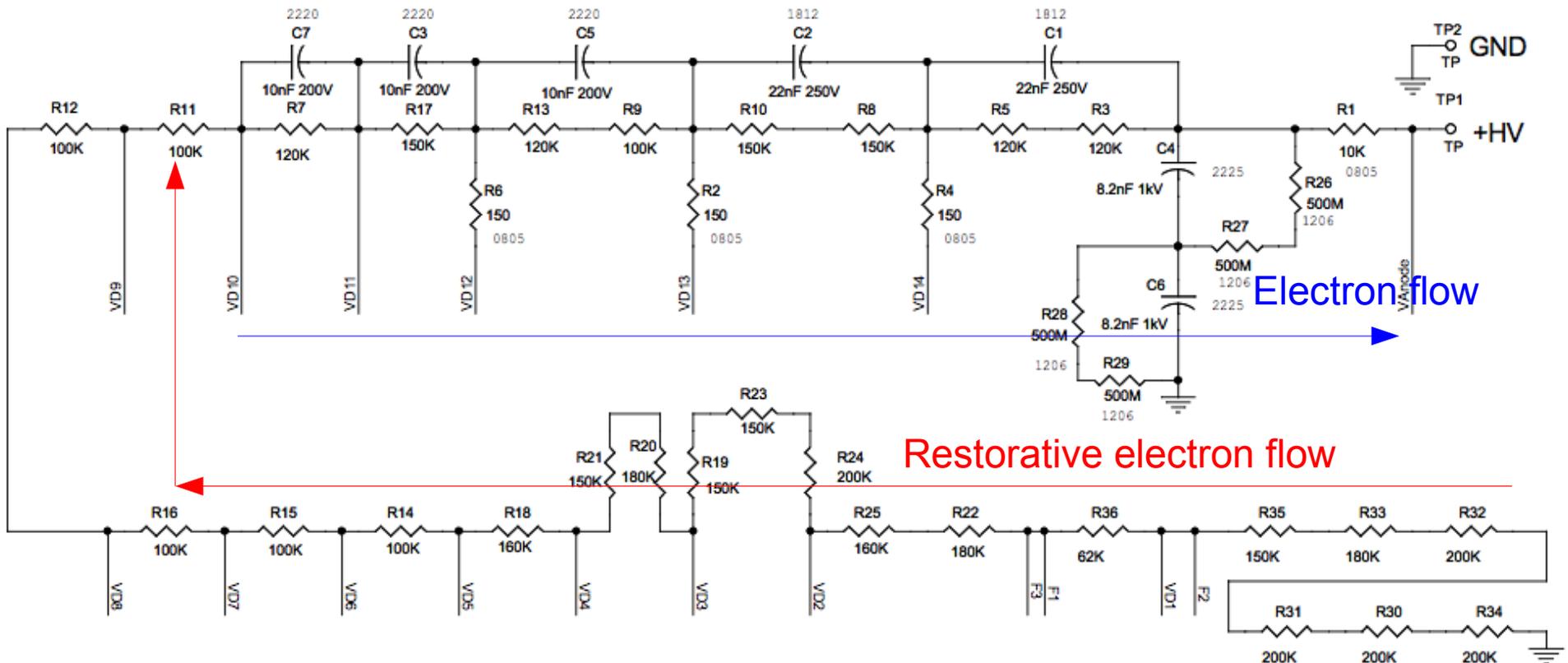


# Update on PMT crosstalk studies

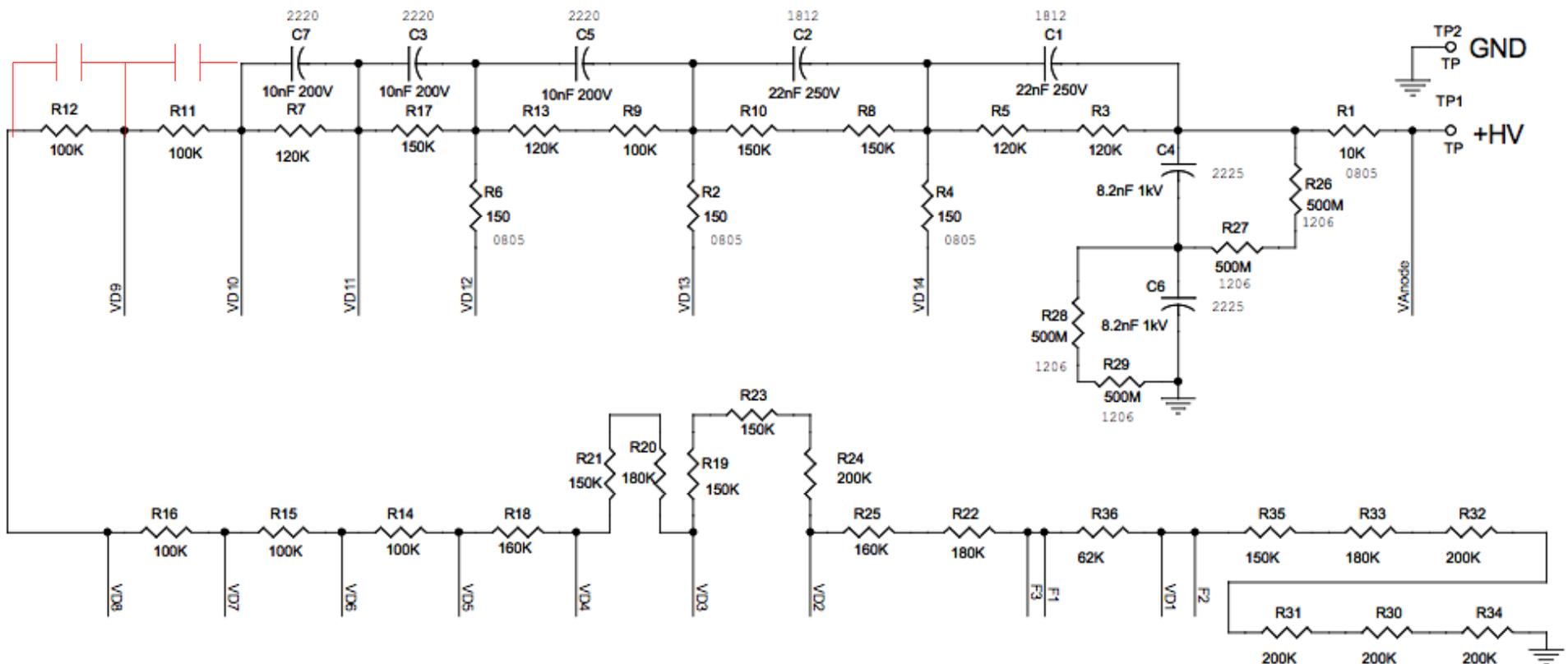
# Hypothesis

- Electrons leaving dynode 9 causes greatest temporary absence of charge (due to being the last dynode without a capacitor).
- Electrons flow from the photocathode to the dynode in order to restore this deficit.
- This creates temporary absence of charge on the photocathode, and associated electric field couples to the wire plane.



