Field response check in PDVD

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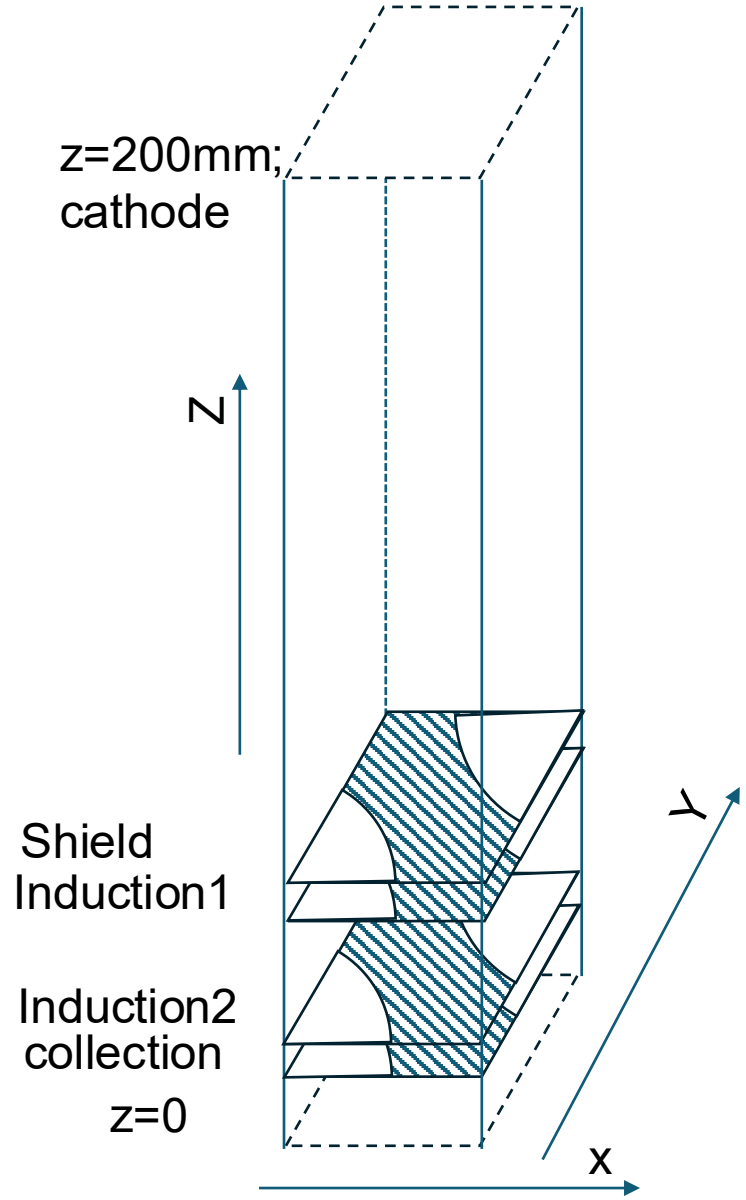
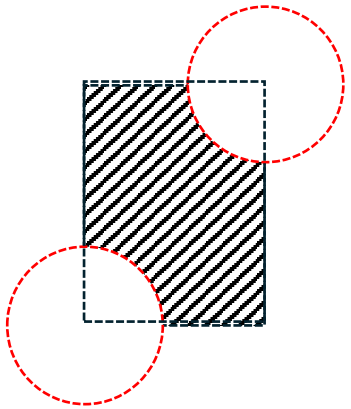
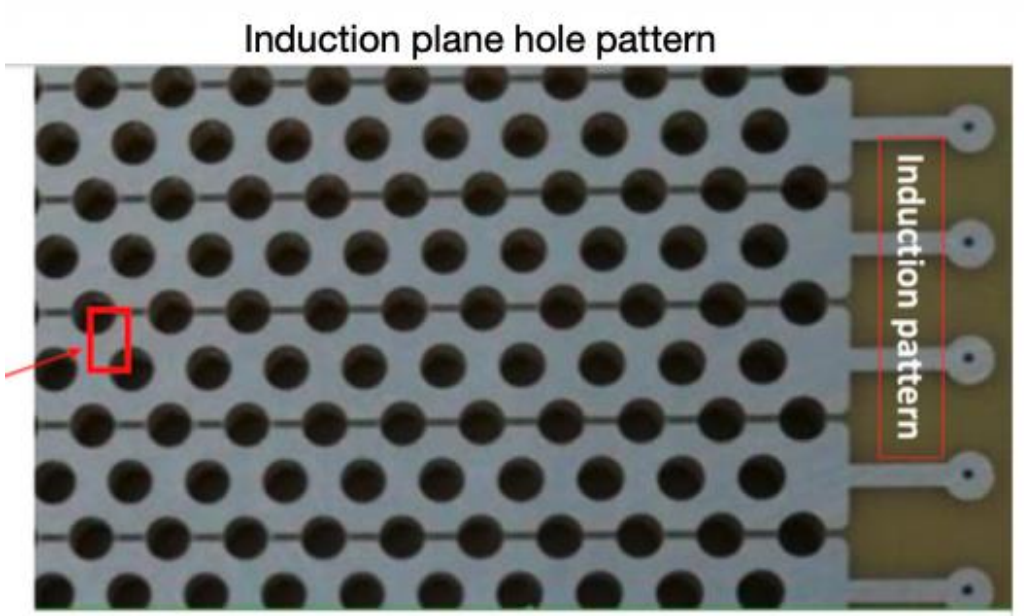
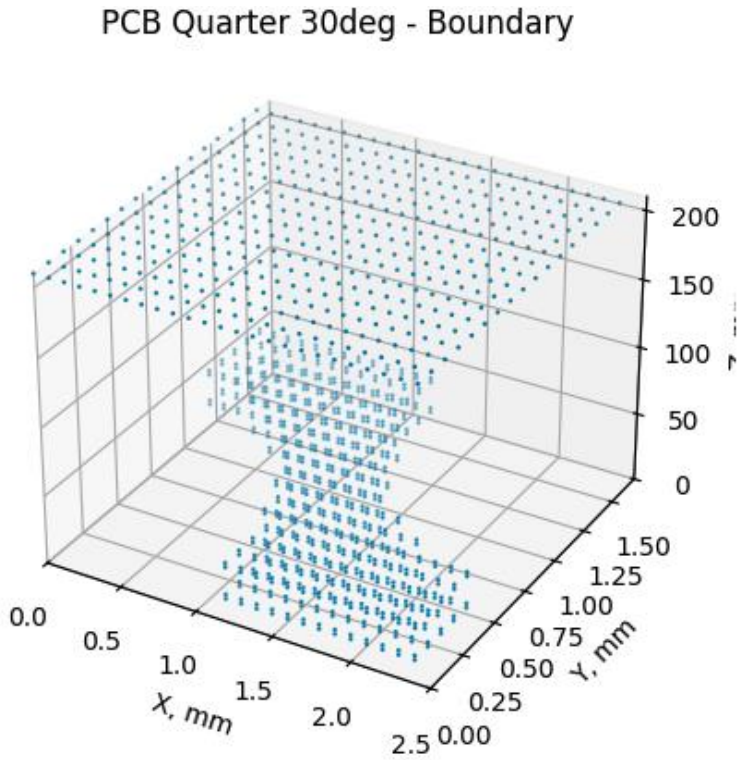
3D Drift field

