \pm 45^\circ$



50 MHz $\hat{=} 20\text{ns}$



calculated

Legnaro

17 - Oct. - 1988

Review

on the

Side Coupled Limac
proposed design for

E. H. F.

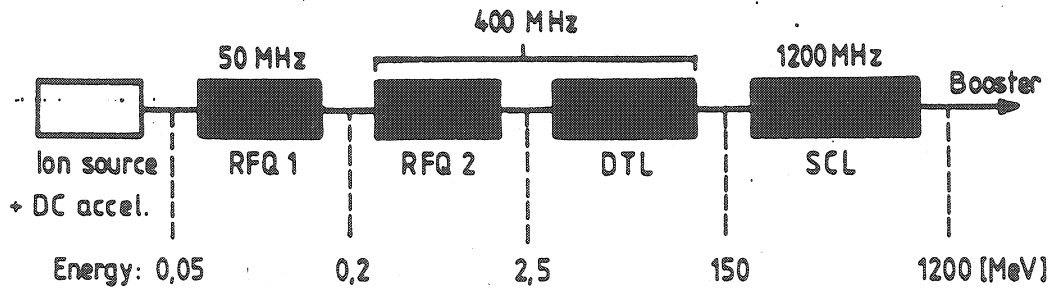


Figure 13.1: Scheme of the linear accelerator complex