# Test by adding capacitors

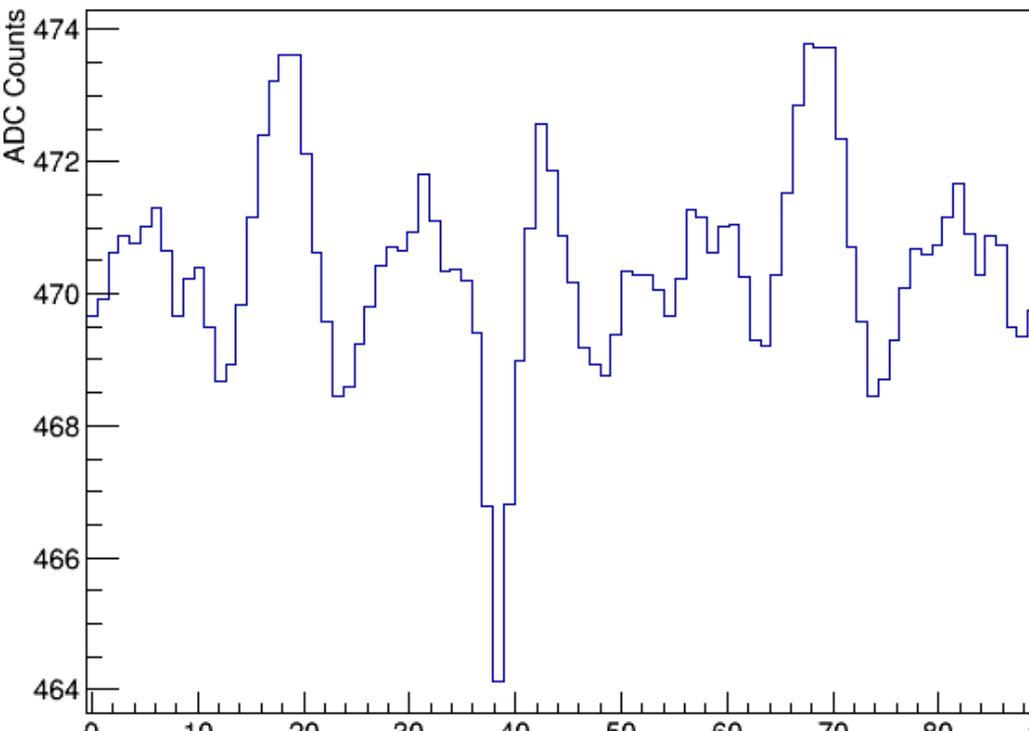
- Extra 22nF caps were added over R11, R12.
- These capacitors restore charge to the dynodes, eliminating the effect.
- Should see decrease in observed crosstalk signal.



