Status Report
100 keV DC Gun Test Stand

December 12, 2005

Gun Test Stand Status

- Since the last meeting
  - Thermionic emission from ZrC single tip → anode electron bombardment
  - Lots of technical problems...
  - But finally, inserted first FEA

- Ongoing
  - FEA conditioning (low U_g, long τ)
  - First solenoid tests
  - First beam imaged on YAG screen
  - Gate voltage variation
  - FEA conditioning (high U_g, short τ)
  - Pulse width variation

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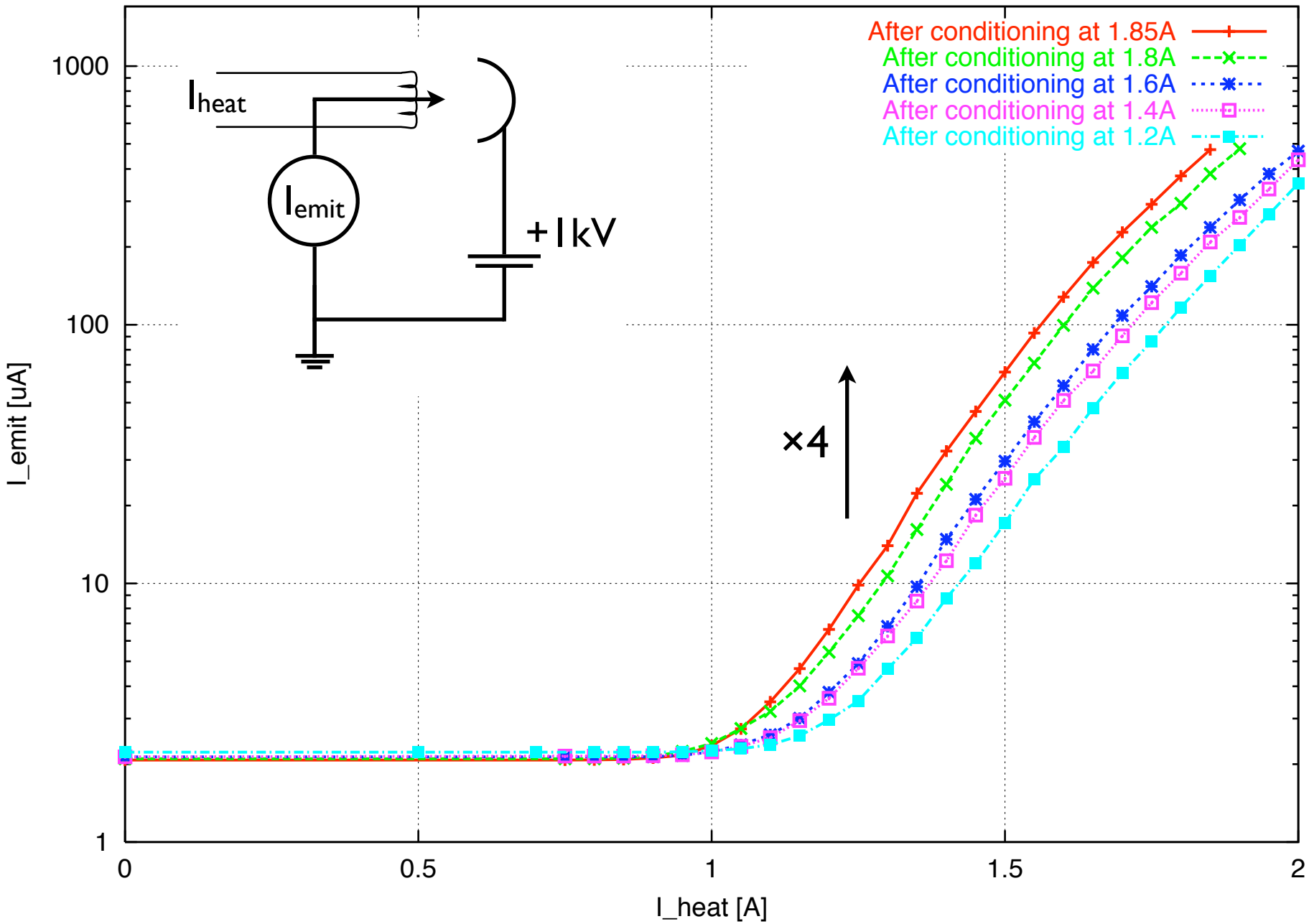
Thermionic Emission from ZrC Single Tip



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Many Technical Problems

- HV testing
  - Potential to bare hot-deck raised up to 100kV → no leak current
  - With cathode flange attached to hot-deck leak current started to appear at 80kV and increased with potential
    → corona discharges at ceramics weld seam
    → smoothing, taping