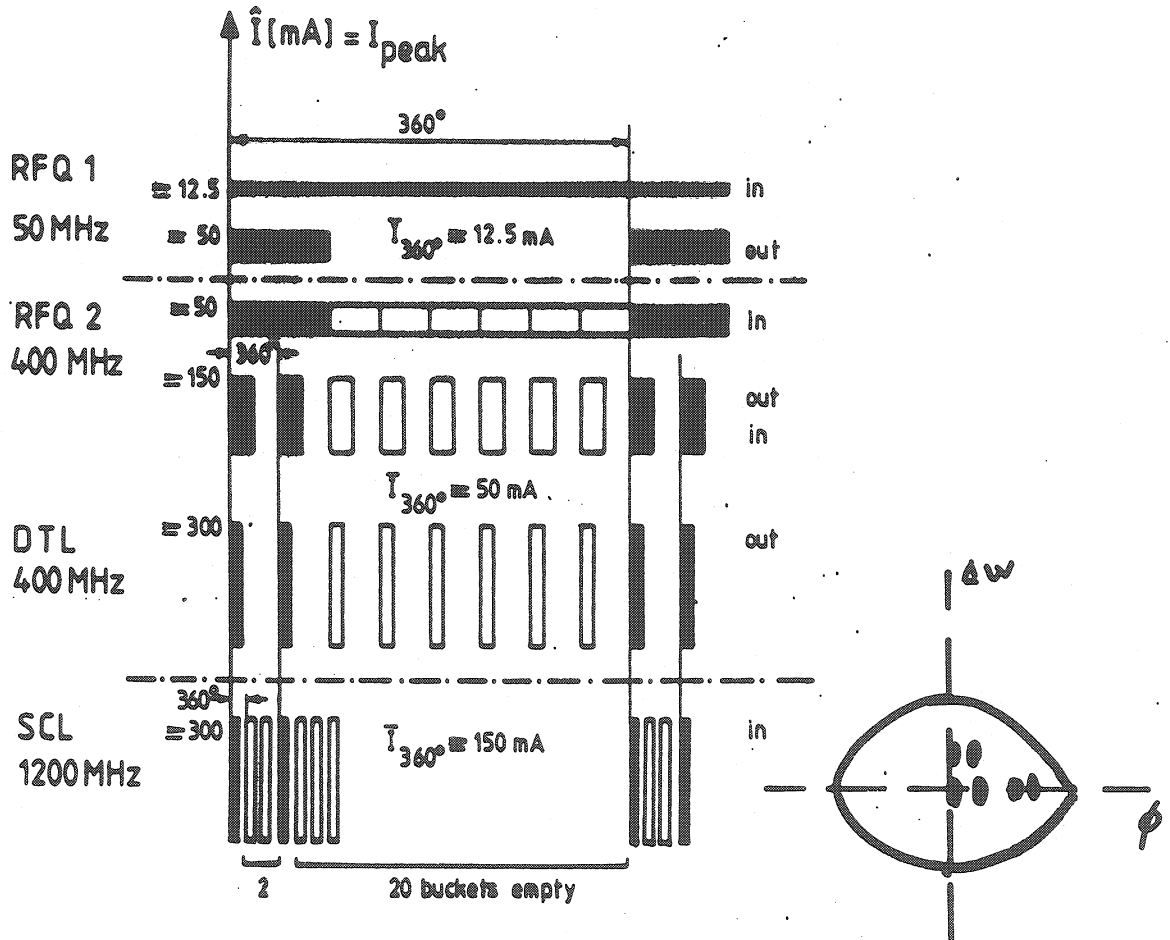


Figure 13.2: The "2 out of 8" philosophy and correlated currents in the different linac sections

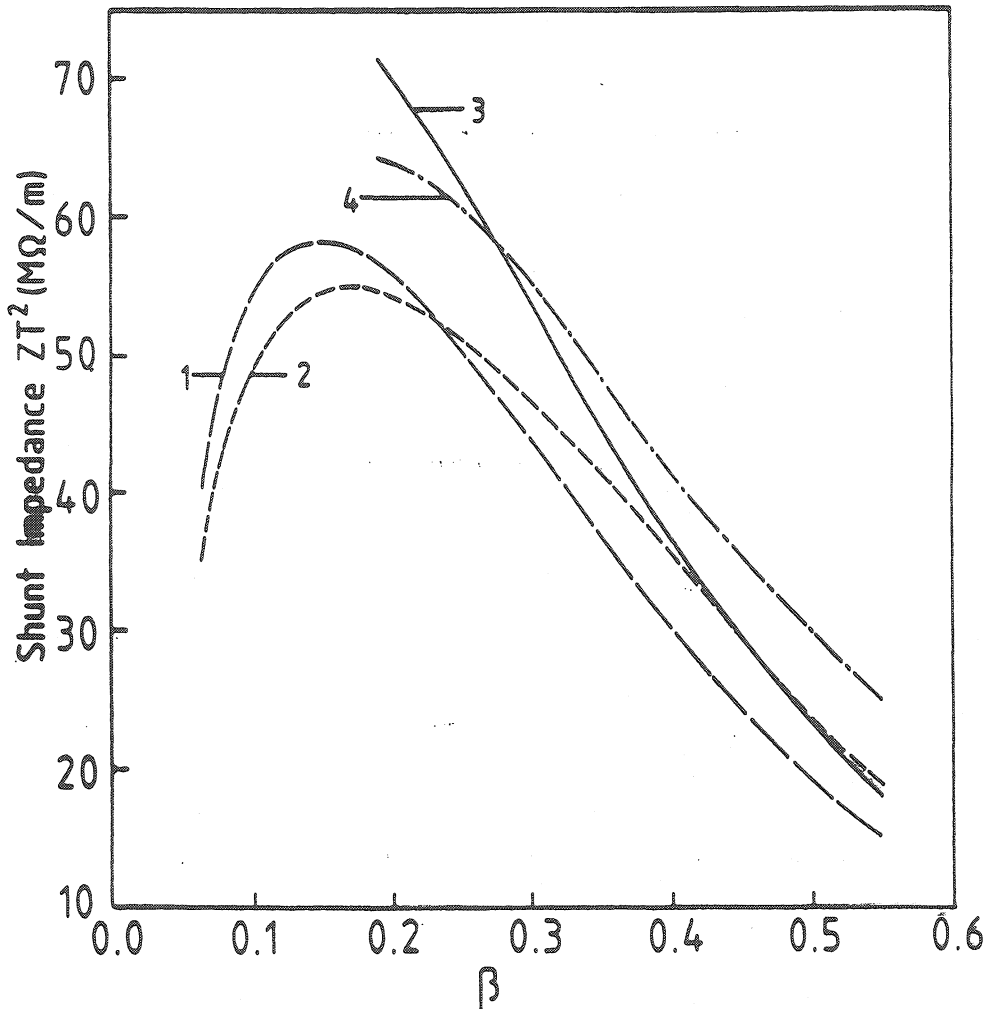


Figure 13.7: Ideal shunt impedance ZT^2 as a function of the relative particle velocity β .

