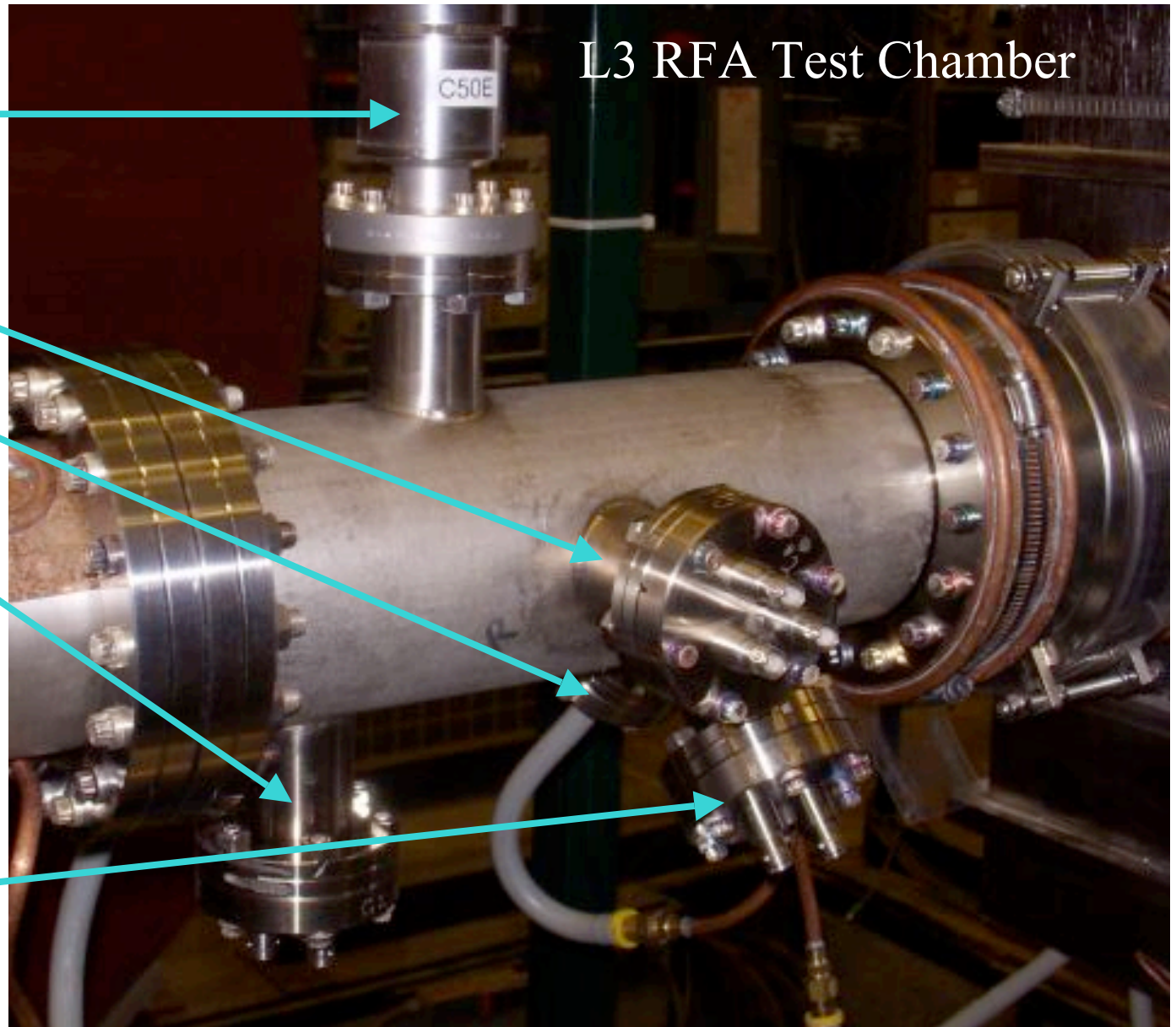
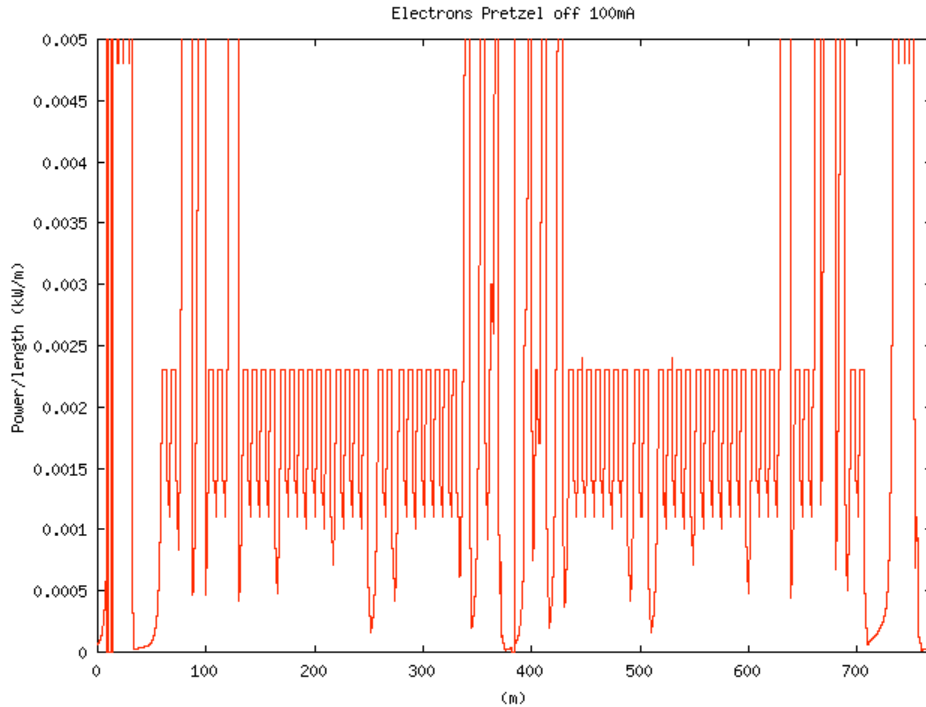




