

# Partial Discharge Effect on Beam Dynamics

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# Method

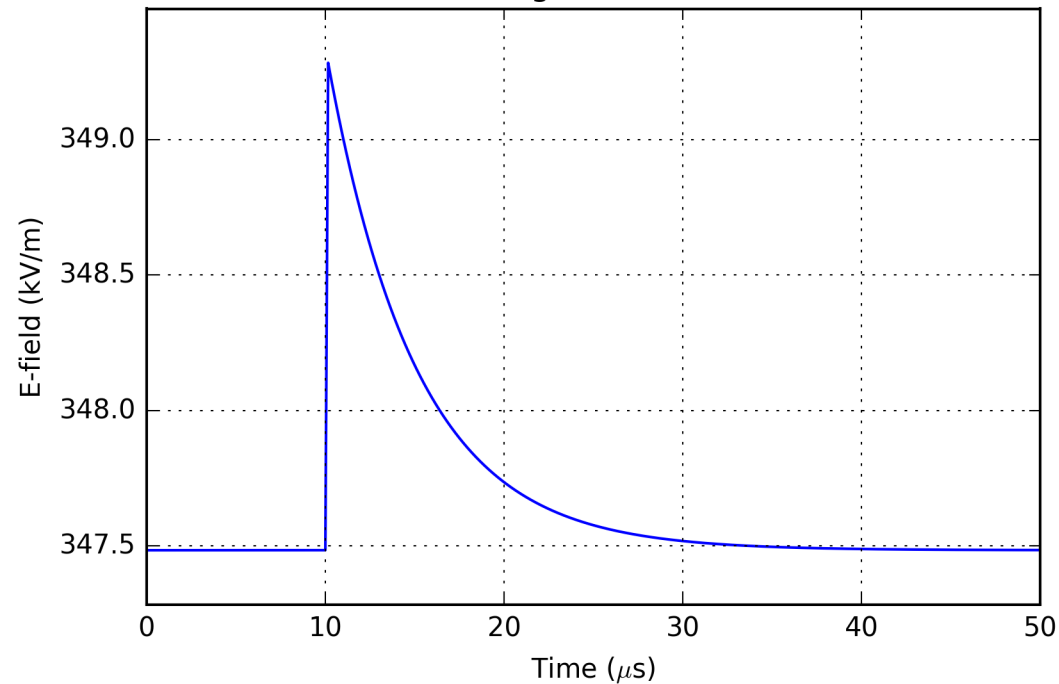
- Single muon tracked
  - ‘Magic’ momentum
  - $x = 0$
- Voltage kick/drop of 180 V\* added to bottom plate in all long quads
- Actual quad setup plus assuming quads continuous around entire ring
  - Realistic setup: effect of discharge lost

\* V. Tishchenko, E989 docdb 4449 (2016)