Minimal symmetry for Drift Field





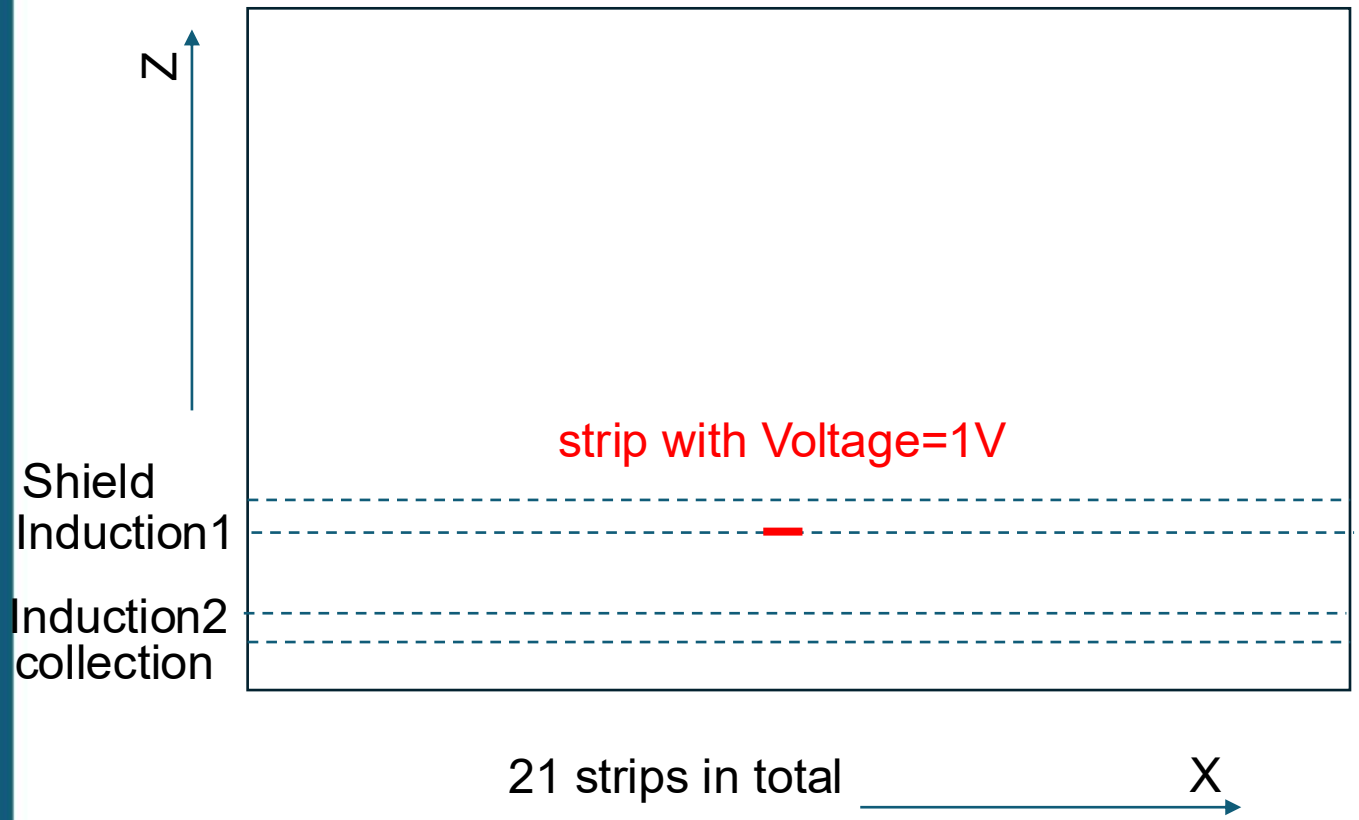


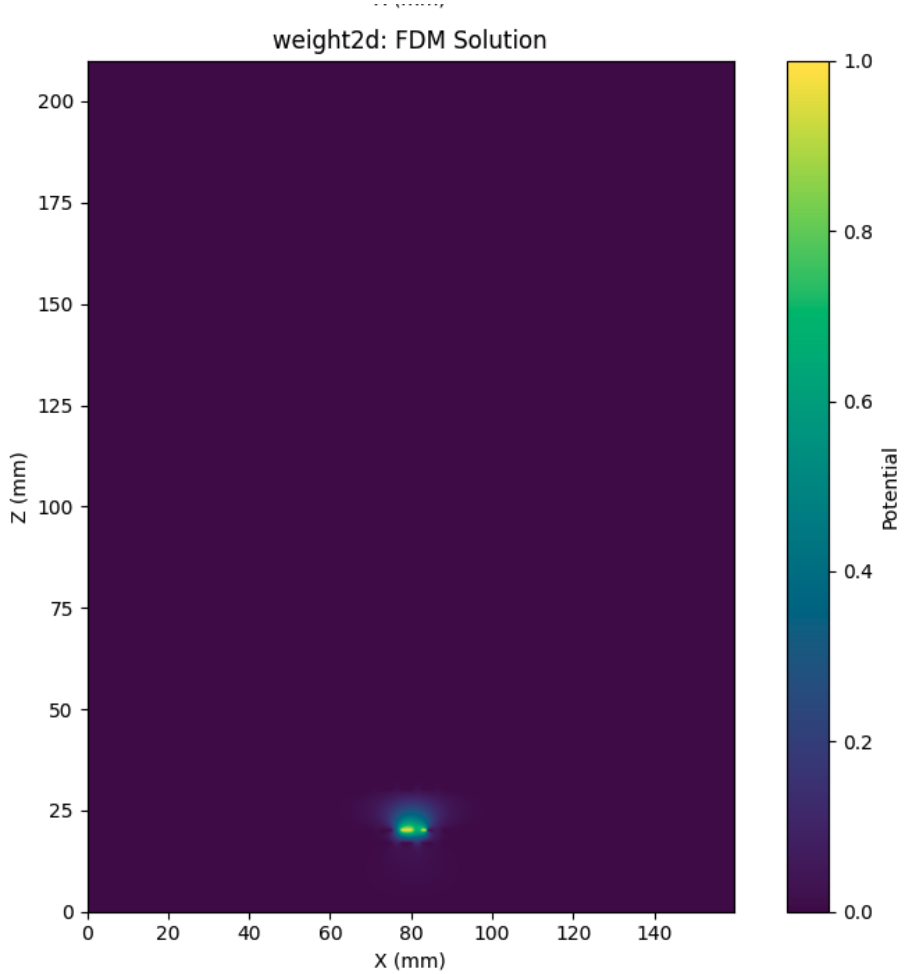


2 arrays to describe:
one for boundary;
one for voltage.

Then solved by FDM.

