

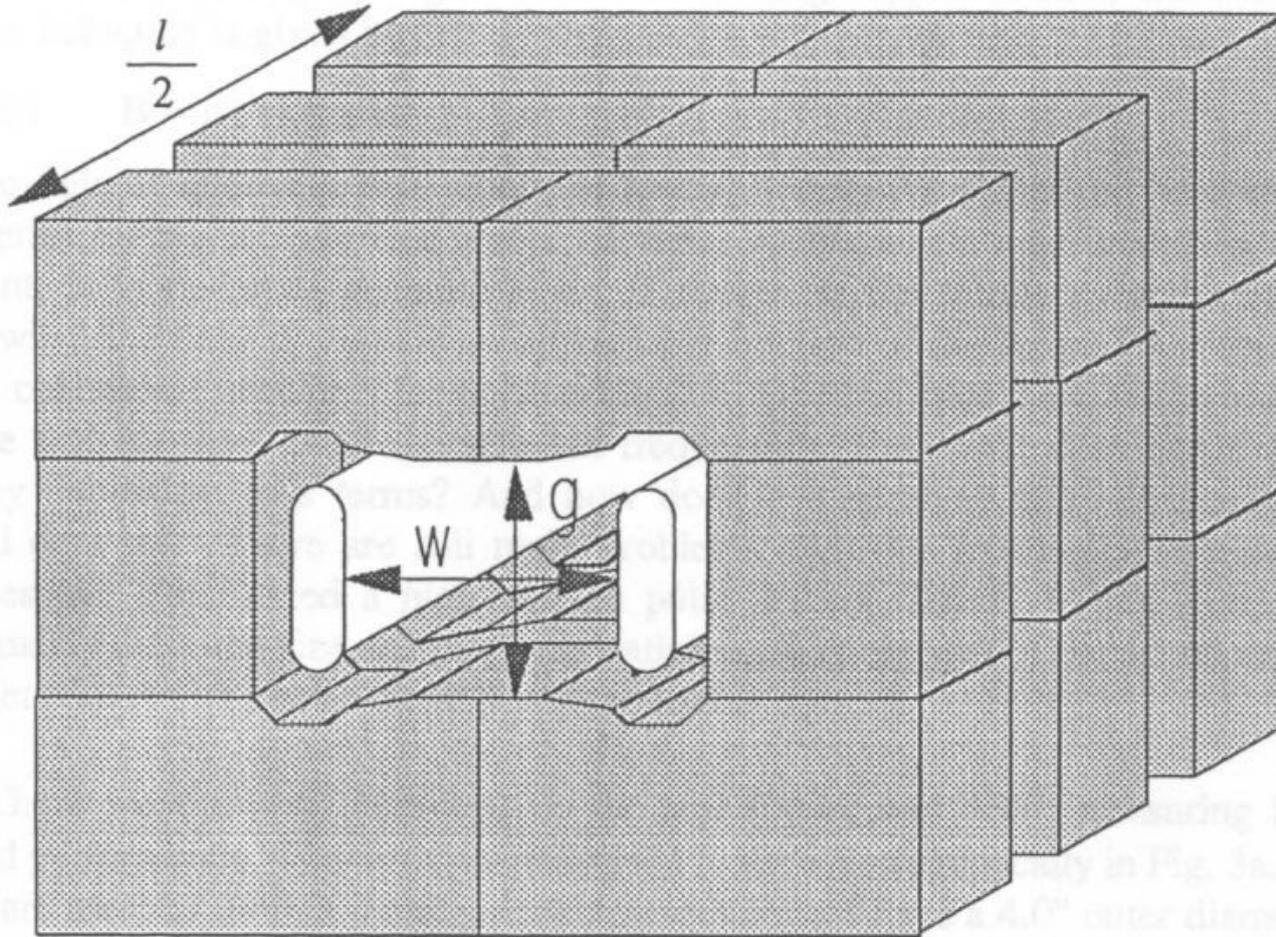
# Dark Current Kicker with Pulsed Magnet

C.Y. Tan  
J. Steimel

# Goal

- To see whether power requirements are smaller with a pulsed magnet.
  - Use Tevatron D48 pulsed magnet kicker as basis for calculation.
  - Use same beam pipe aperture of 2.5” OD.
  - D48 is a ferrite loaded picture frame magnet.

# Picture Frame Magnet



Length of kicker is assumed to be 25 cm. Aperture is 2.5".

# Results

- For 20 mrad kick we need
  - 37 A current
  - Impedance is  $6.25\Omega$  (assuming 60kV)
  - Peak power is 8.6 kW
  - Average power is 650 W. (assuming pulse on is 25ns and 3MHz rep rate).
- Filling time is 25 ns

# Comparison with stripline kicker

- Peak power is 360 kW.
- Average power is 2 kW.
- Fill time is 2 ns.
- Ratios:
  - Peak power stripline/Peak power magnet = 42
  - Ave power stripline/Ave power magnet = 3
  - Fill time stripline/Fill time magnet = 1/12.5
- From power considerations, it seems that pulsed magnet is the way to go.

# Advantages

- Power advantages is factor of 3 for averaged power and 42 for peak power.
- We have pulsed magnet experts.
- Everything is external to the beam pipe.

# Possible problems

- Vacuum because of ceramic beam pipe.
  - A0 gun vacuum is  $10^{-9}$  torr.
  - c.f. Tevatron ceramic beam pipe vacuum. Note much longer than what we will have at NML. (About 10 m worth of ceramic beam pipe vs 30 cm)

# F17 Kicker Vacuum Recovery

