First positive ionic drift measurements
Very preliminary

Fred Hartjes

NIKHEF

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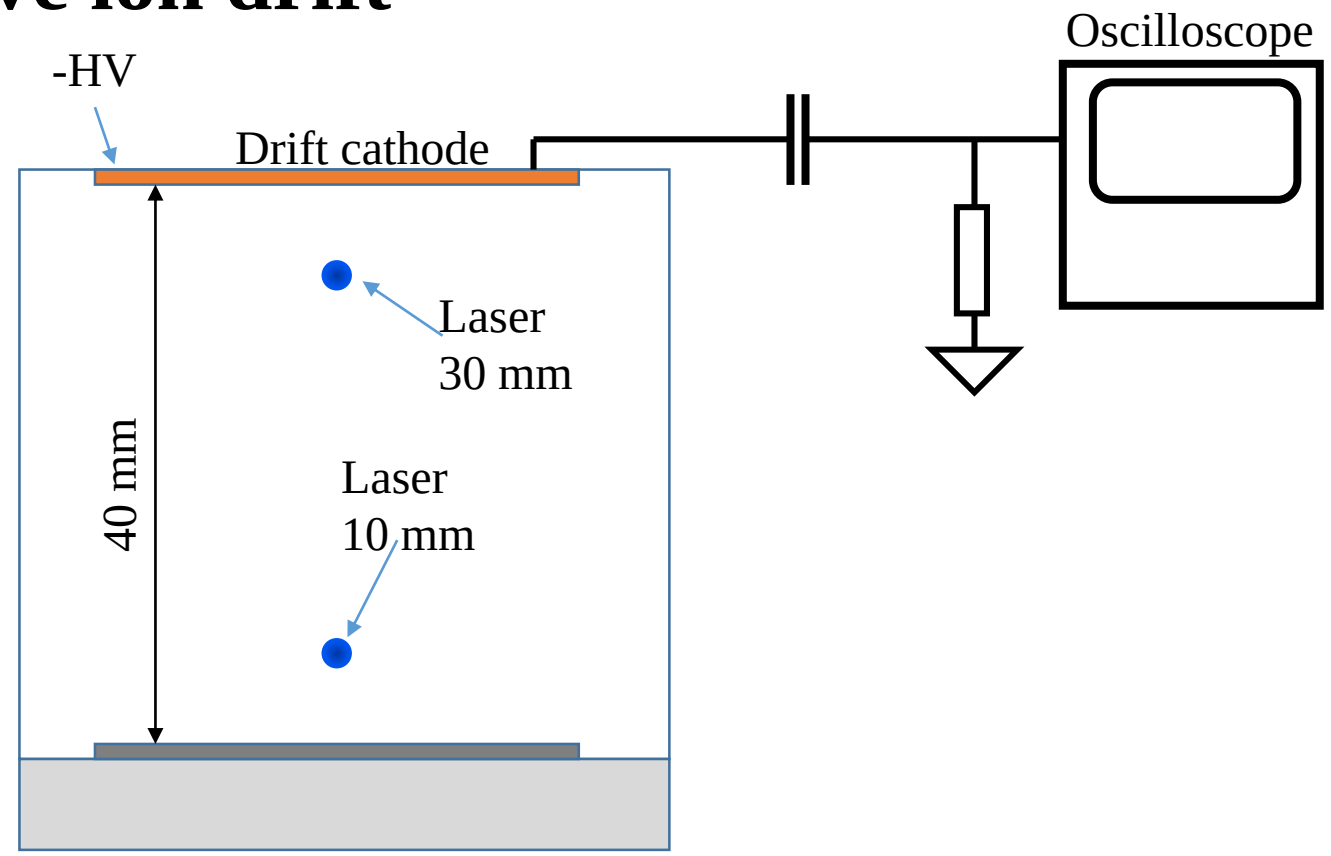
Setup for measuring positive ion drift