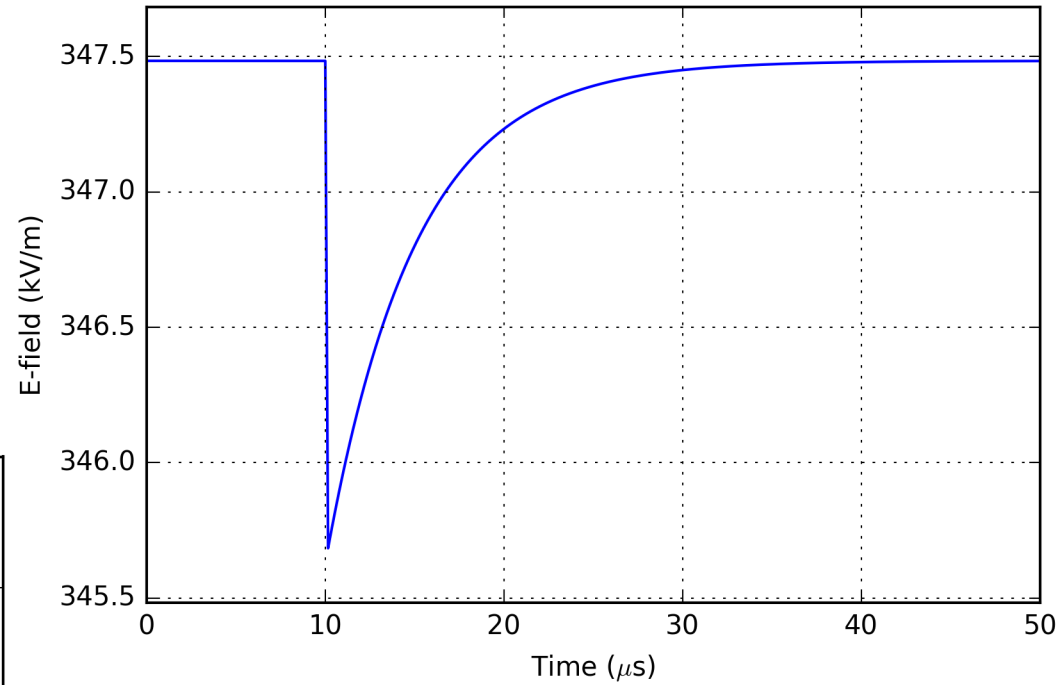
# Voltage Kick/Drop

Initial change: 156 ns  
Recovery time constant: 5 micro sec.

