

# Activities final report: Insulating machine - AC dipole - Ringer

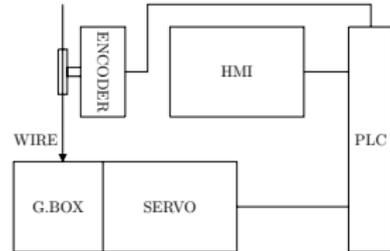
Vladimir Pietro Cravero

Supervisor: Luciano Elementi  
Coordinator: Emanuela Barzi  
Fermilab National Accelerator Laboratory

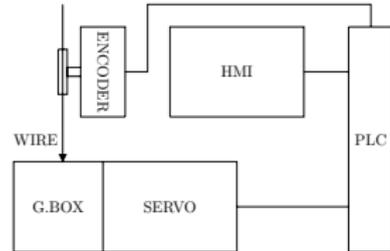
September 21, 2012



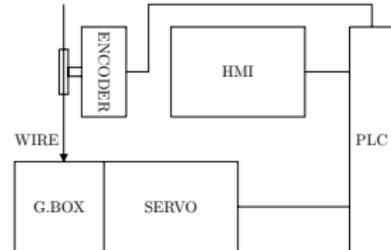
- Accurate superconducting cable insulation



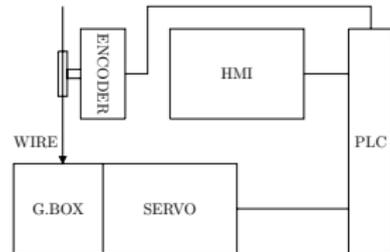
- Accurate superconducting cable insulation
- Pitch and coverage tuning



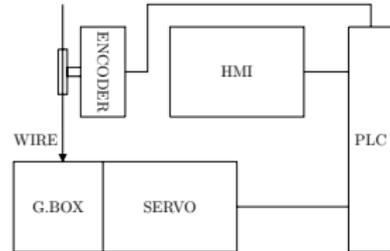
- Accurate superconducting cable insulation
- Pitch and coverage tuning
- Processed cable and used insulator measurement



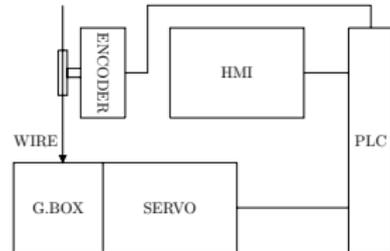
- Precision position control



- Precision position control
- Real time input processing



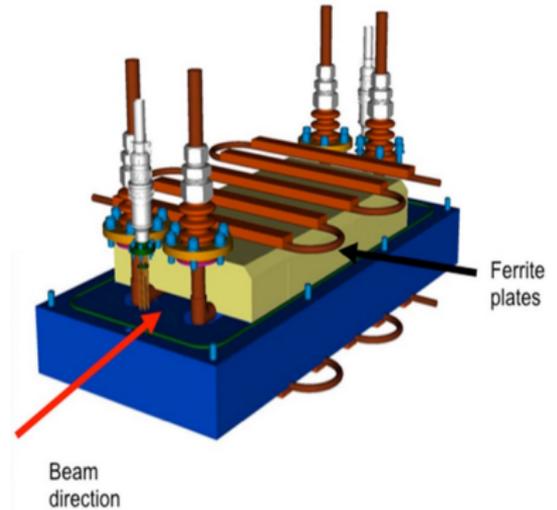
- Precision position control
- Real time input processing
- HMI support for remote operation