- New cathode cone arrived, but it was too long
  → needed distance piece to get 11mm accelerating gap

- Cathode holder chipped during ultrasonic cleaning → replaced

- Leak at weld seam of YAG insert bellow → sealed, new insert ordered

- But finally, on November 16 we pulsed the FEA for the first time

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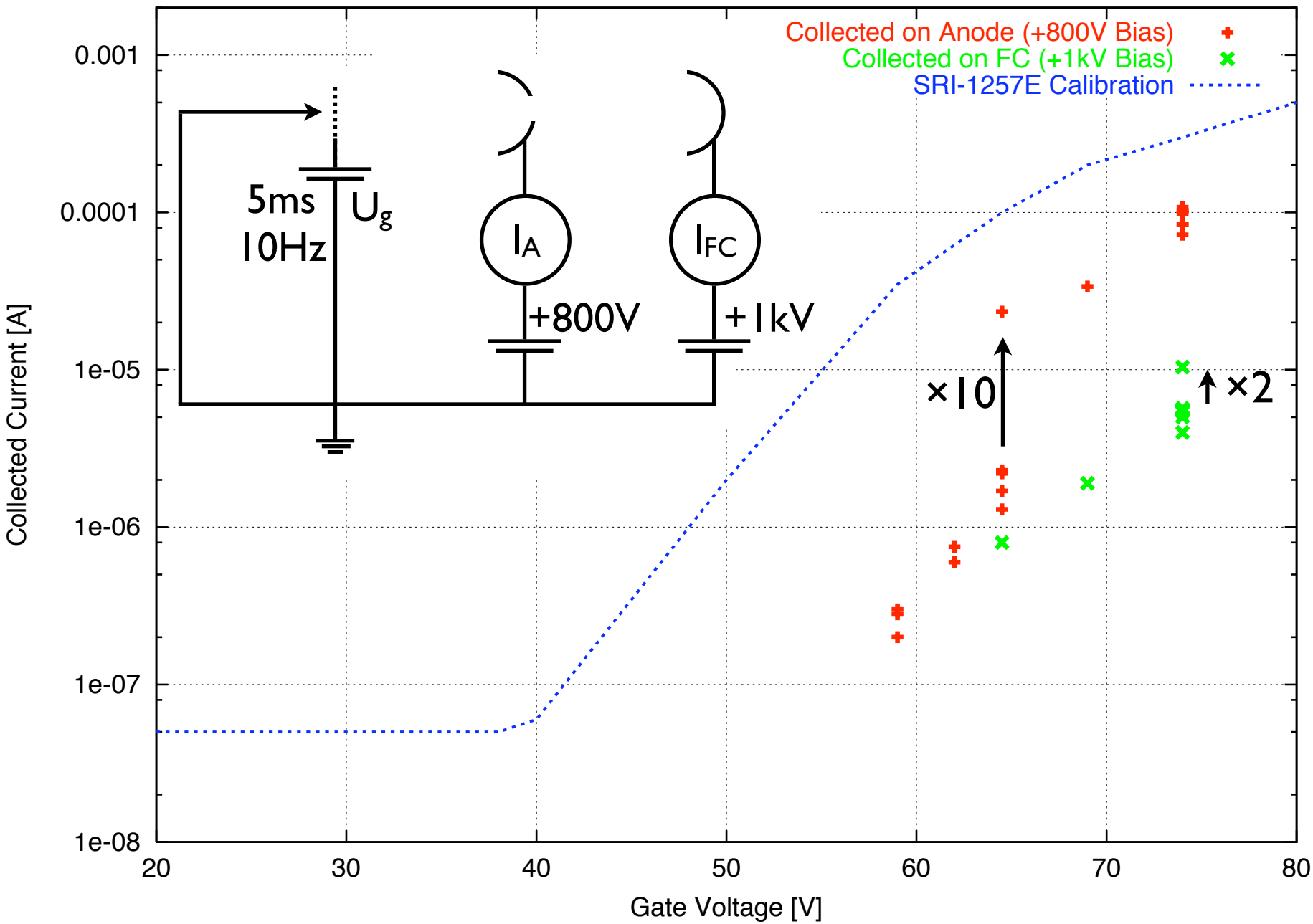
FEA Conditioning (low U_g, long τ)