Line 1: $2R = 48$ cm and $r_c = 1$ cm

Line 2: $2R = 42$ cm and $r_c = 1$ cm

Line 3: $2R = 48$ cm and $r_c = 3.2$ cm

Line 4: $2R = 42$ cm and $r_c = 3.2$ cm

$$ZT^2 = \frac{\text{(Energy gained by the particles)}}{\text{dissipated power}}$$

$$\text{Cost}_s \propto \frac{1}{\sqrt{ZT^2}}$$

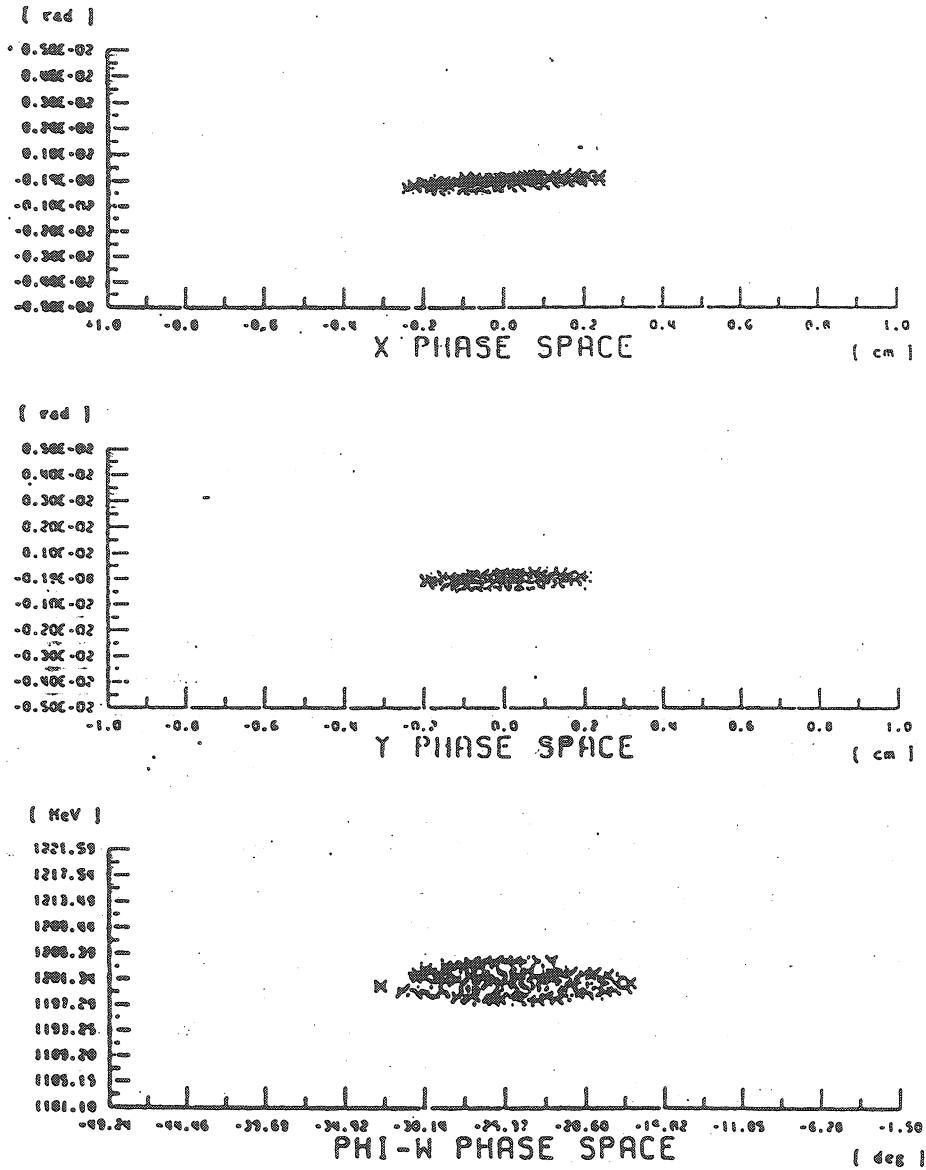


Figure 13.13: Output emittances of the SCL with $4\beta\lambda$ bridges

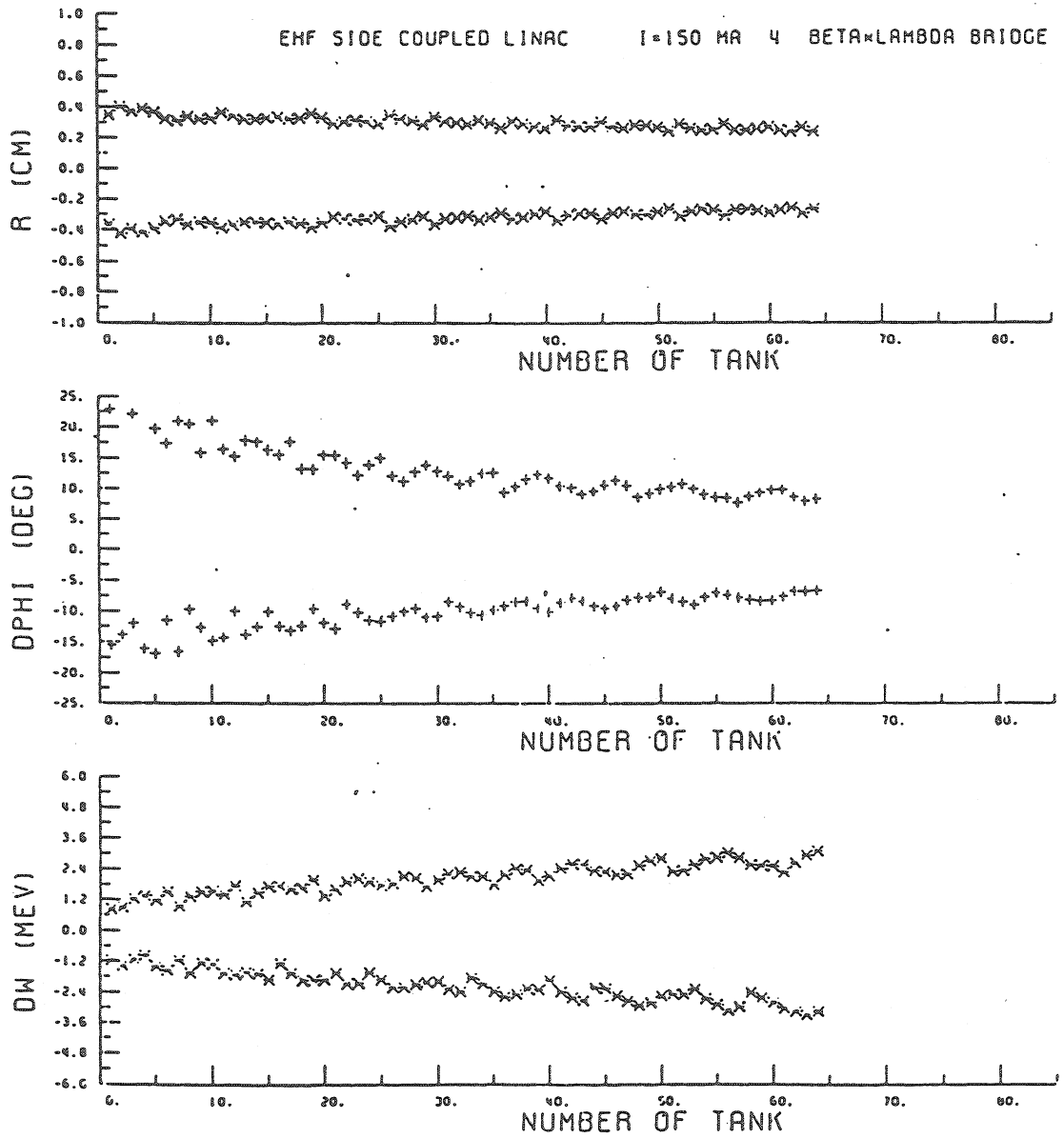


Figure 13.14: Beam Radius, Phase and Energy spread along the SCL with $4\beta\lambda$ bridges