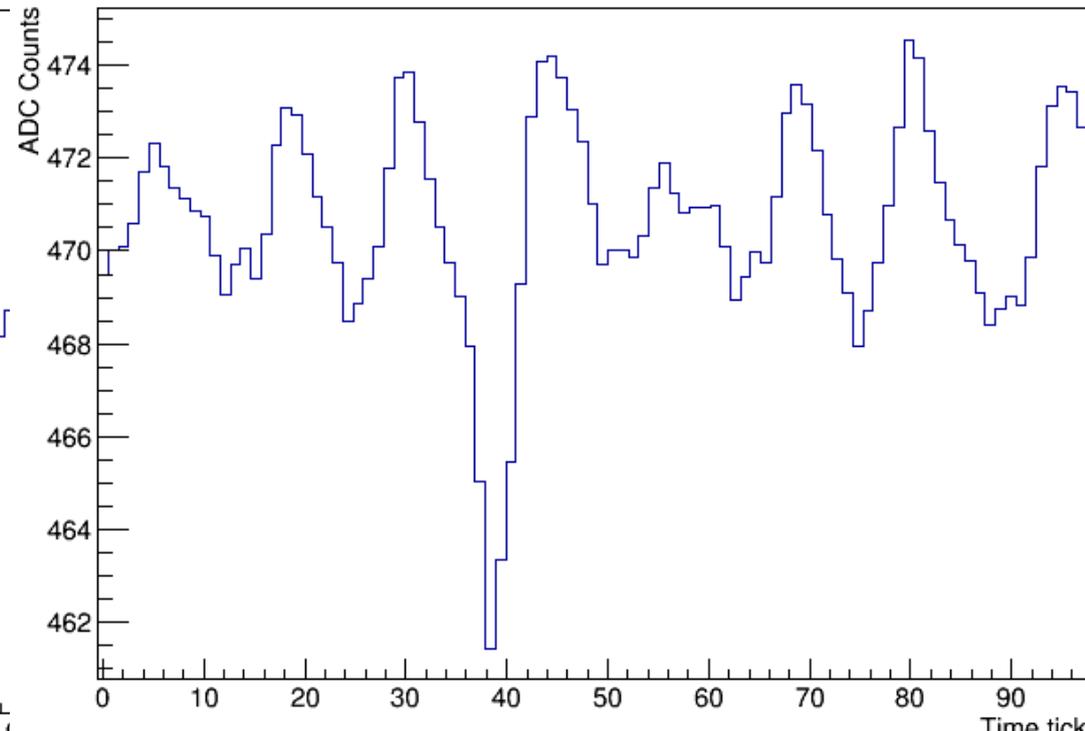
# Results

- No observed decrease in crosstalk signal.
- Thus, crosstalk not due to voltage droop.
- Left: Capacitors on. Right: Capacitors off.

Pulse from Crate 1, FEM 13, Channel Number 32



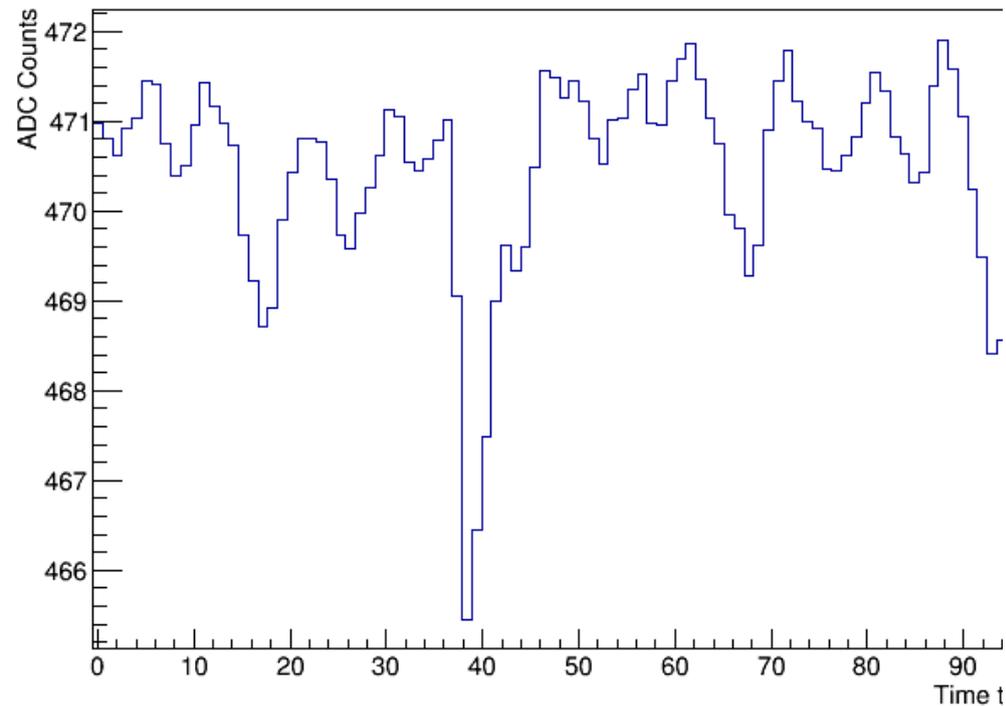
Pulse from Crate 1, FEM 13, Channel Number 32