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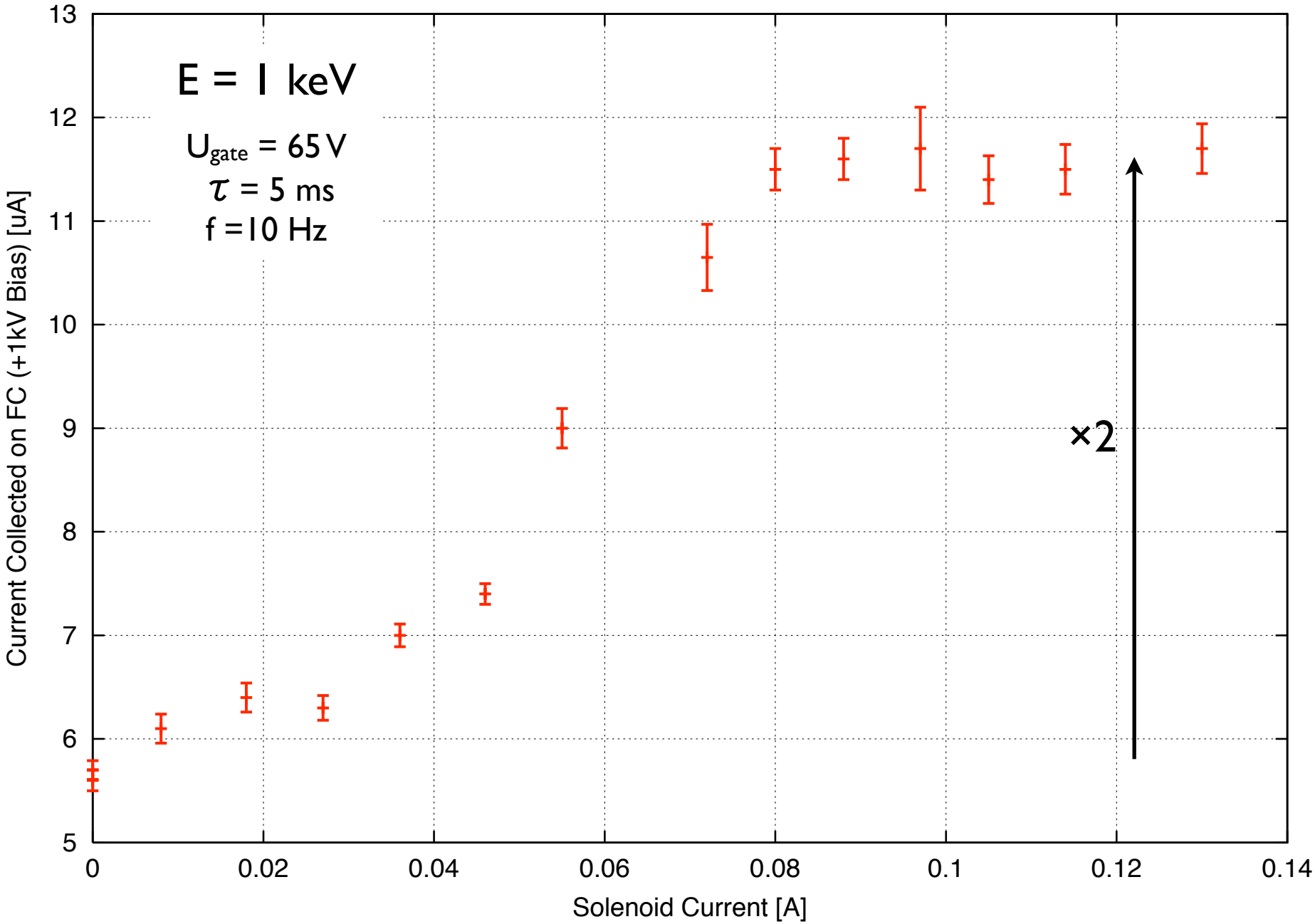
First Solenoid Tests



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First Beam Imaged on YAG Screen

E = 4.5 keV

U_{gate} = 160 V
τ = 100 ns
f=1kHz

≅800µA beam
(I_a ≅ 4mA)