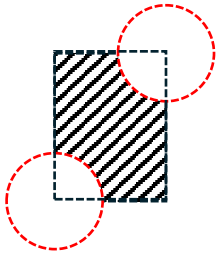
2D weighting field

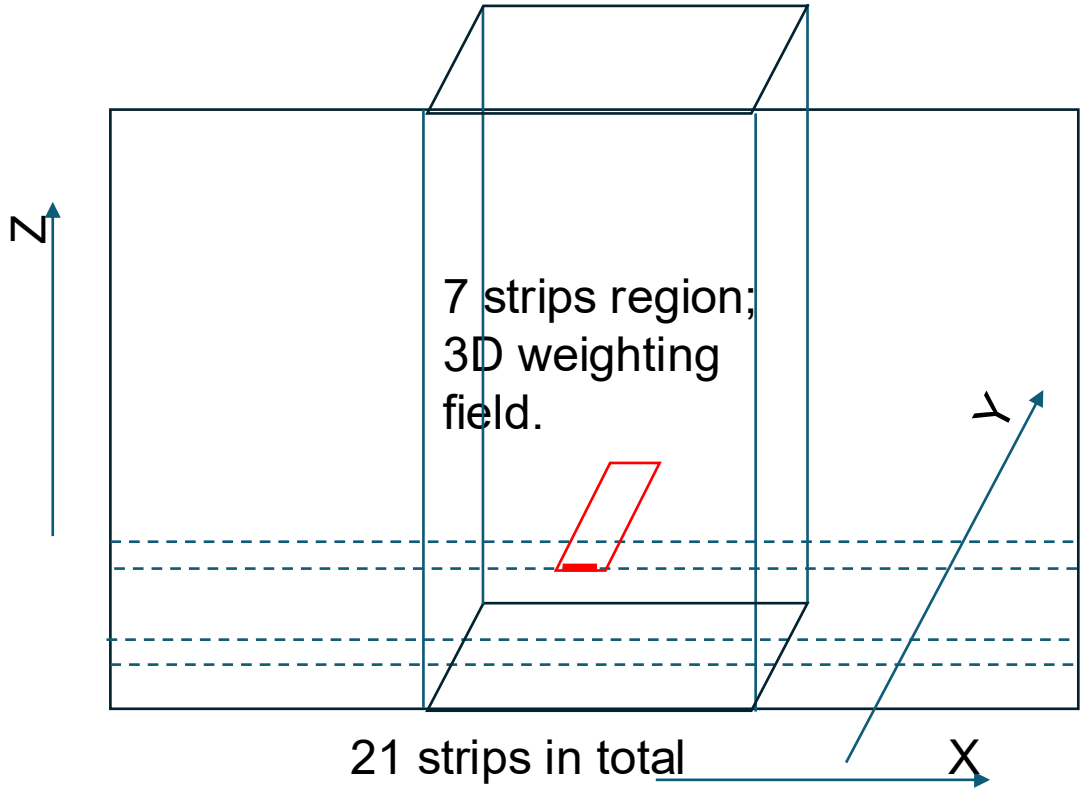




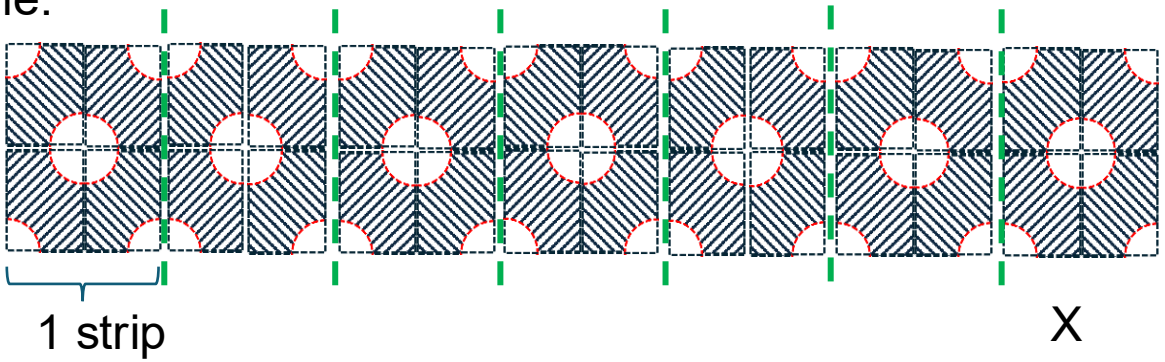
3D weighting field

⊗, strip direction

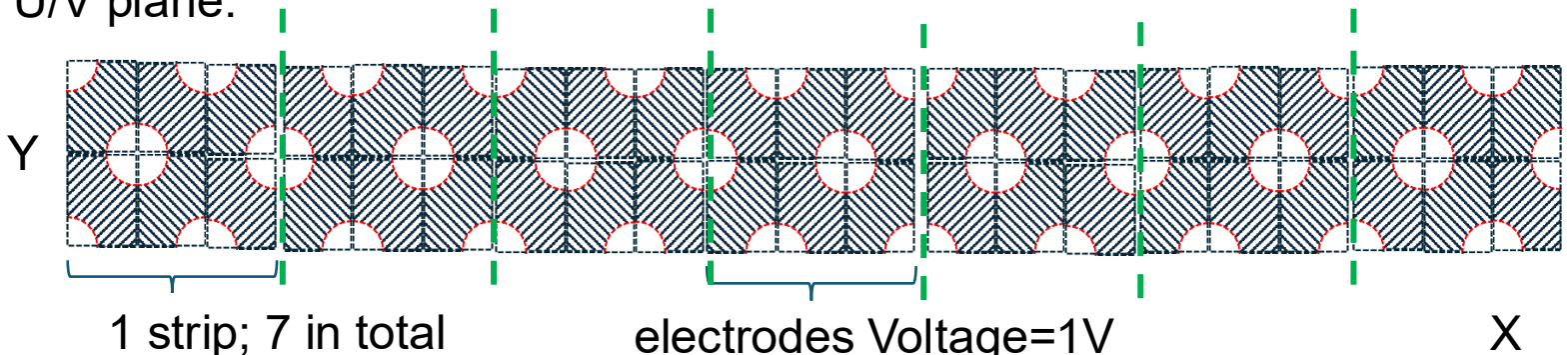




W plane:

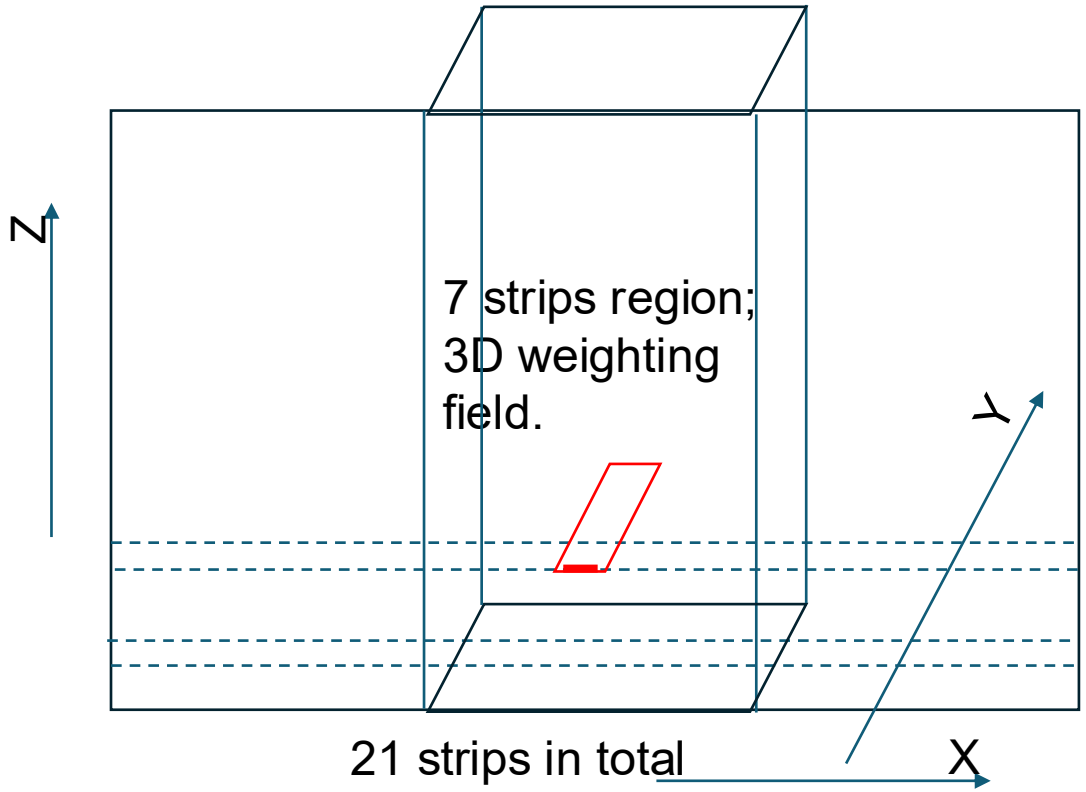


U/V plane:

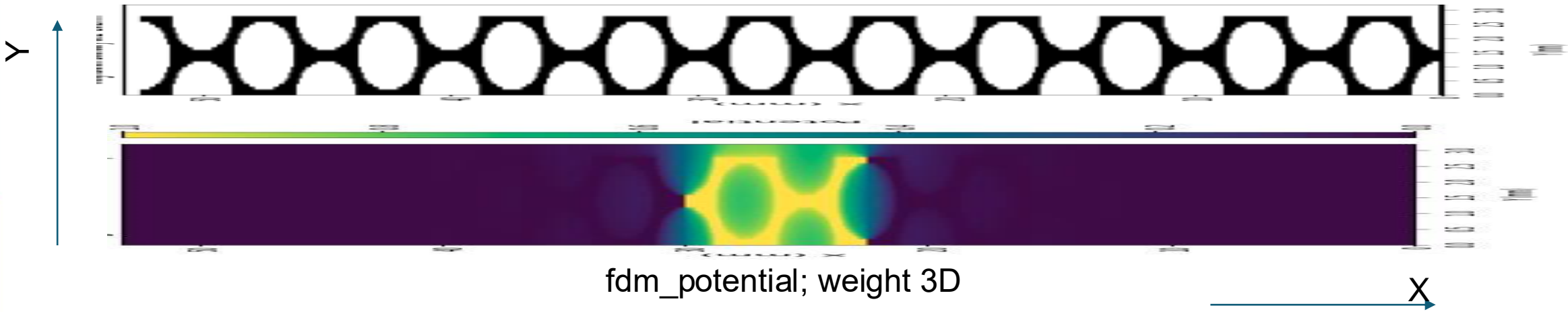


3D weighting field

initial value on boundary is got from 2D weighting field solution.