# PMT cable

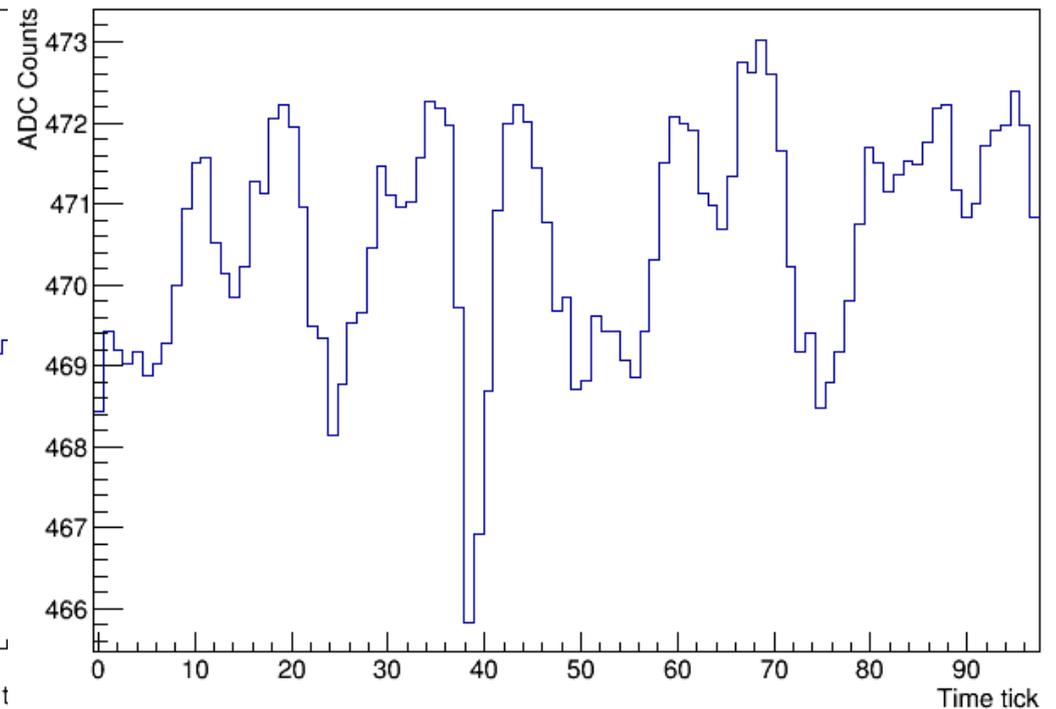
- Sten suggested that the crosstalk may be due to an imbalance of charge on the PMT cable.
- Reducing the cable length should reduce the effect.
- Left: Long cable.