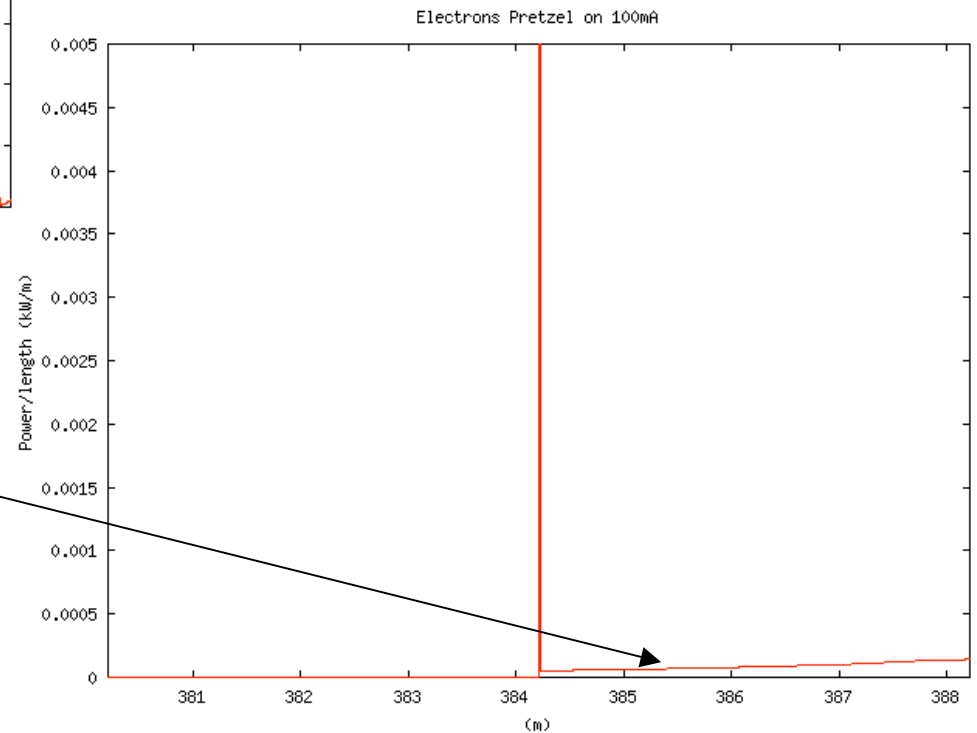
Retarding Field Analyzers in L3

- Vacuum Gauge
- RFAs
 - Radially in
 - 45 deg off radially out
 - Bottom
- Antennas
 - Loop
 - Dipole