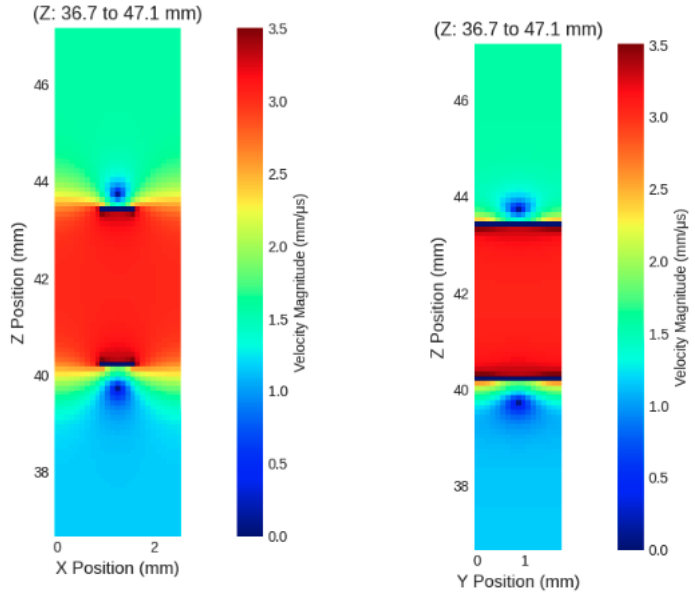
boundary



fdm_potential; weight 3D

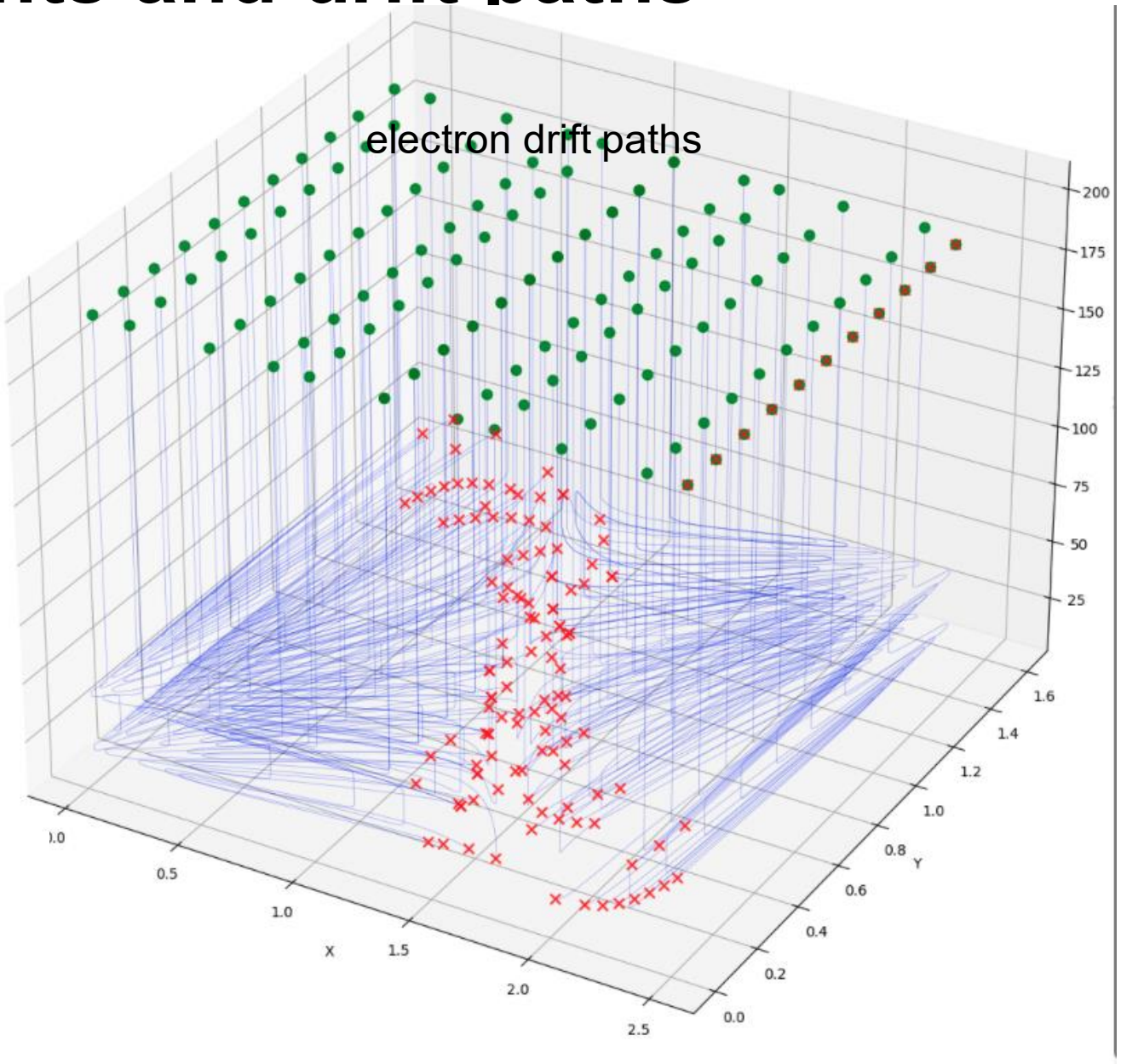
Velocity, starting points and drift paths

velocity distribution

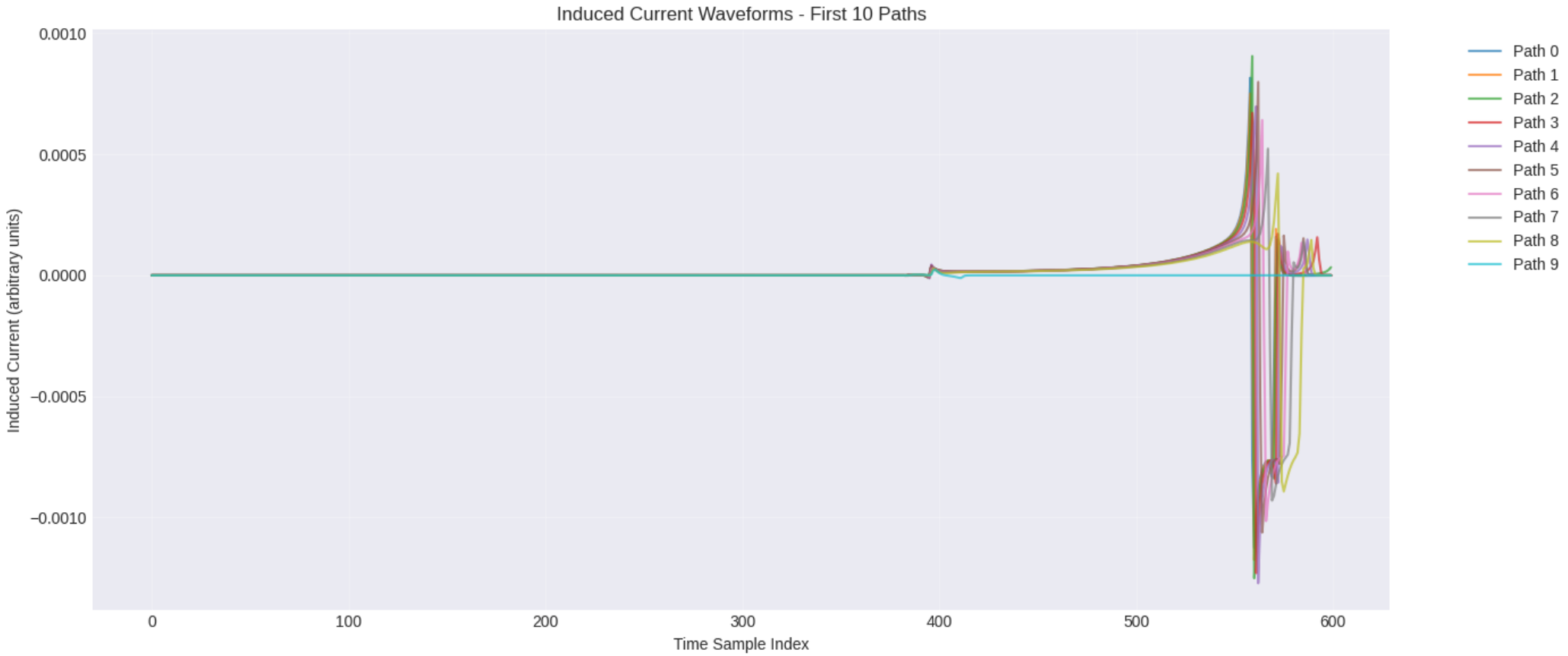



```
Drift Velocity Magnitude:
  |v| range: [0.0000, 3.5935] mm/µs
  |v| mean: 1.4554 mm/µs
```