# AC dipole

What is it, what is it for

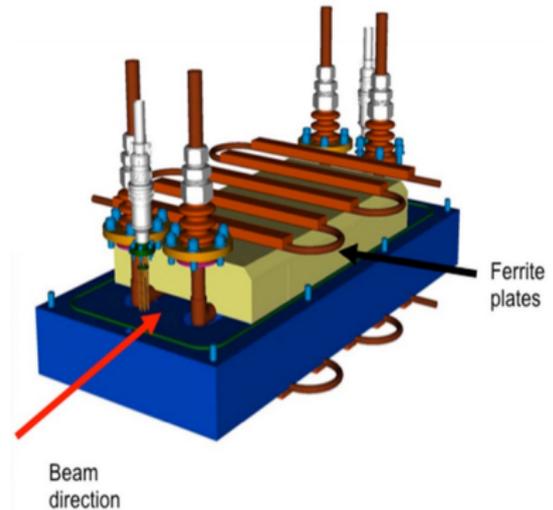
- $\mu 2e$  experiment



# AC dipole

What is it, what is it for

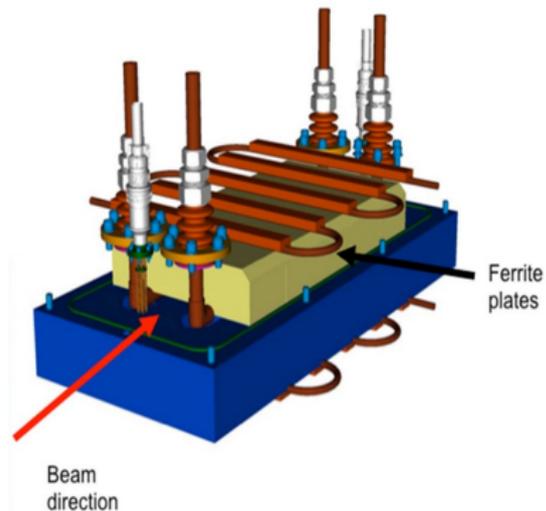
- $\mu 2e$  experiment
- Noise and beam toggling



# AC dipole

What is it, what is it for

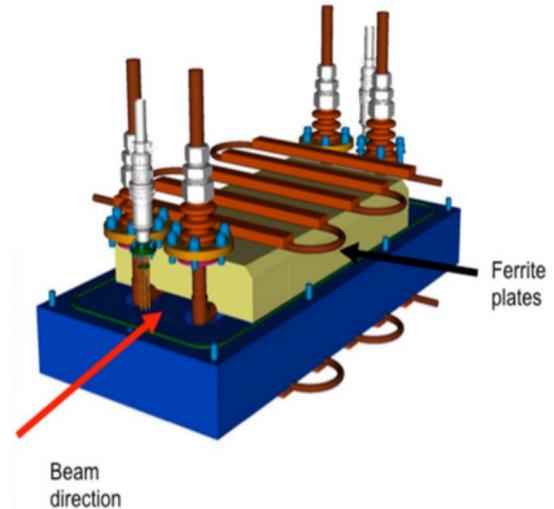
- $\mu 2e$  experiment
- Noise and beam toggling
- Beam deflection



# AC dipole

Power measurement

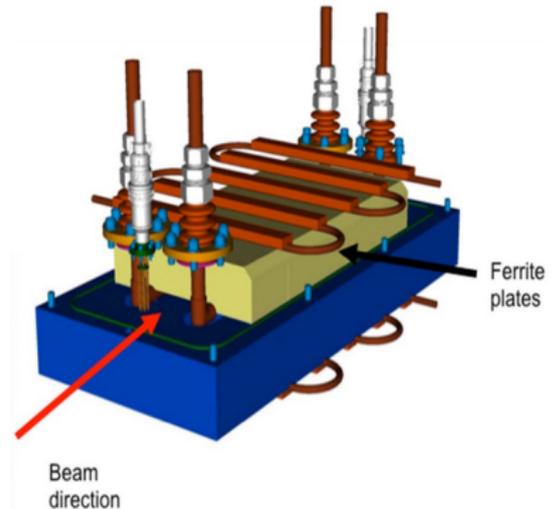
- 300kHz and 5.1MHz excitation power requirements