E-field Strength - Kick: 180 Volts

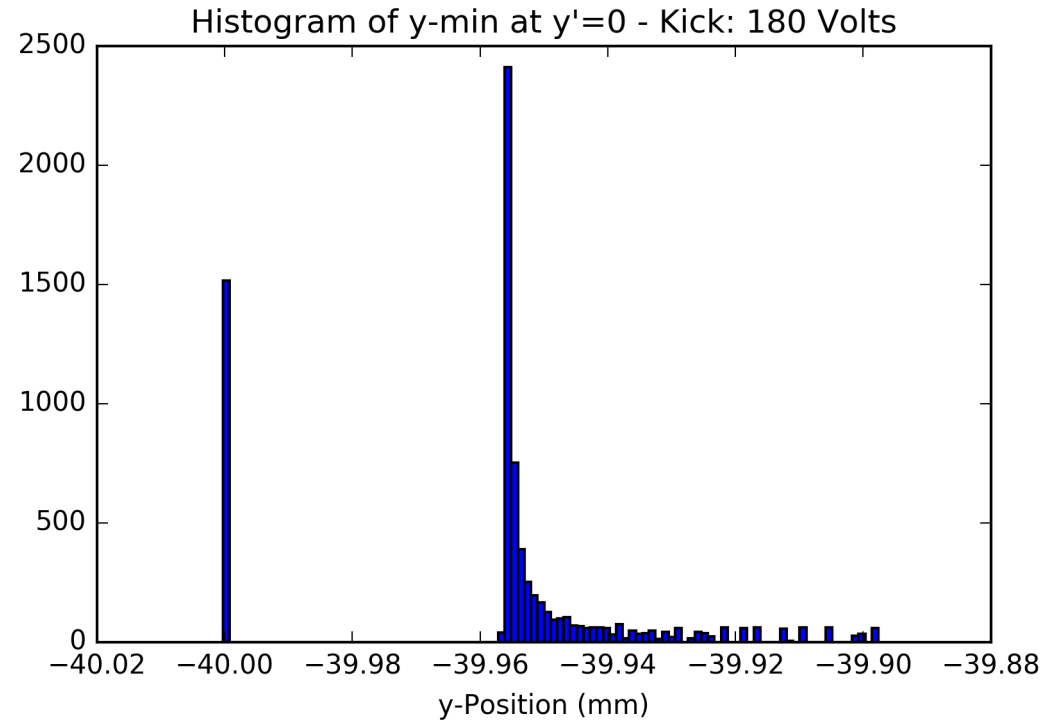
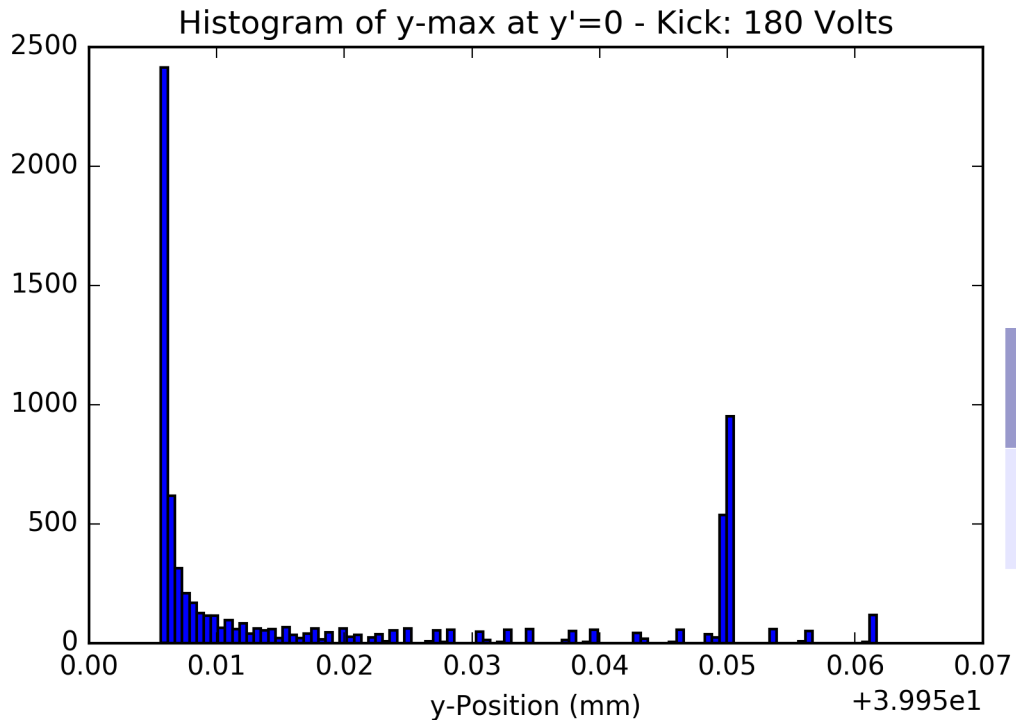