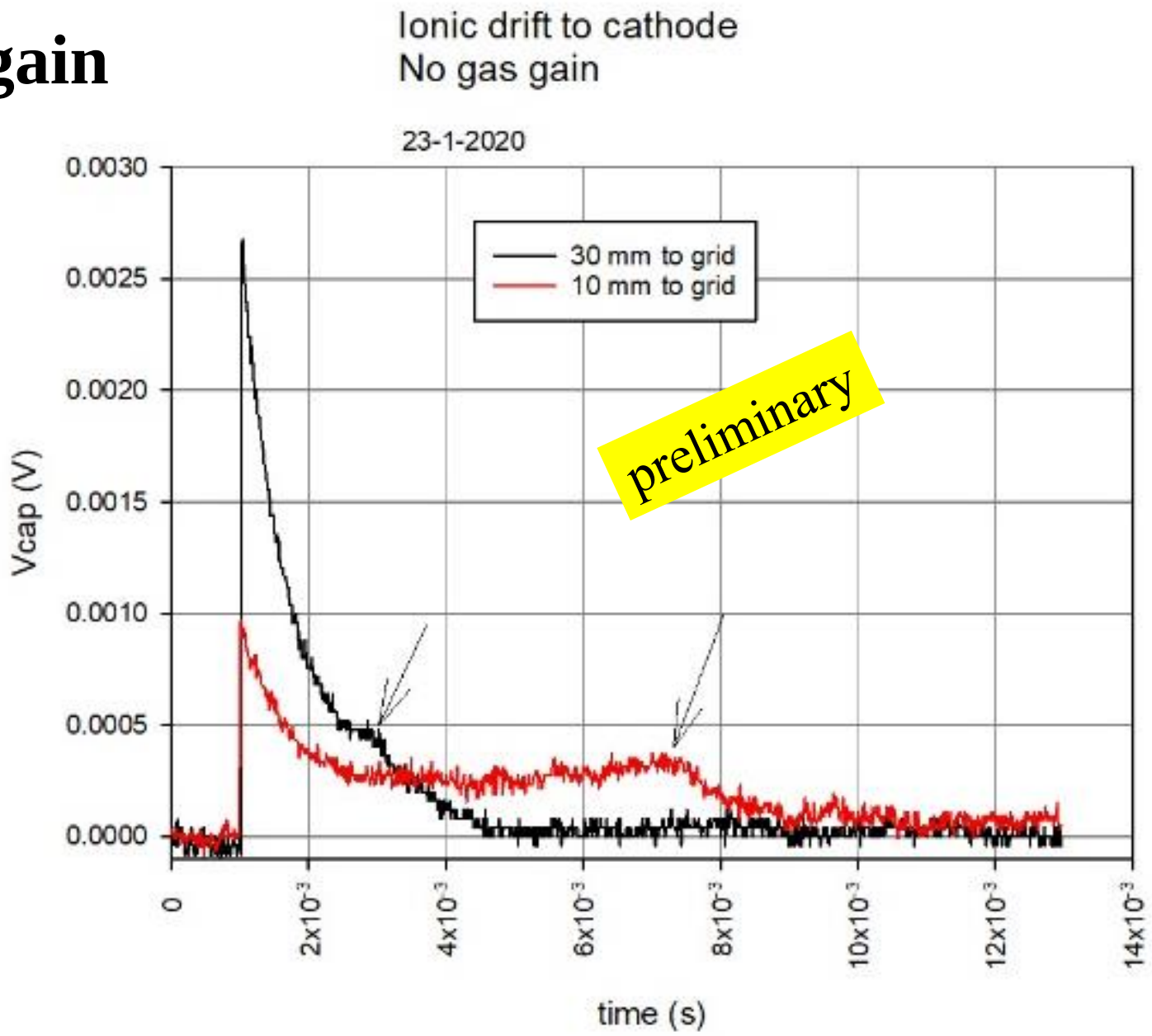
- Ions induce charge on drift cathode
- This is larger at smaller distance to the cathode
- Measurements triggered by laser diode
- Measurements averaged over 32 triggers