electron drift paths

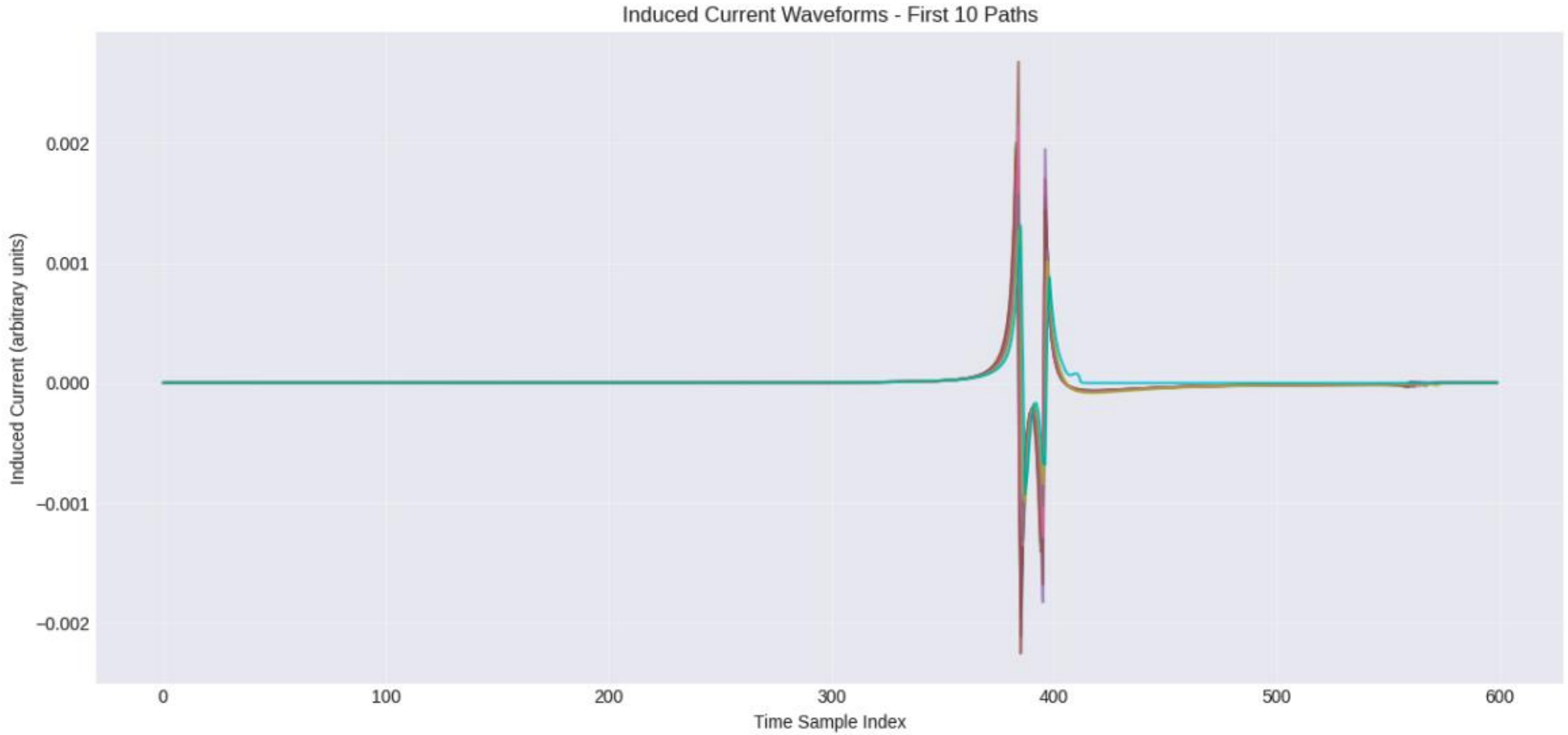


Induced current on v



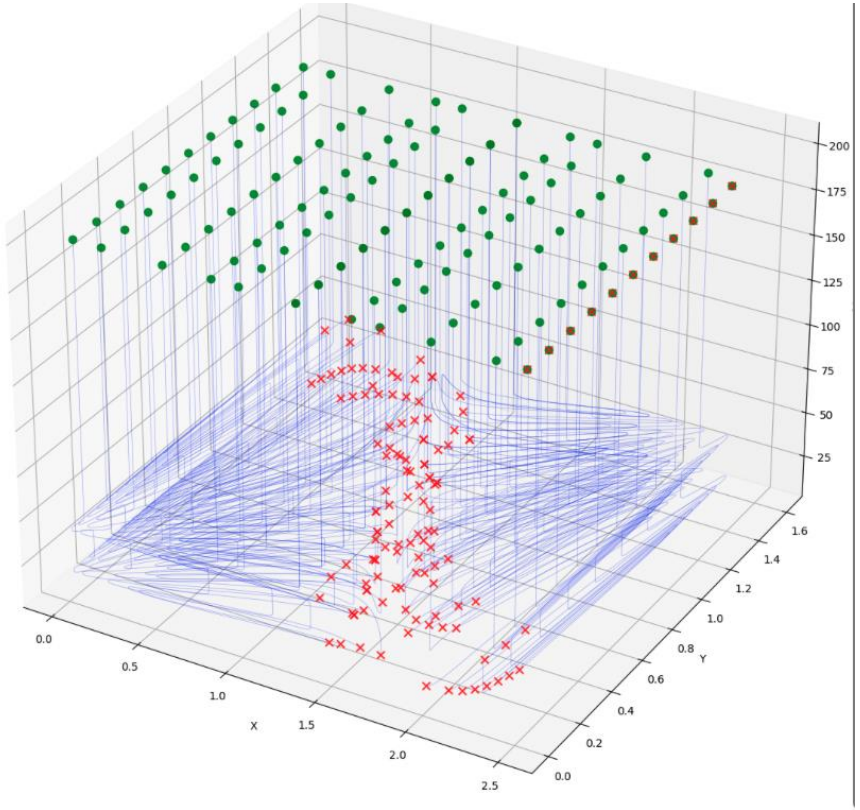
Induced current calculated using Ramo's theorem $i = -e \times \vec{v} \times \vec{E_w}$