I_{sol} = 310 mA
B_z = 18 mT on axis

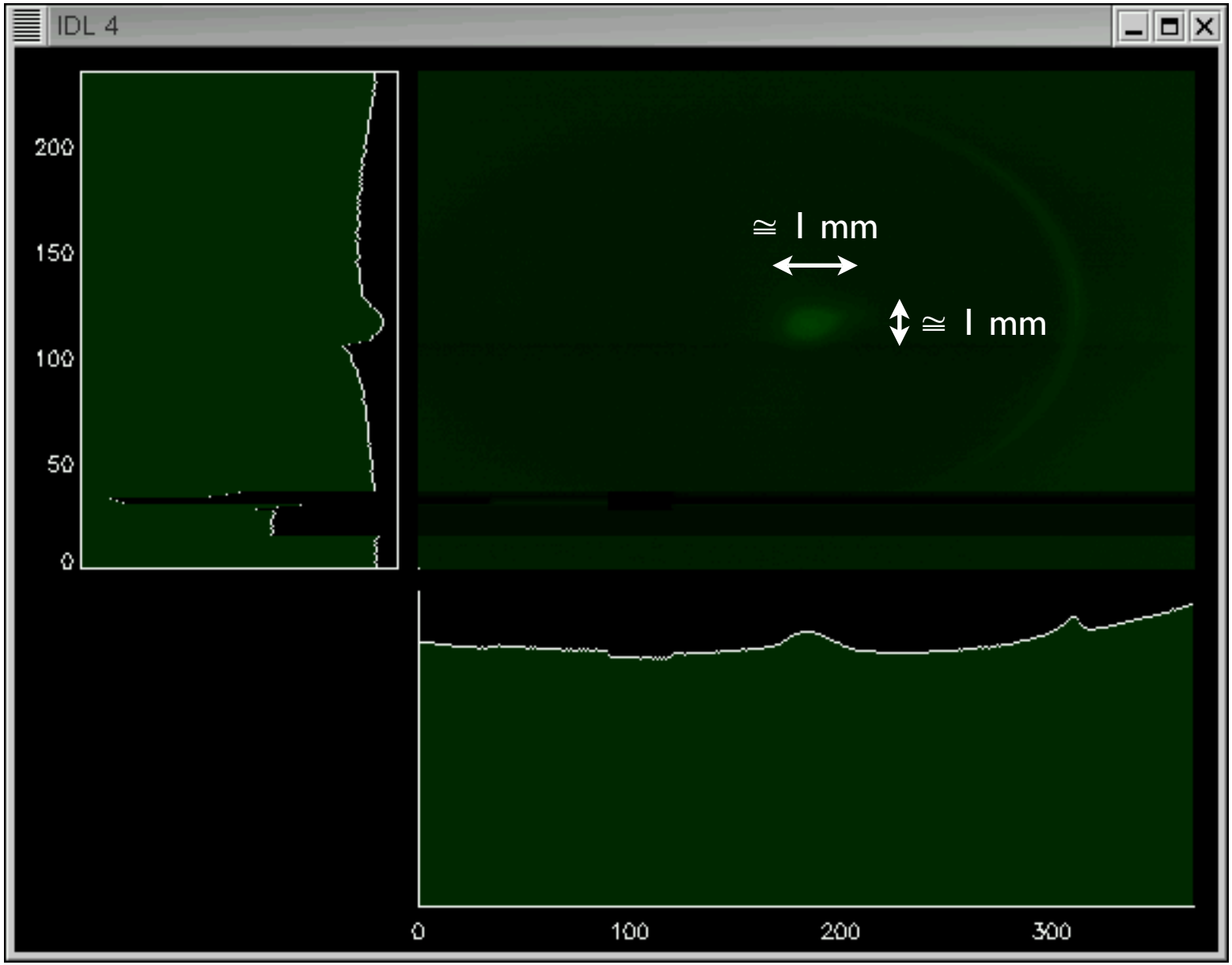

Image distortions due to problems with framegrabber read-out

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