Ionic drift without gas gain

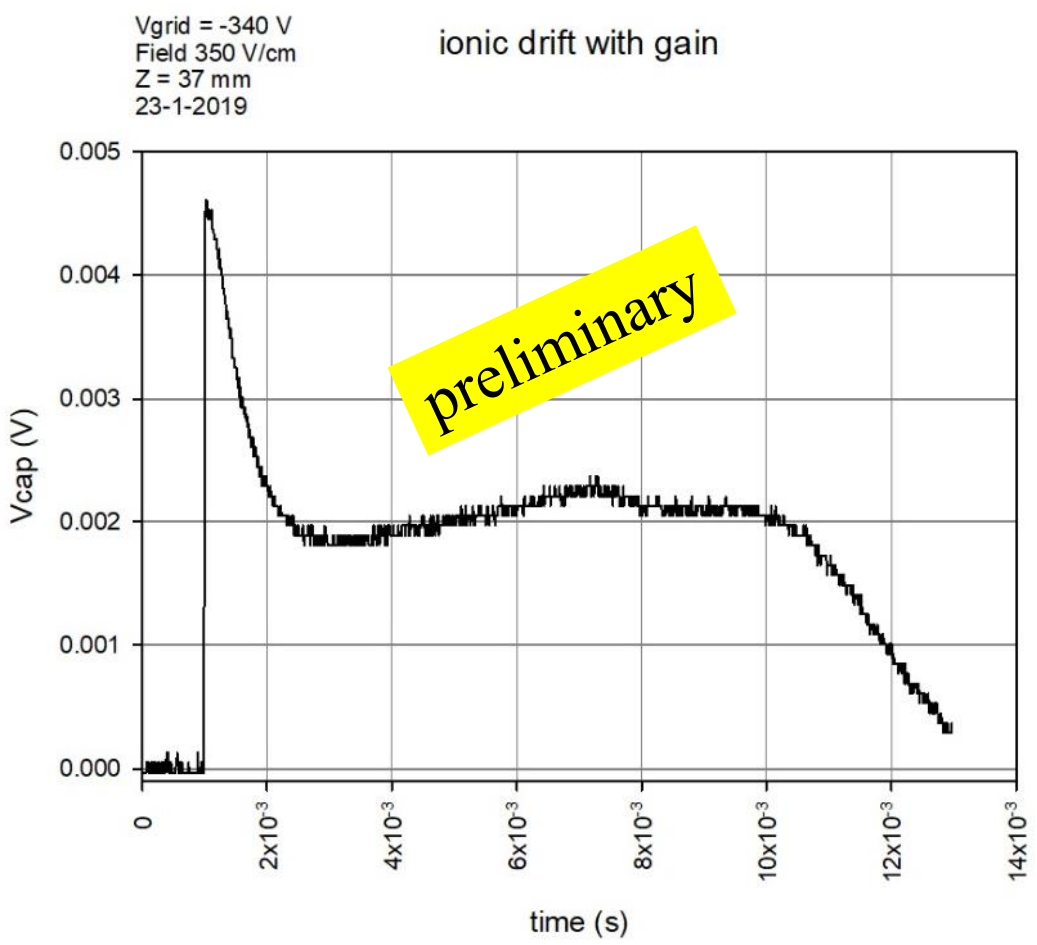
- Only the primary ions are visible
- => No ions from the avalanche
- Laser beam at 10 mm (black curve) and 30 mm (red curve) from the drift cathode

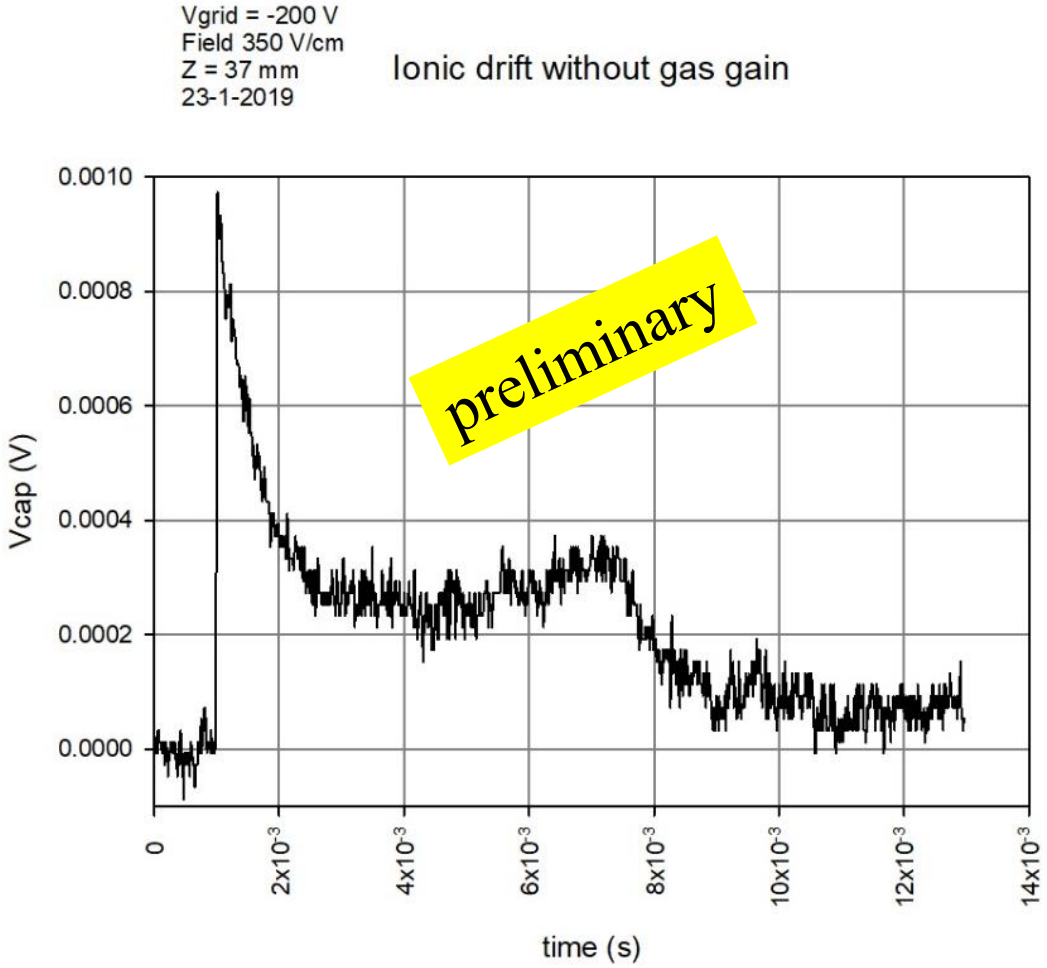
- Note that the plot merely depicts the induced current on the drift cathode, NOT the integrated charge
- Time constant about 0.5 ms
  - Due to resistance of protection diodes (about 10 Mohm)