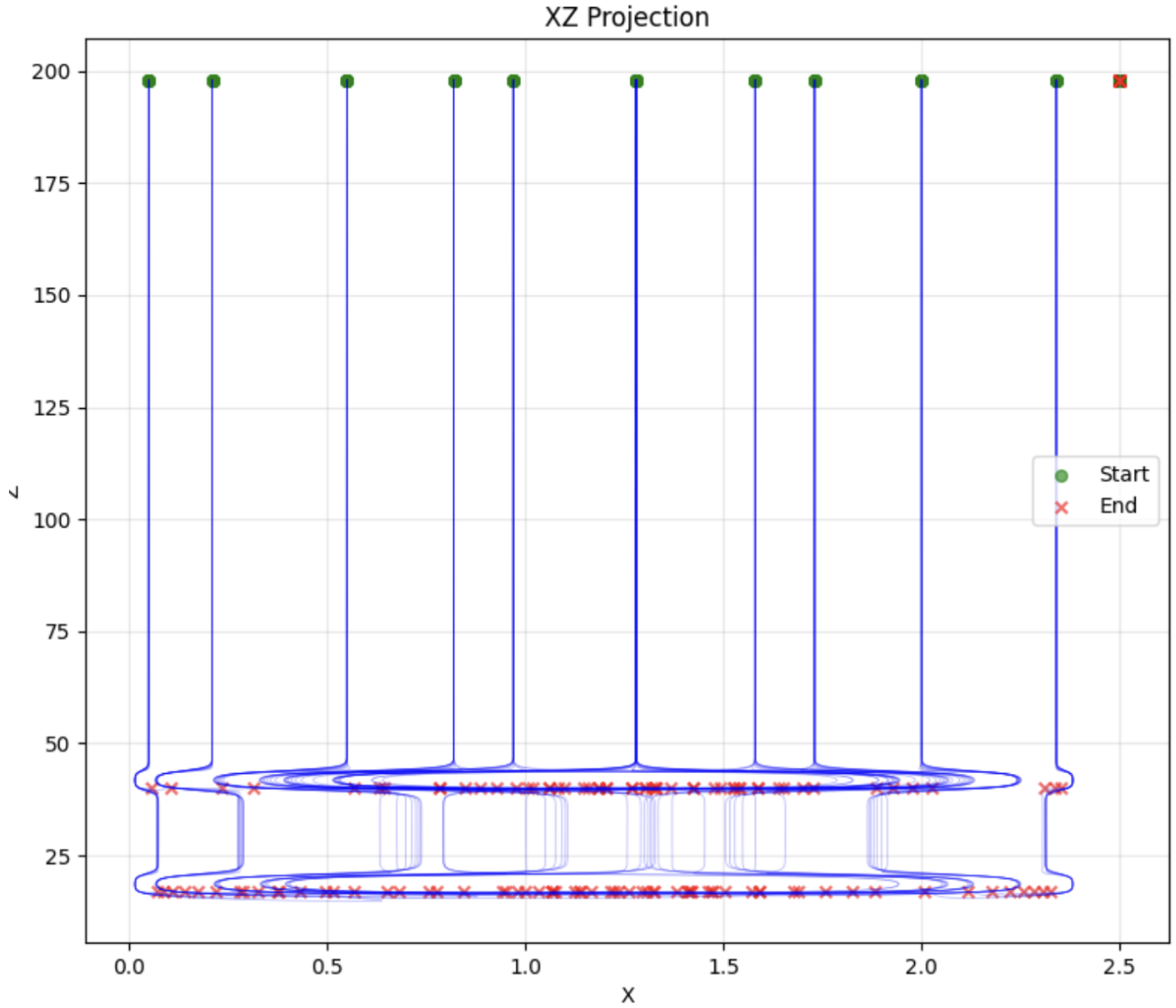
induced current on u



This is weird…I am still checking

Drift path from last time:

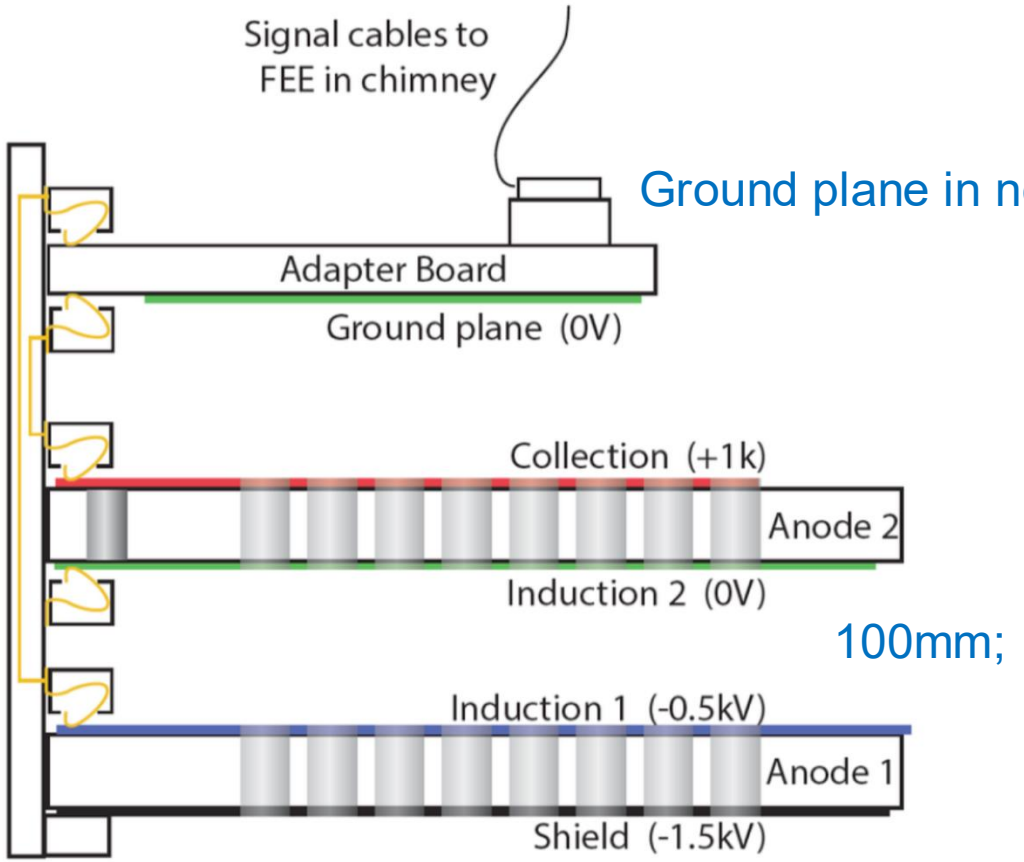




some path ends at u;
due to the wrong geometry

Check geometry in detail

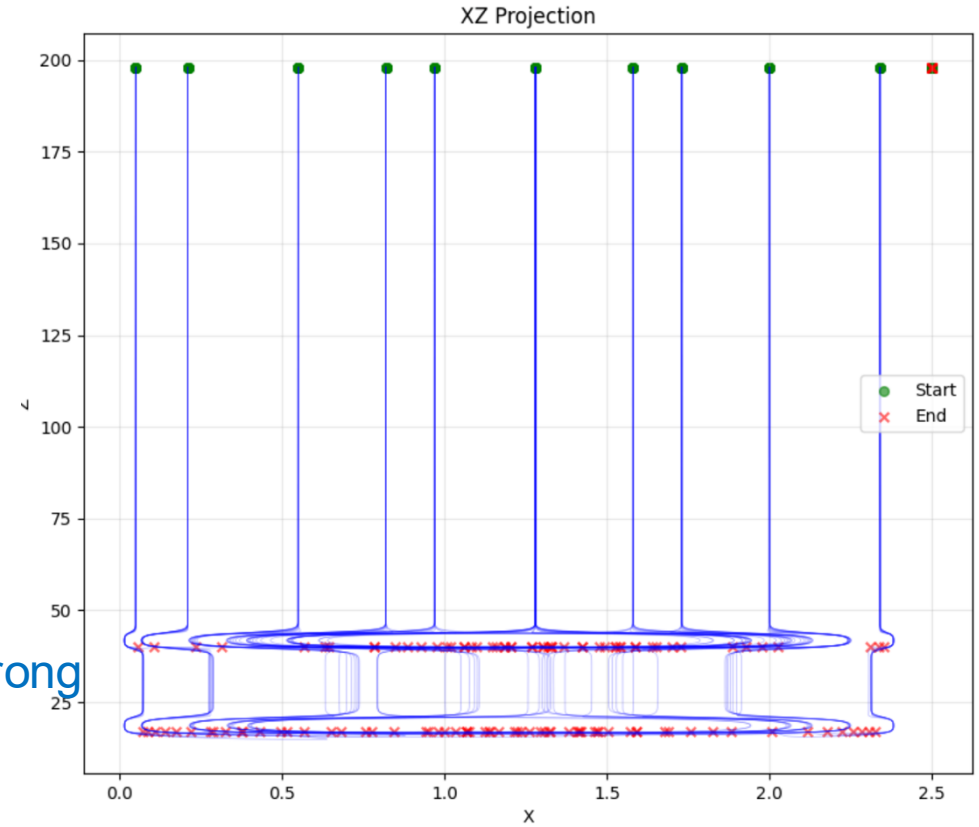
- **Previous issues:**
- Hard-coded values in drift and 3D weighting fields
- PCB spacing set to 200 (no unit)
- Default 0.1 mm spacing → incorrect 200 mm distance