Pulse from Crate 1, FEM 13, Channel Number 32



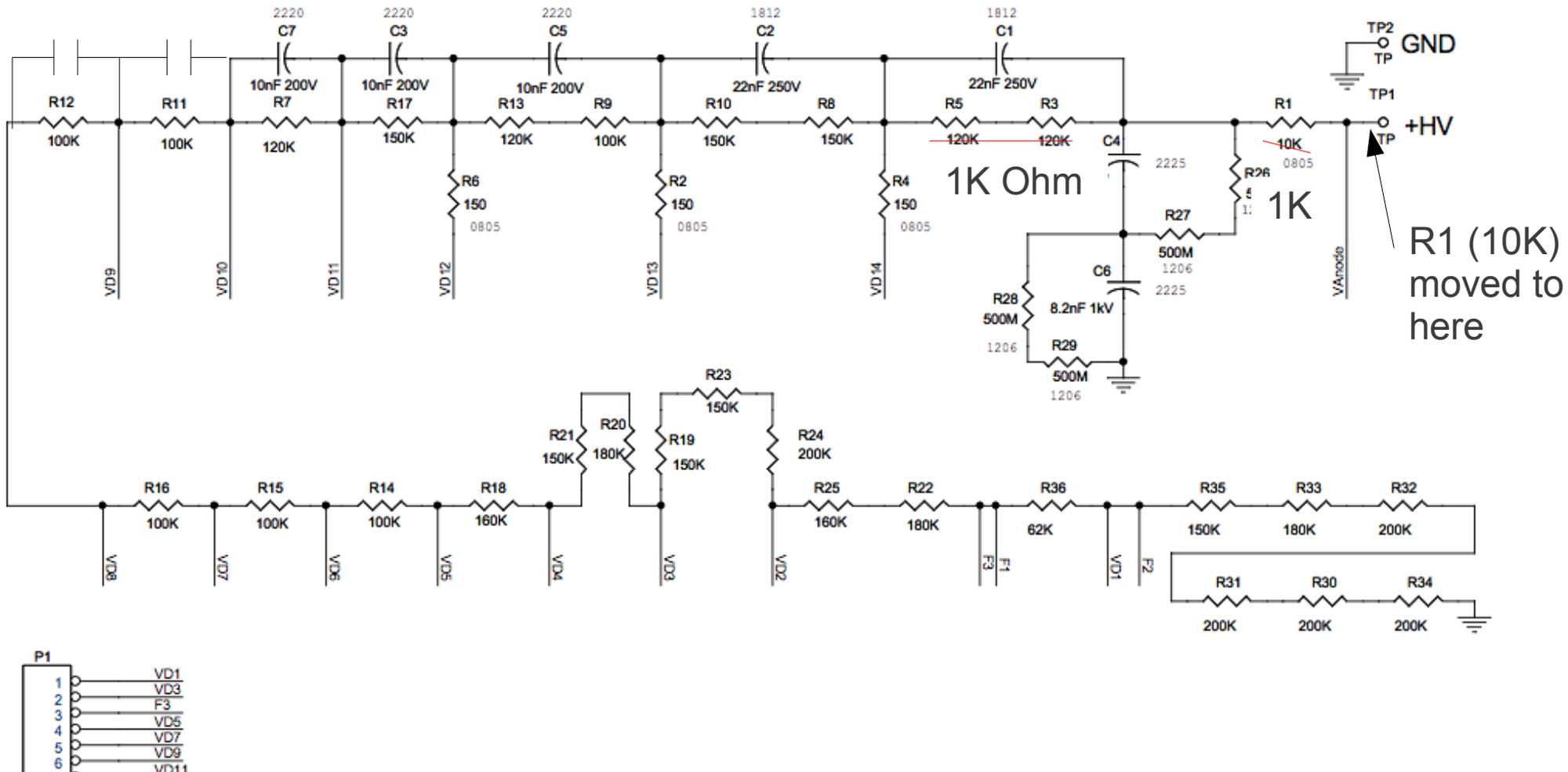
Right: Short cable.