Ionic drift with and without gas gain

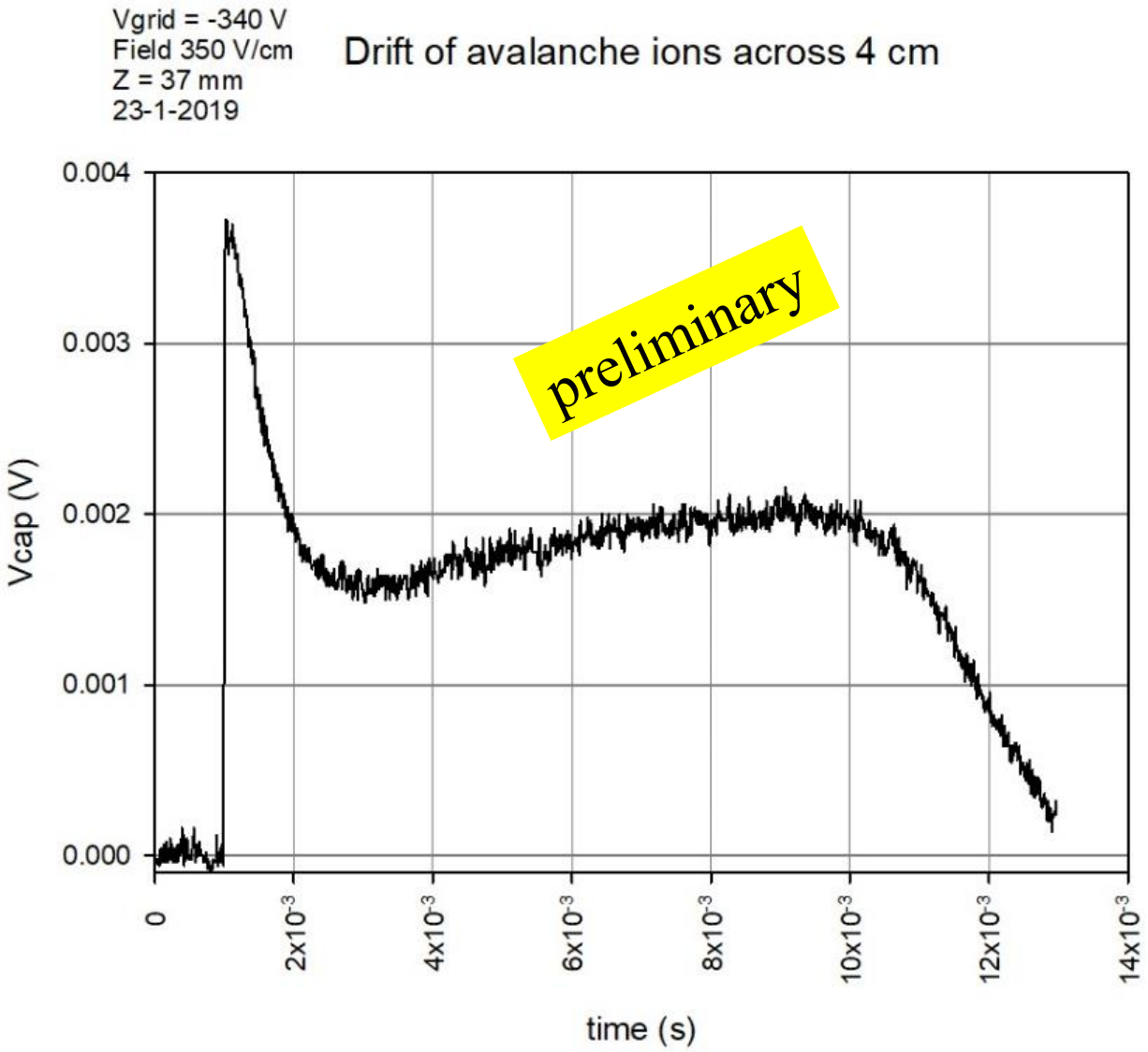
- Note that the amount of avalanche ions is about 6 x the amount of primary ions
  - See the current at 3.5 ms