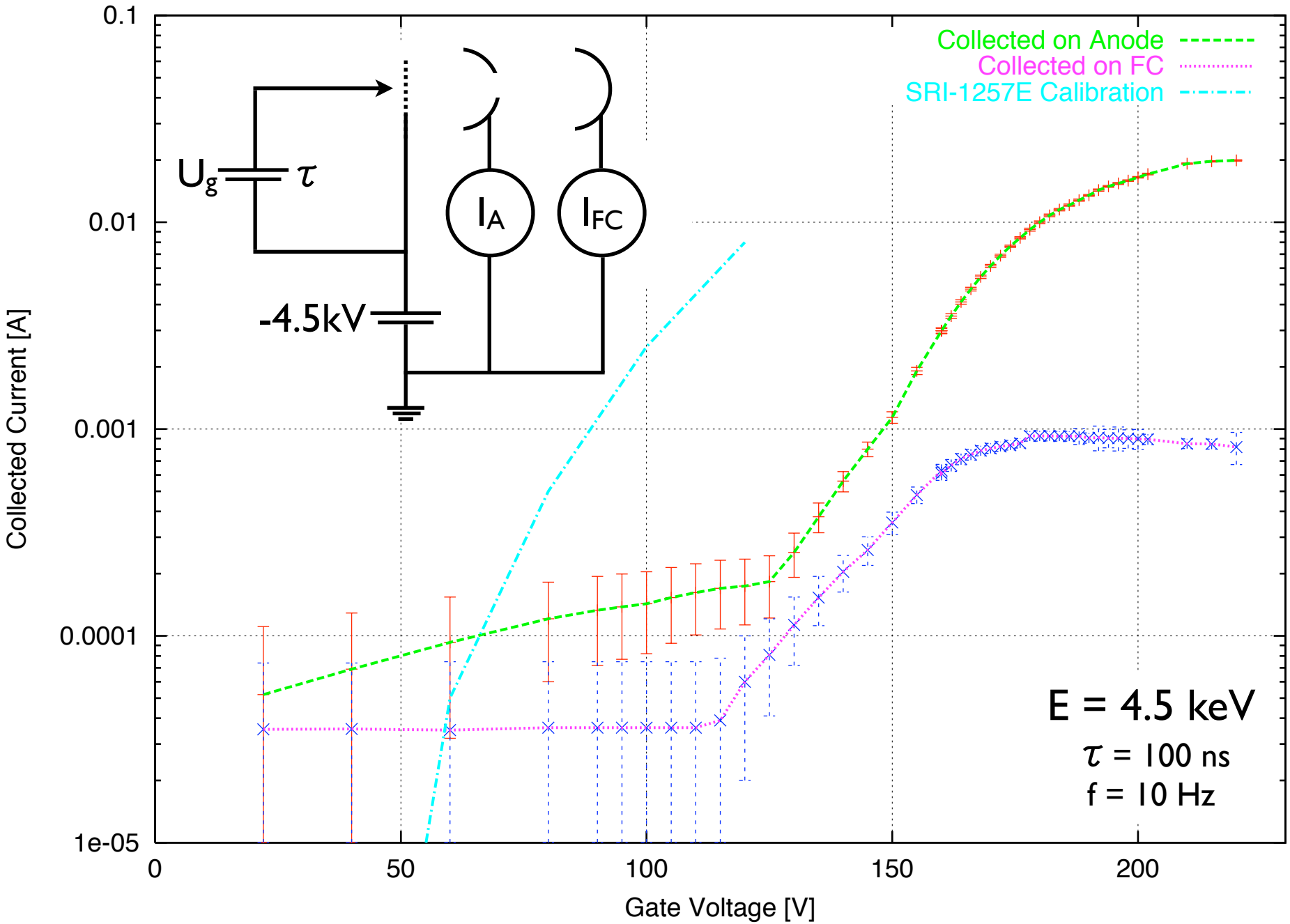
Gate Voltage Variation



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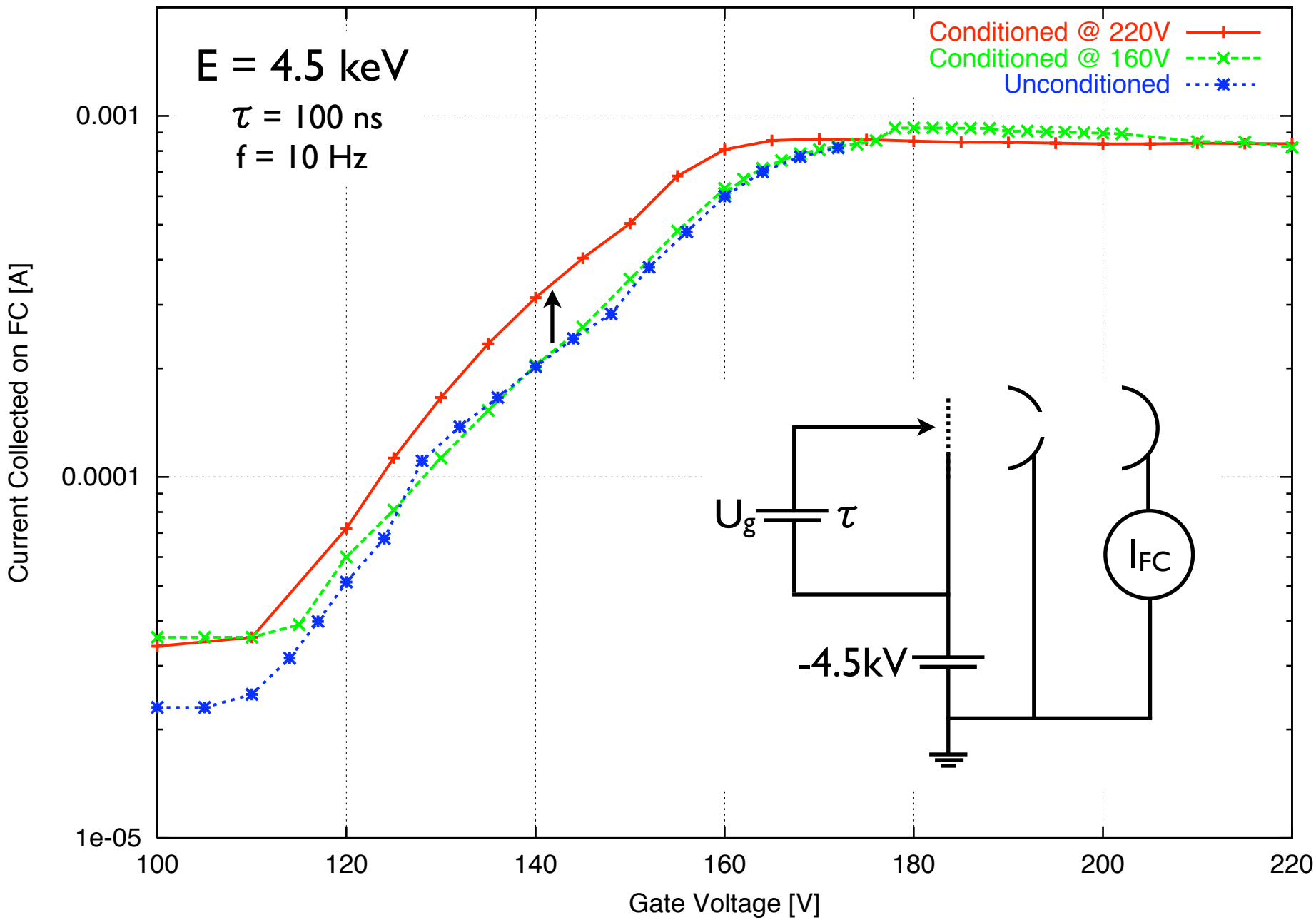