# AC dipole

## Power measurement

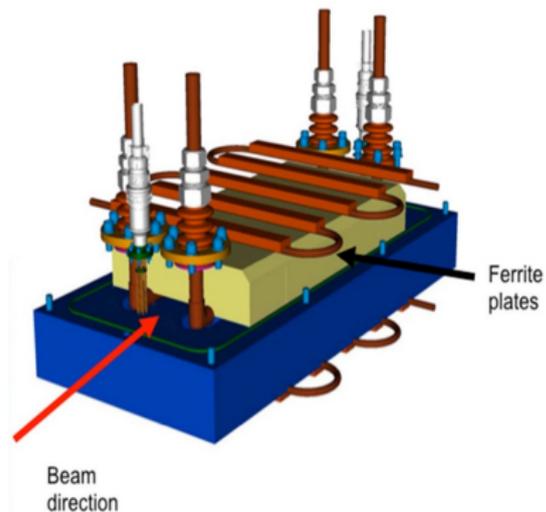
- 300kHz and 5.1MHz excitation power requirements
- Different ferrites behavior



# AC dipole

## Power measurement

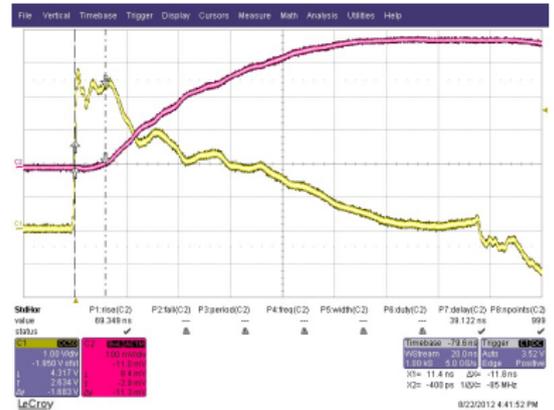
- 300kHz and 5.1MHz excitation power requirements
- Different ferrites behavior
- Experimental setup



# AC dipole

## Cable length problems

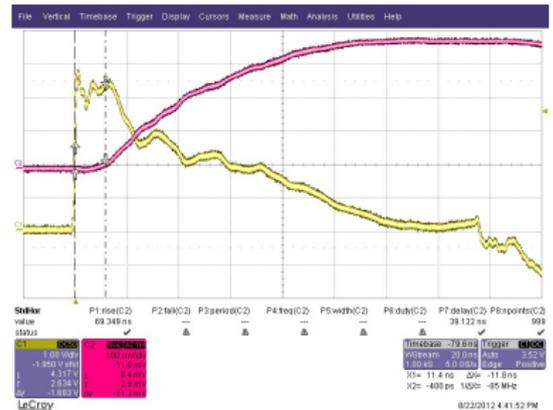
- Cable delay effects on  $\cos(\varphi)$



# AC dipole

## Cable length problems

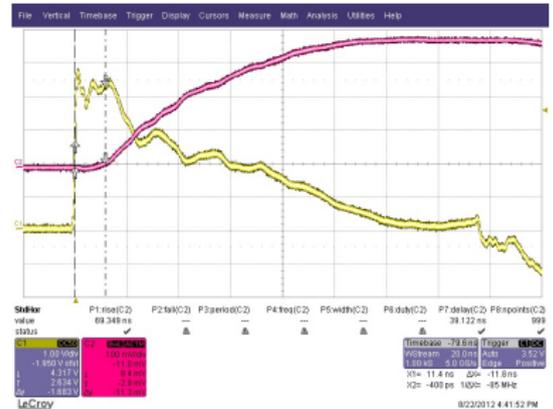
- Cable delay effects on  $\cos(\varphi)$
- Different effects on primary and secondary measurement



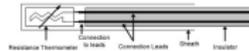
# AC dipole

## Cable length problems

- Cable delay effects on  $\cos(\varphi)$
- Different effects on primary and secondary measurement
- Delay measurement experimental setup



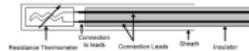
- Thermocouples and RTDs



# AC dipole

## Temperature measurement

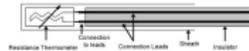
- Thermocouples and RTDs
- High frequencies challenges