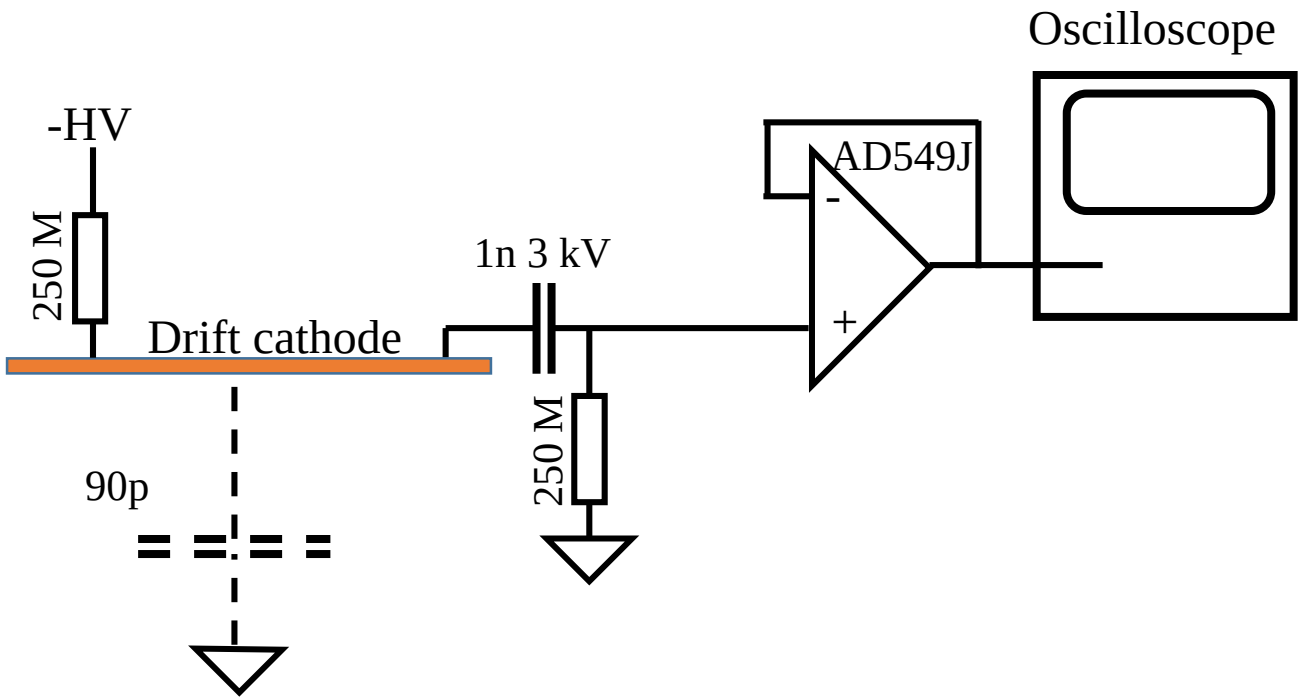
Drift of the avalanche ions

- The primary ions have been subtracted
- Grid current 0.50 nA
- => 0.167 nC per laser shot
- Note the slow decay after 10 ms
  - High diffusion?
  - Different drift paths?



Electronic setup

- For the previous plots the decay time (~ 0.5 ms) is very short
- This has now (24-1-2020) been changed to 10 ms
- Scope has a most sensitive scale of 0.5 mV/div



Basic electronic circuit

- Situation since 24-1-2020 (NOT for the previous plots)

- Values measured with test pulse
  - Through 1 pF and 100 MOhm
- Parasitic capacity of drift cathode, Lemo cable, electronics measured as 89.5 pF
- Time constant 0.5 => 10 ms
- We may increase this by adding additional capacitors at the circuit
- We may get an ideal integrator by deconvolution of the measured curve from the RC time constant