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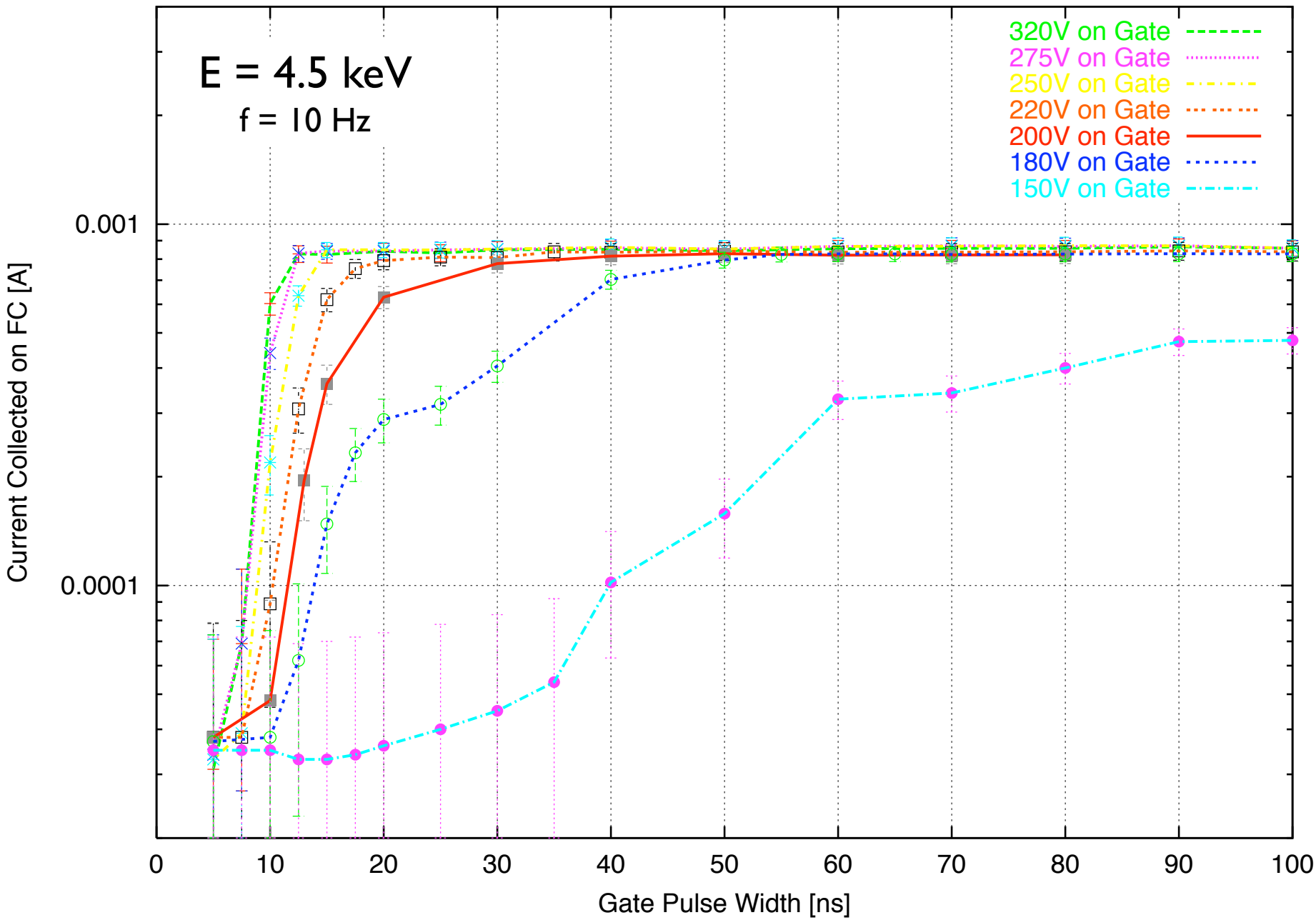