Pulse from Crate 1, FEM 13, Channel Number 32



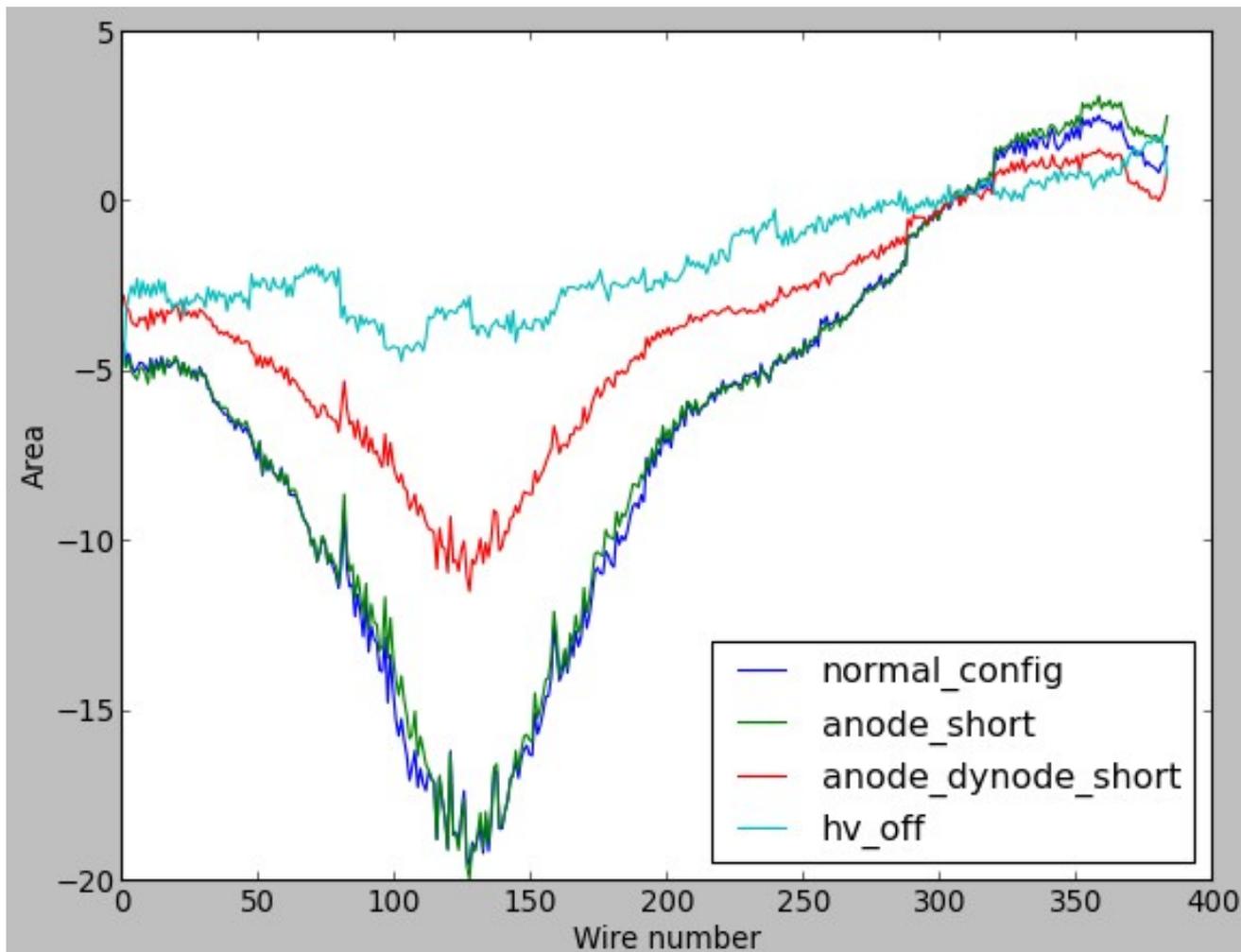
# Where is the effect coming from?

- Goal: Disable the anode in order to see the effect this has on the crosstalk signal.



# Results

- Reduction in signal observed when replacing 120K resistors with 1K



- anode\_short: R1 moved and replaced with 1K Ohm
- anode\_dynode\_short: The above along with R3 and R5 replaced with 1K Ohm