Ground plane in not included

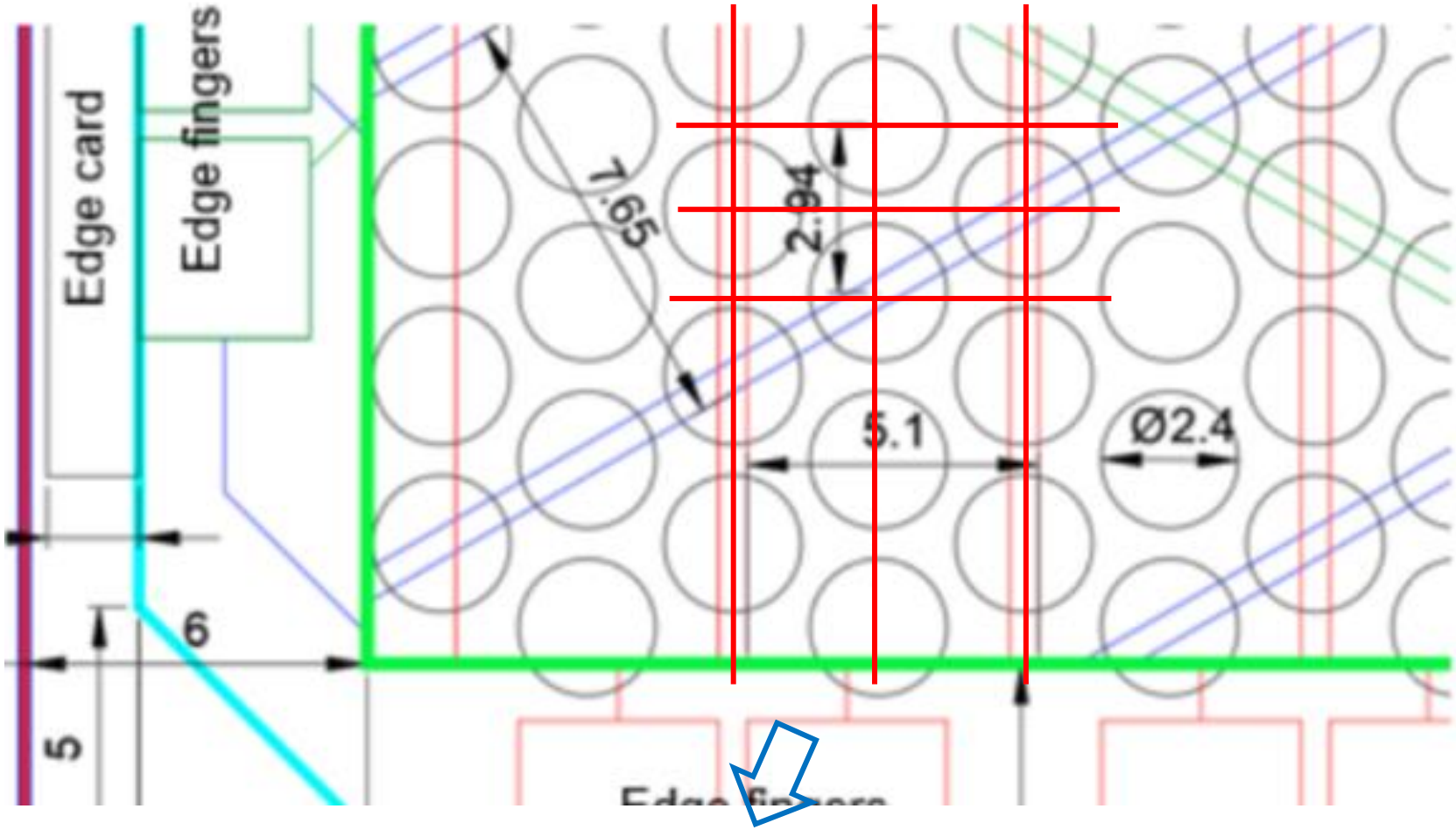
100mm;

200mm; wrong

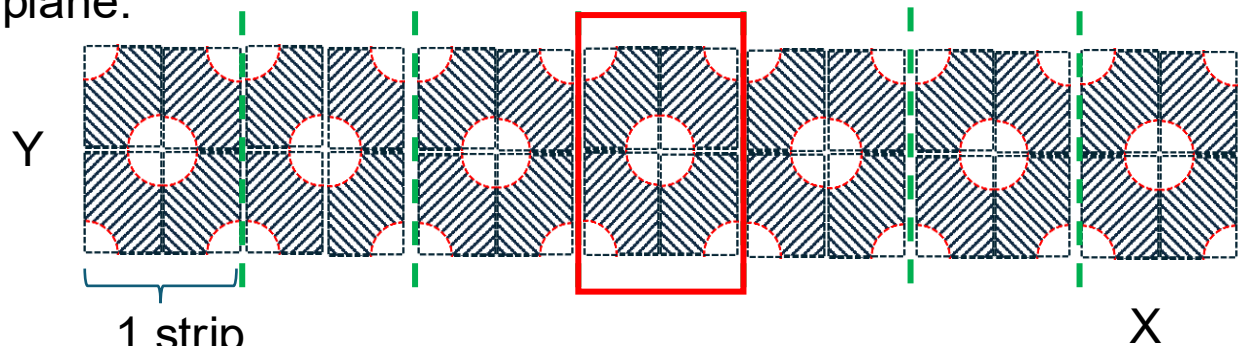


Due to the wrong gap, some electrons are collected at u plane;