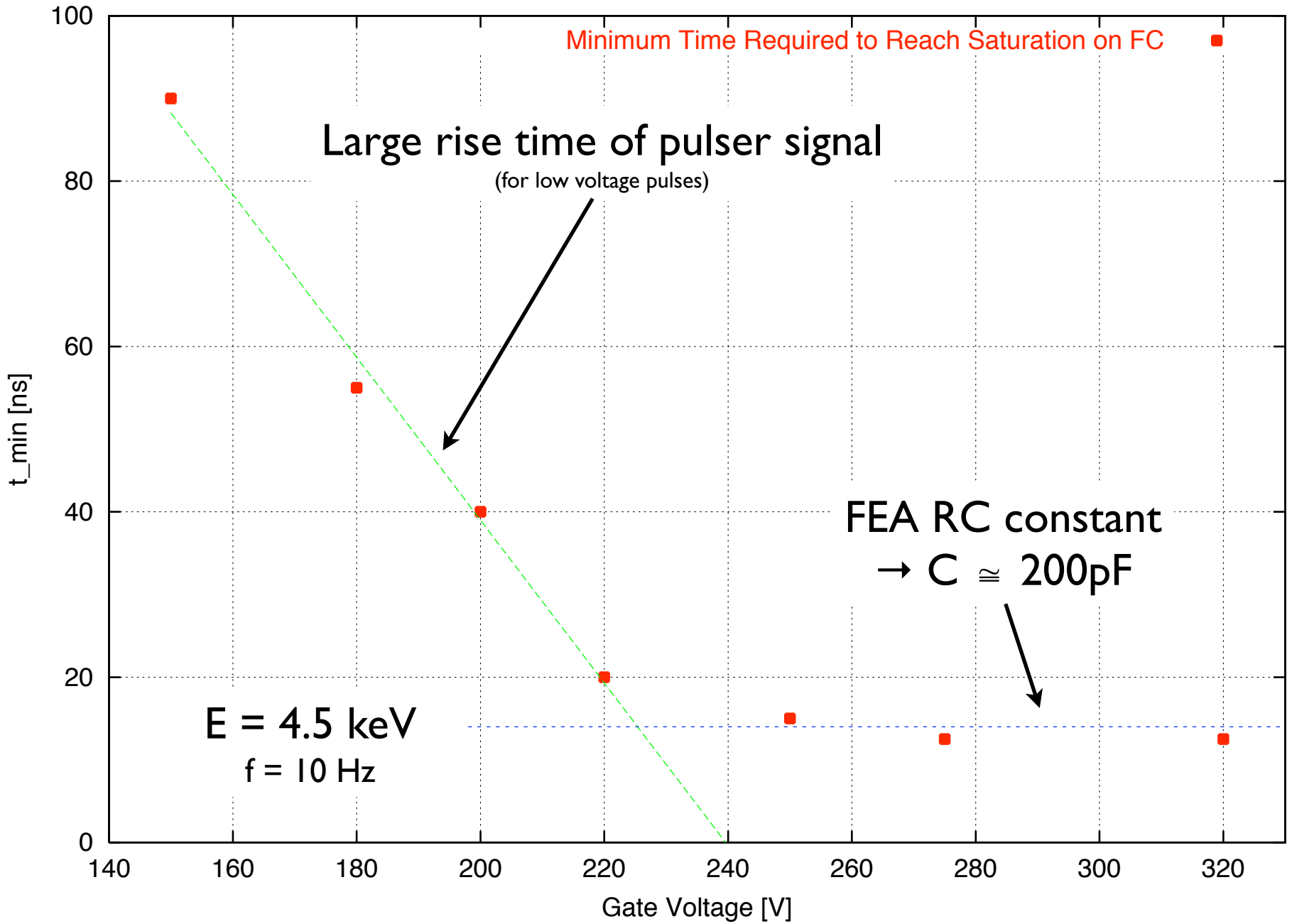
Pulse Width Variation