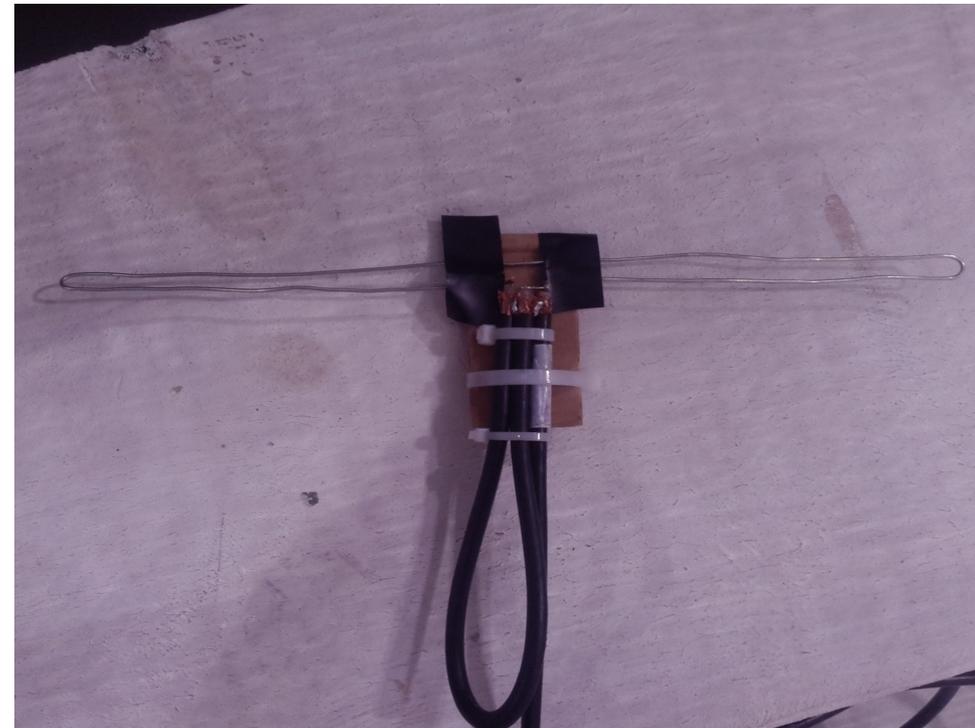
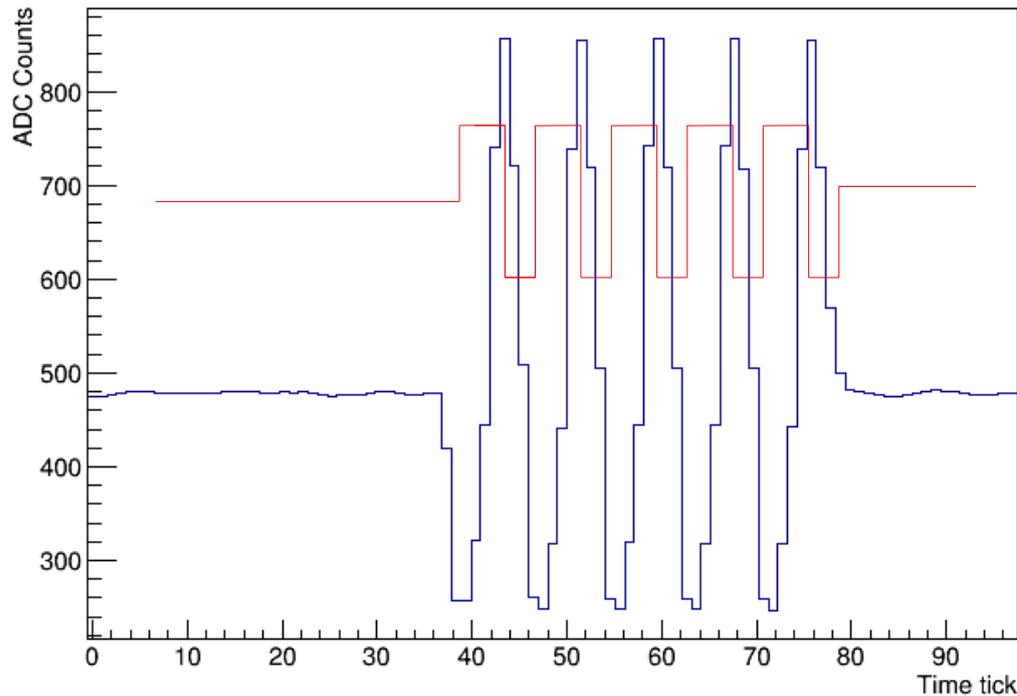
# Conclusion

- Crosstalk effect seems to be generated at the end of the dynode chain, around the anode.
- As yet, no clue to what the effect actually is.

# Antenna: Dipole design

- Folded dipole for maximum radiating efficiency.
- Greatest crosstalk effect observed with long period square wave modulation.
- Suggests capacitive coupling.

Pulse from Crate 1, FEM 15, Channel Number 32



# Antenna: Plate

- Plate design for maximum capacitive efficiency.
- Tests done at same distance/modulation settings as folded dipole.
- 2x crosstalk improvement recorded.

Pulse from Crate 1, FEM 16, Channel Number 32