Table 13.6: SCL - Table of Parameters

Input Energy	150	MeV
Output Energy	1200	MeV
Frequency	1200	MHz
Number of Modules	16	
Number of Tanks	64	
Number of Acc. Cells per Tank	38	
Accelerating Field $E_0 T$	5.6-4.7	MV/m
Peak Power	117	MW
Average Power	1.2	MW
Duty Cycle	1%	
Total Length	248.2	m
Synchronous Phase	-25°	
Beam Radius	~ 0.4	cm
Norm. Transv. Emittance (RMS)	~ 0.6 π	mm.mrad
Norm. Long. Emittance (RMS)	~ 4 π	deg.MeV
Output Phase Spread	8°	
Output Energy Spread	2.7	MeV
Bore Hole Radius	1	cm
Ratio of gap/cell length	0.3-0.5	
Accelerating Cell Radius	8.8-9.4	cm
Real Eff. Shunt Impedance	47-58	M Ω /m
Transit Time Factor	0.89-0.85	
Quality Factor	19-25	$\times 10^3$
Peak Surface Electric Field	38-32	MV/m
Quadrupole Gradients	35-55	T/m

The Linear Accelerator Complex

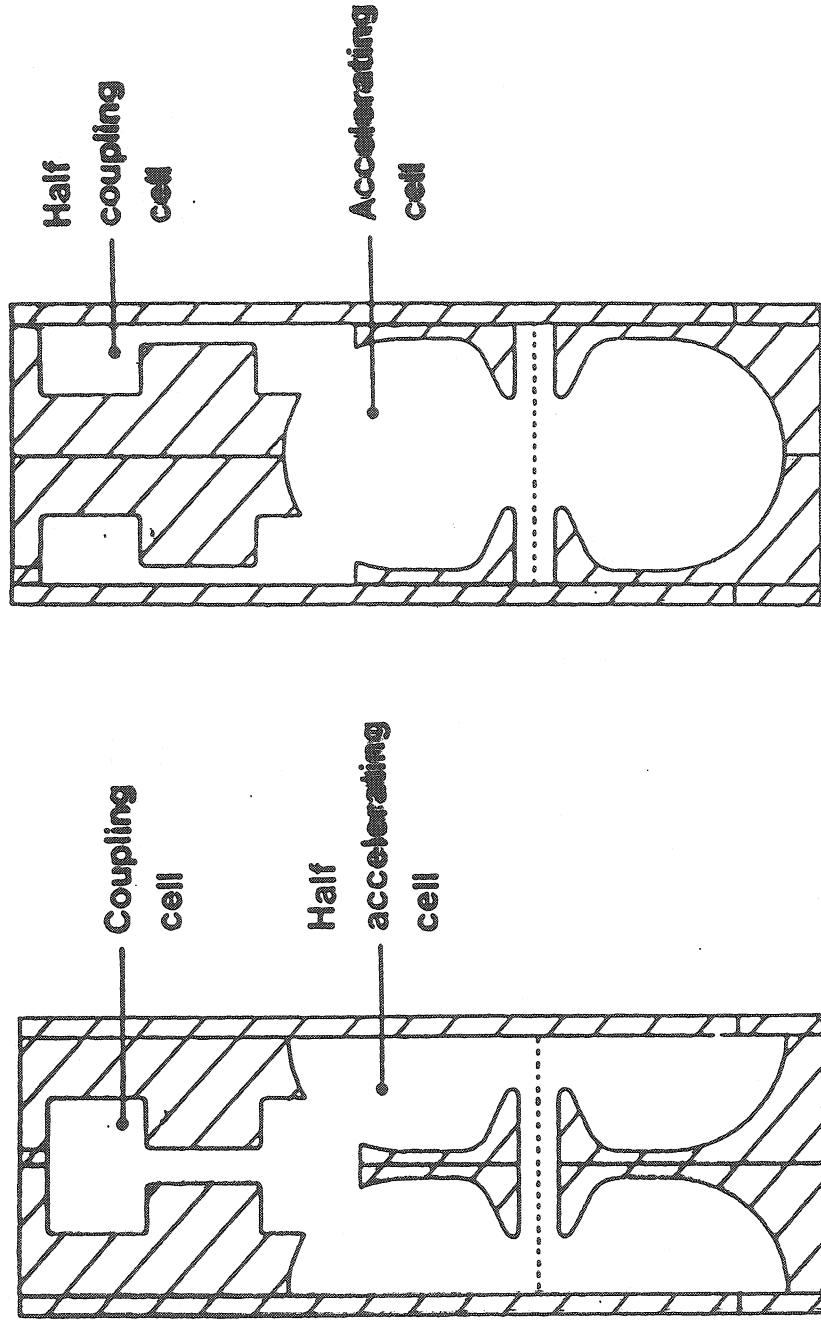


Figure 13.12: Full scale model of SCL cell

MODEL TESTS

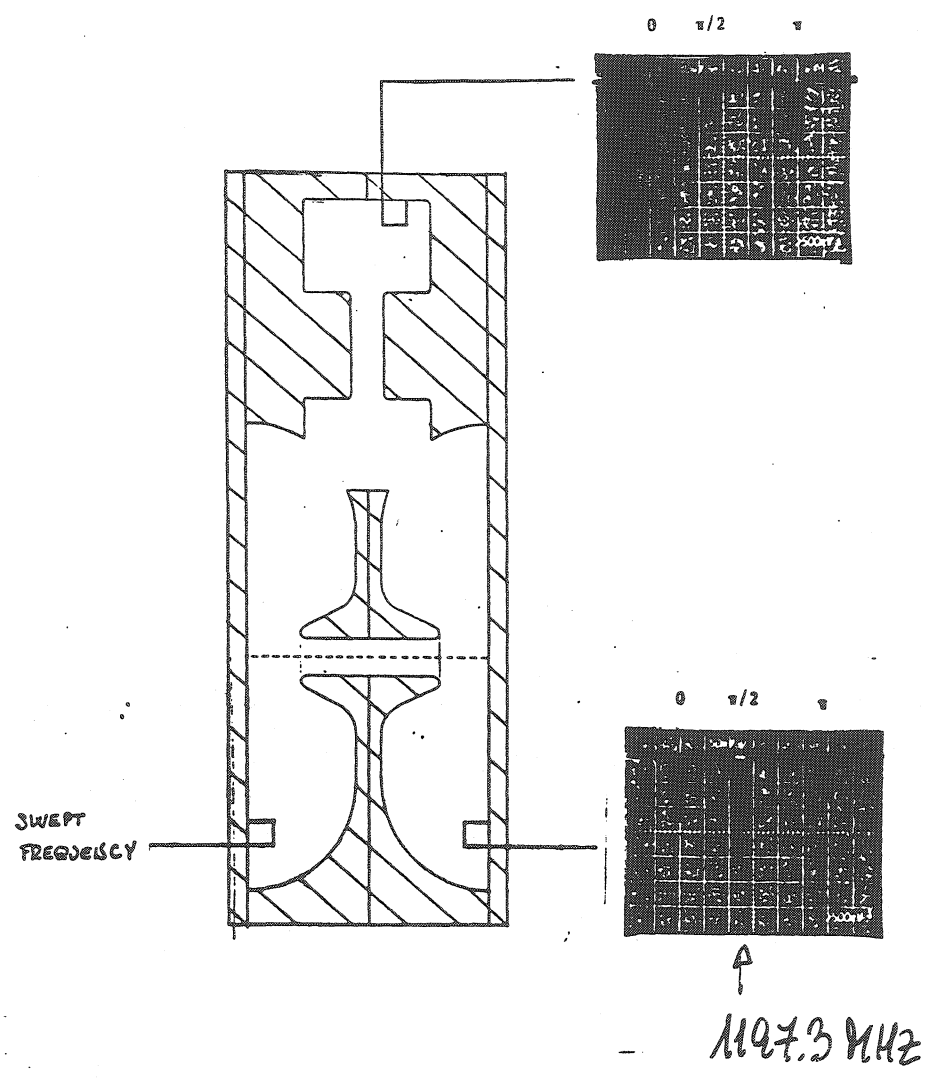


Fig. 12 : Test Model Arrangement

3 COUPLED OSCILLATORS ⇒

+	+	+	0 mode
+	0	-	$\pi/2$ mode
+	-	+	π mode