# AC dipole

## Temperature measurement

- Thermocouples and RTDs
- High frequencies challenges
- Temperature readings

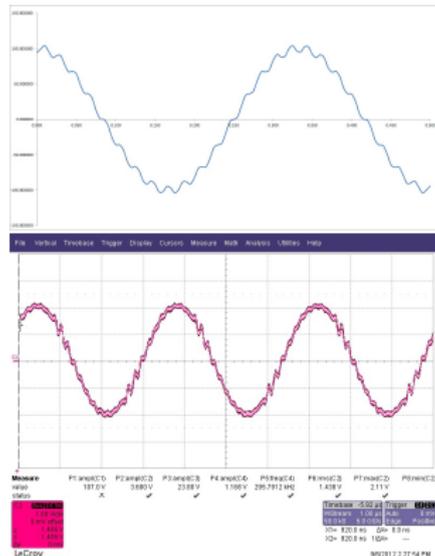




# AC dipole

## Multi modal excitation

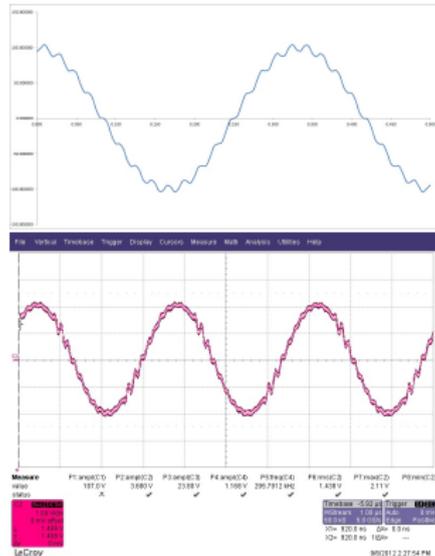
- Double resonant filter
- Design guidelines



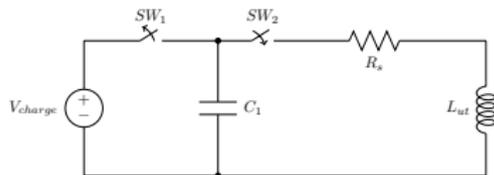
# AC dipole

## Multi modal excitation

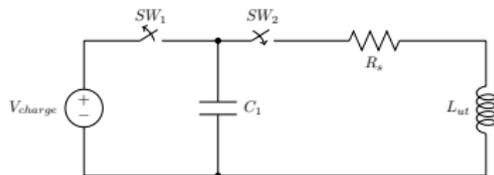
- Double resonant filter
- Design guidelines
- Prototype testing



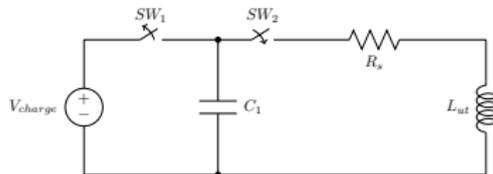
- RLC resonant circuit



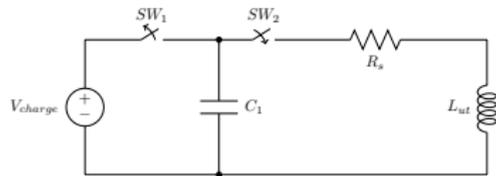
- RLC resonant circuit
- Transient analysis



- RLC resonant circuit
- Transient analysis
- Waveform connections with physical parameters



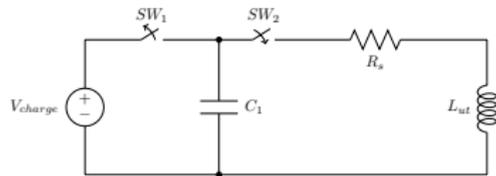
- Coil characterization



# Ringer

What we will do with it

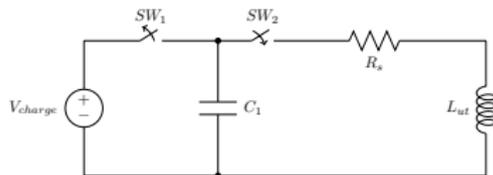
- Coil characterization
- Coil stress test



# Ringer

What we will do with it

- Coil characterization
- Coil stress test
- Coil insulation quality



Questions?