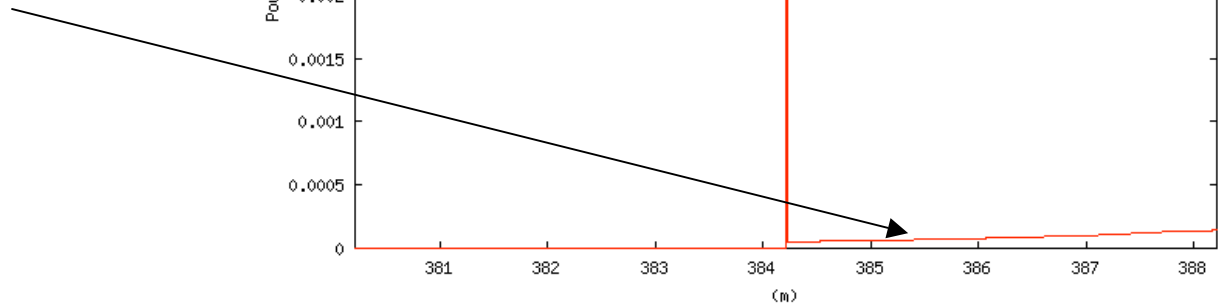




- L3 photon flux approx. $1/20^{\text{th}}$ of flux in arcs
- L3 synch light mirror shadows outside of chamber wall at RFA for positrons



Approximate RFA Location



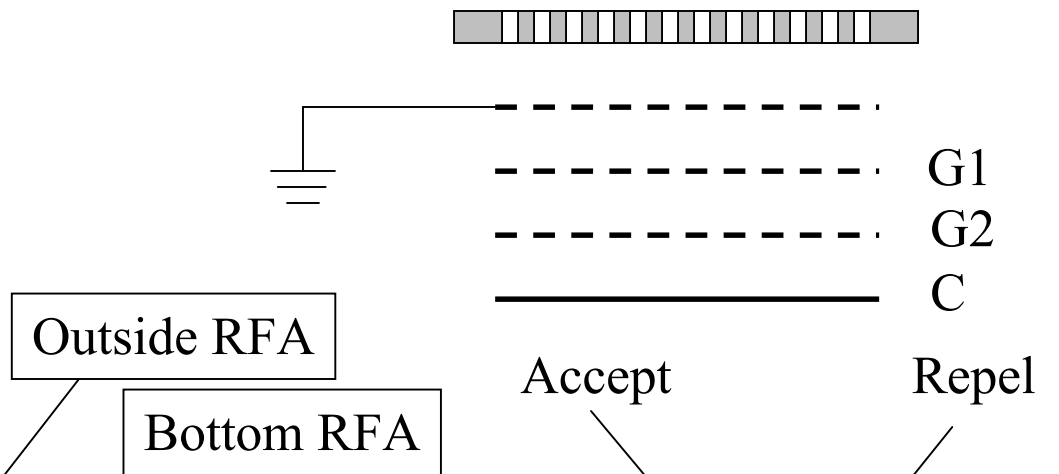


- Tune shifts in single species conditions consistent with
 - $>10^{11}/\text{m}^3$ density of electrons in chamber after long train
 - Approx. 100 ns decay time constants
- In HEP conditions expect
 - Less than full development of cloud for each train
 - Assume $\sim 10^{11}/\text{m}^3$ in dipoles
 - Estimate $\sim 5 \times 10^9/\text{m}^3$ in L3
 - Assume 100 ns decay
 - RFA sensitive to volume $\sim 1.2 \text{ in.} \times 9.6 \text{ in.}^2 = 1.9 \times 10^{-4} \text{ m}^3$
 - $\sim 10^6$ electrons per train
 - Each RFA covers $\sim 10\%$ of wall
 - RFA wall transparency: $\sim 21\%$
 - RFA efficiency?
 - Total charge $\sim 2 \times 10^4$ per train? $\sim 2 \times 10^5$ per turn?
 - Expected currents (*no RFA efficiency included*)
 - Instantaneous: $<32 \text{ nA}$
 - Average: $<12 \text{ nA}$



• Read out collector

- Shunt
 - 1 M Ω
 - ~ 0.03 nA resolution
- Test with e- and e+ trains
- Approx. $2 \text{ mA} \times 9 \times 5$



Beam	Condx	RFA 1	RFA2	ΔV_{G1}
Ele	HEP orbit	~ 0.1 nA	< 0.05 nA	100 V
Pos	HEP orbit	≤ 0.1 nA	< 0.05 nA	100 V
Ele	HEP orbit	0.1 nA	0.04 nA	200 V
Ele	L3 Disp Bump	0.14 nA	0.1 nA	200V
Ele	Seps Off/L3 Bump	0.07 nA	0.08 nA	200V
Ele	Seps & Bump Off	0.07 nA	0.08 nA	200V

$V_{G1} = 0$ or $-100/-200$ V
 $V_{G2} = 30$ V
 $V_C = 300$ V

Appeared to have slightly smaller signal than e⁻



- RFAs 1 and 2 configured for simultaneous AC and DC measurements
- Amplifier failed and has been removed for now.