E-field Strength - Drop: 180 Volts



# Kick Results

Small peak: Pre-Change  
Large peak: Recovered

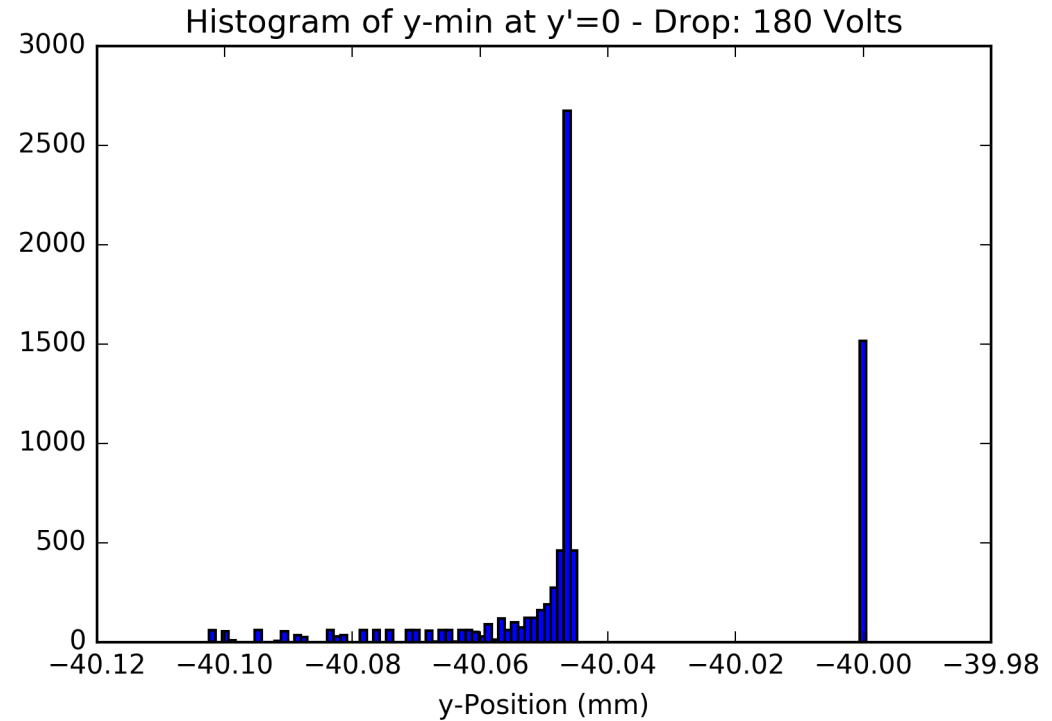
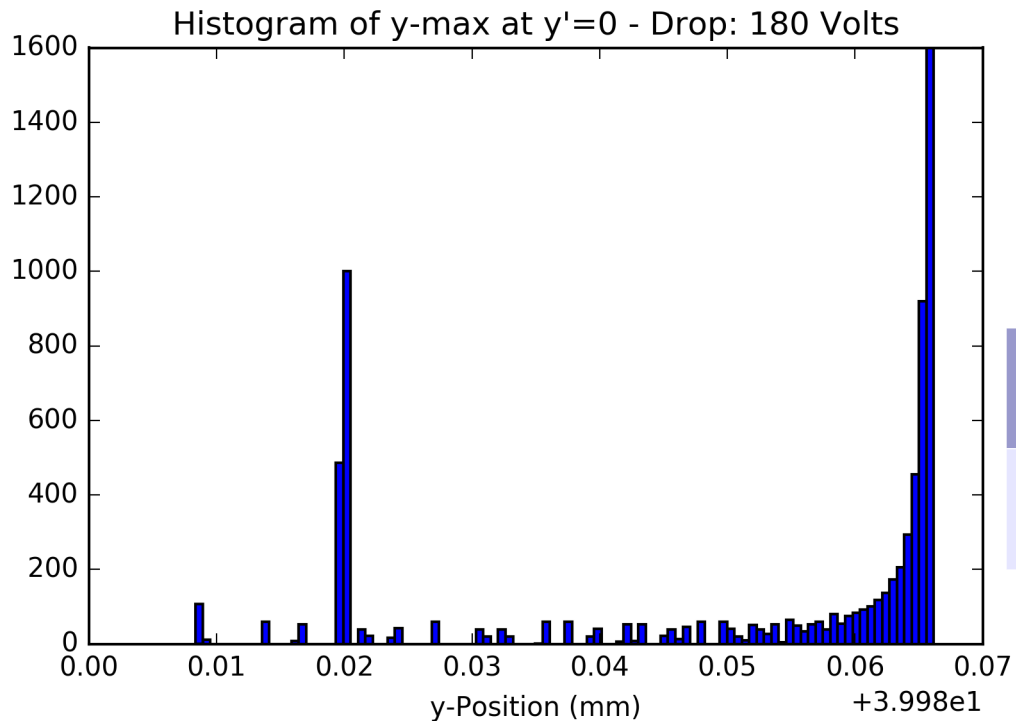


Voltage Change	Min. y (mm)	Max y (mm)	Rec. Min. (mm)*	Rec. Max. (mm)*
+180	-40.06	40.101	-39.955	39.955

\*Data read from the histograms

# Drop Results

Small peak: Pre-Change  
Large peak: Recovered



Voltage Change	Min. y (mm)	Max y (mm)	Rec. Min. (mm)*	Rec. Max. (mm)*
-180	-40.102	40.046	-40.045	40.045

\*Data read from the histograms

# Combined Results

Voltage Change	Min. y (mm)	Max y (mm)	Rec. Min. (mm)*	Rec. Max. (mm)*
+180	-40.000	40.012	-39.955	39.955
-180	-40.102	40.046	-40.045	40.045
0	-40.000	40.000	-	-

Largest effect is an extension of the minimum y-position of about 0.1 mm from a voltage drop.

Associated tech note: docid # 4485