The MTA and Muons Inc Experiment

MuCool Test Area

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Muons, Inc

Muons, Inc
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Background

Motivation
• Different idea from ILC
• Neutrino Factory
• Muon Collider

Challenges
• Cool muons in 6-D
• Acceleration
• *This must be done QUICKLY*
Muons Inc Approach

6-D Cooling

- Several techniques being simulated:
- Helical Cooling Channel
- Phase Ionization Cooling (parametric resonance)
- Reverse Emmitance Exchange
Muons Inc Approach

Acceleration

Pressurized RF cavities based on Paschen's Law

Benefits are 3 for 1 with high density $H_2$:

- beam cooling with $\frac{1}{2} \text{ L}_H^2$
- breakdown suppression (higher gradients)
- built in cryogenics for cooling cavity
Muons Inc Previous Results at Lab G

Figure 3. Picture of the Test Cell Stainless Steel Disks and Cylinder before copper plating.

Figure 4. The probe signal taken during the last hours of operation at 250 PSIA and 77K. The pulse time of 20 μs corresponds to the rising part of the 800MHz envelope.

Figure 5. Paschen curve measurements for hydrogen (black diamonds) and helium (red squares) at liquid nitrogen temperature. Each datum was determined by first setting the klystron frequency at reduced voltage, raising the voltage until breakdown occurred regularly, then reducing the voltage until breakdown did not occur.
Muons Inc Present Effort

Material Testing for RF cavities

Paschen's Law predicts suppression of gas breakdown

- Still want optimal material for cavity electrodes
- Use Paschen's curve to normalize data
  - Materials to be Tested:
    - Cu
    - Mo
    - Be
    - Cr
Muons Inc Present Effort

Figure 7. Test Cell Schematic
Muons Inc Present Effort

![Graphs showing resonant frequency vs pressure and pickup vs pressure]
Muons Inc. Present Effort
Muons Inc Present Effort

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### WaveGuide Resonances

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Summary

- Ongoing efforts to make use of the MTA
- Beginning to take data for Muons Inc