Pulse Width Variation



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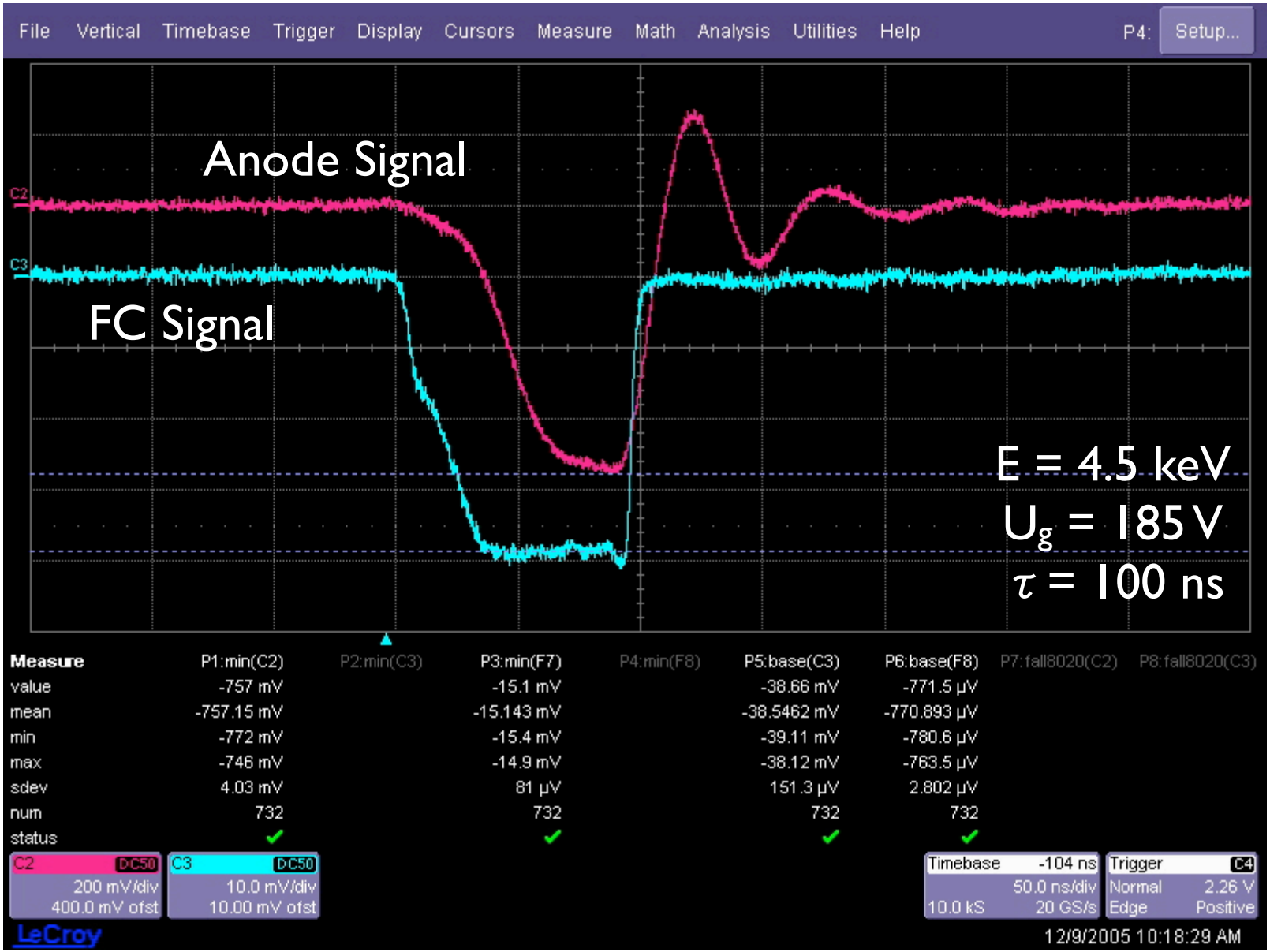
Outlook

- Determine exact pulse shape delivered by pulser at various output voltages
- Increase DC voltage up to 100kV (need clearance from radiation protection)
- Determine influence of increased HV on maximum emitted current
- Commission second camera system and P43 screen
- Transverse measurements, emittance, phase space reconstruction
- Solenoid studies

Pulse Width Variation



Pulse Width Variation