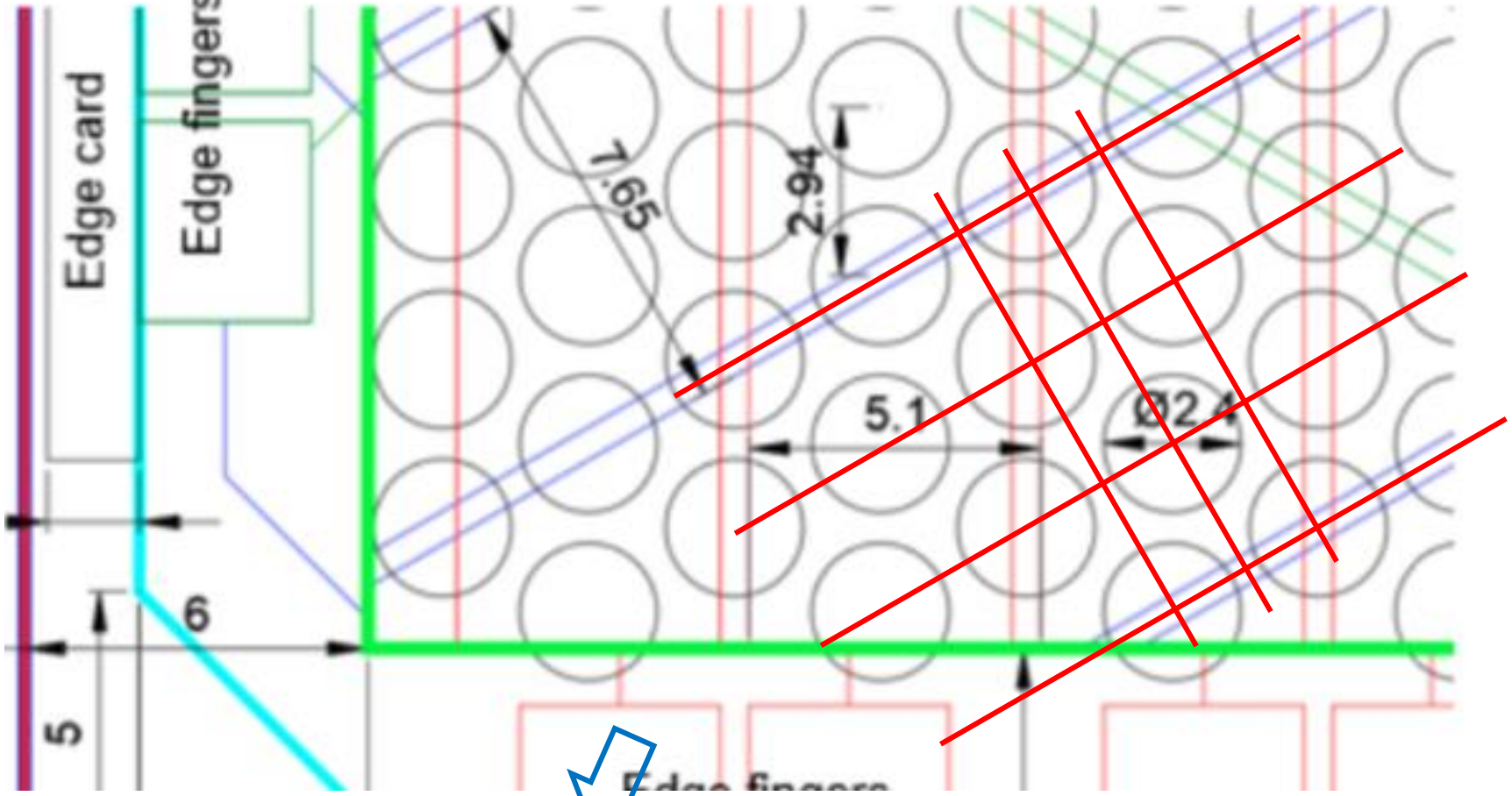
w strip



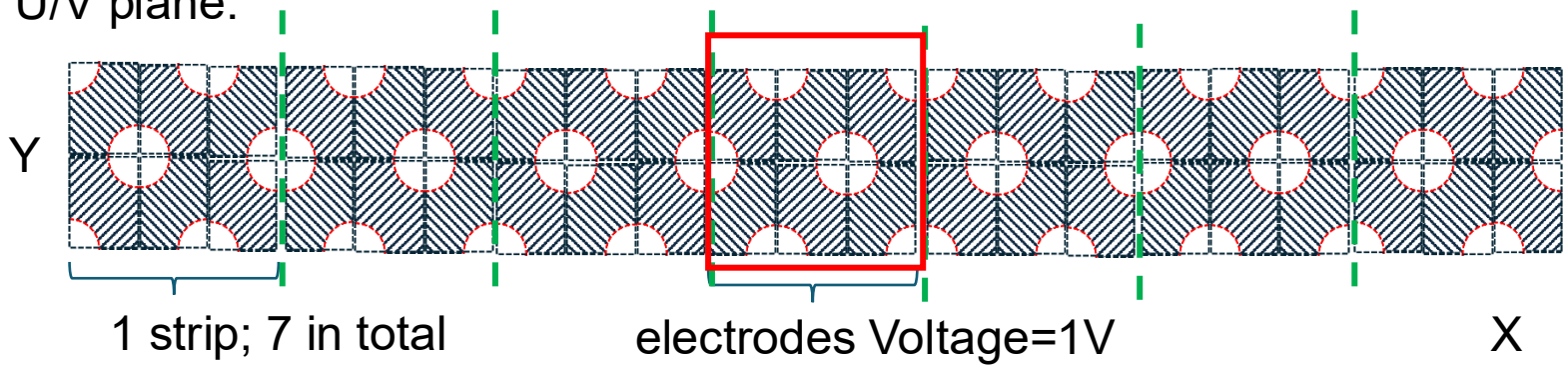
W plane:



u&v strip

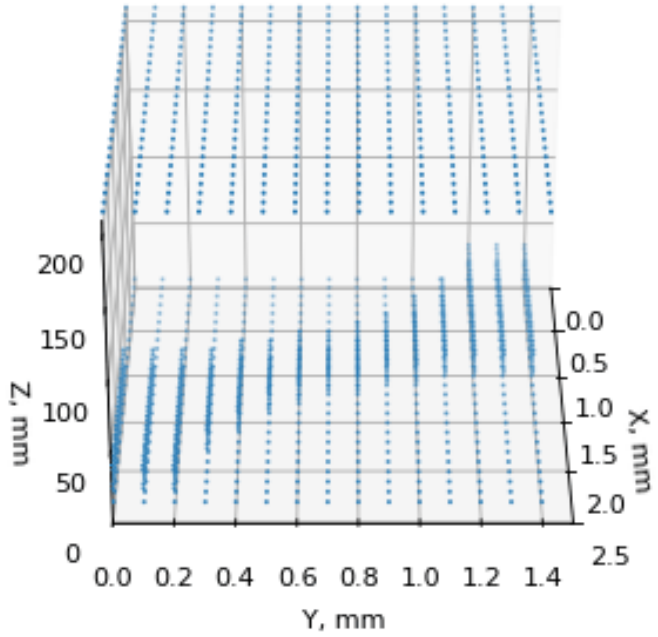


U/V plane:



Updated geometry

3D drift field

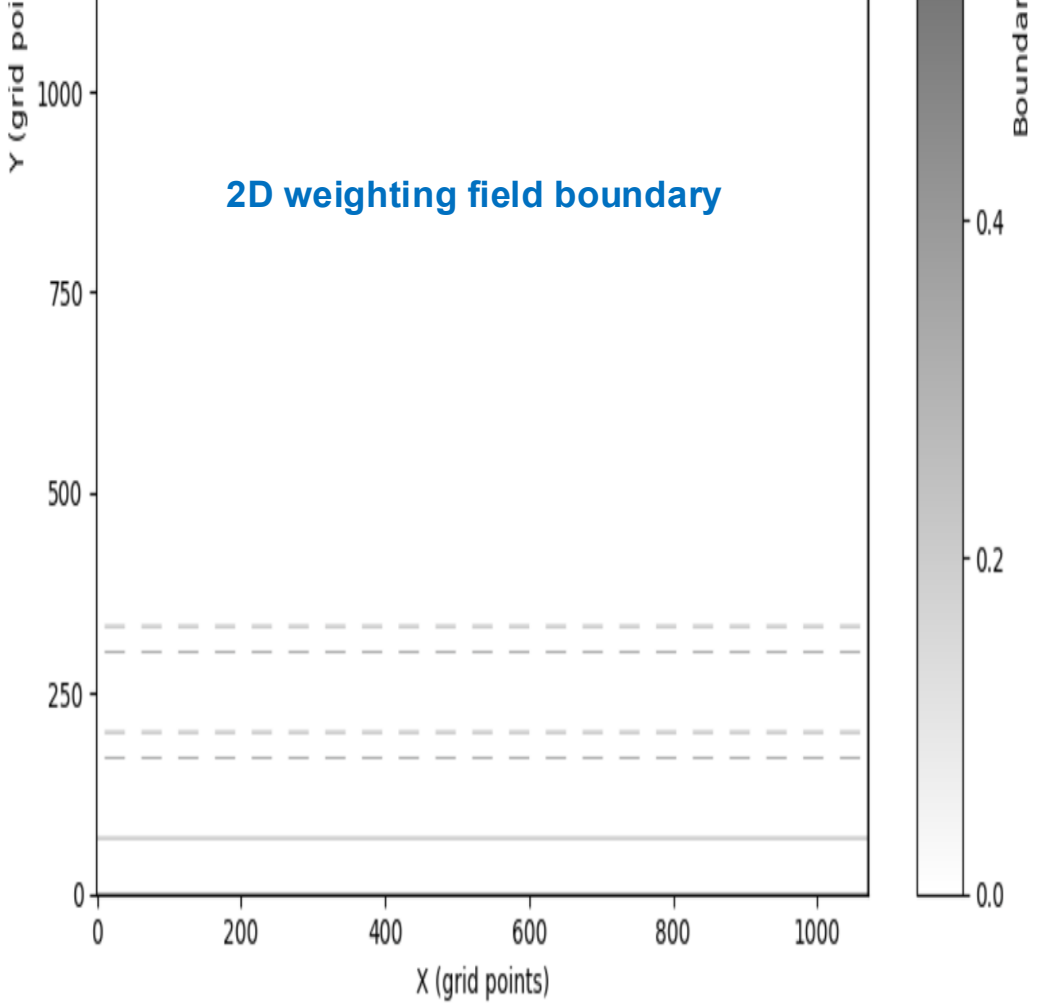


2D weighting field boundary

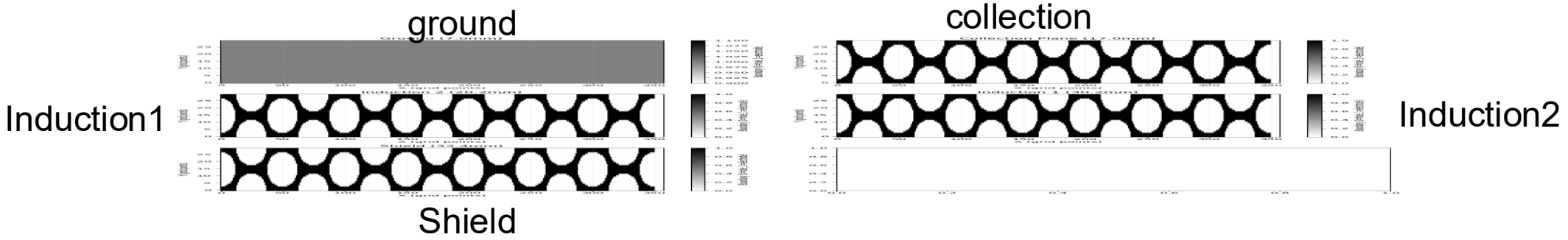
Shield
Induction2

Induction1
collection

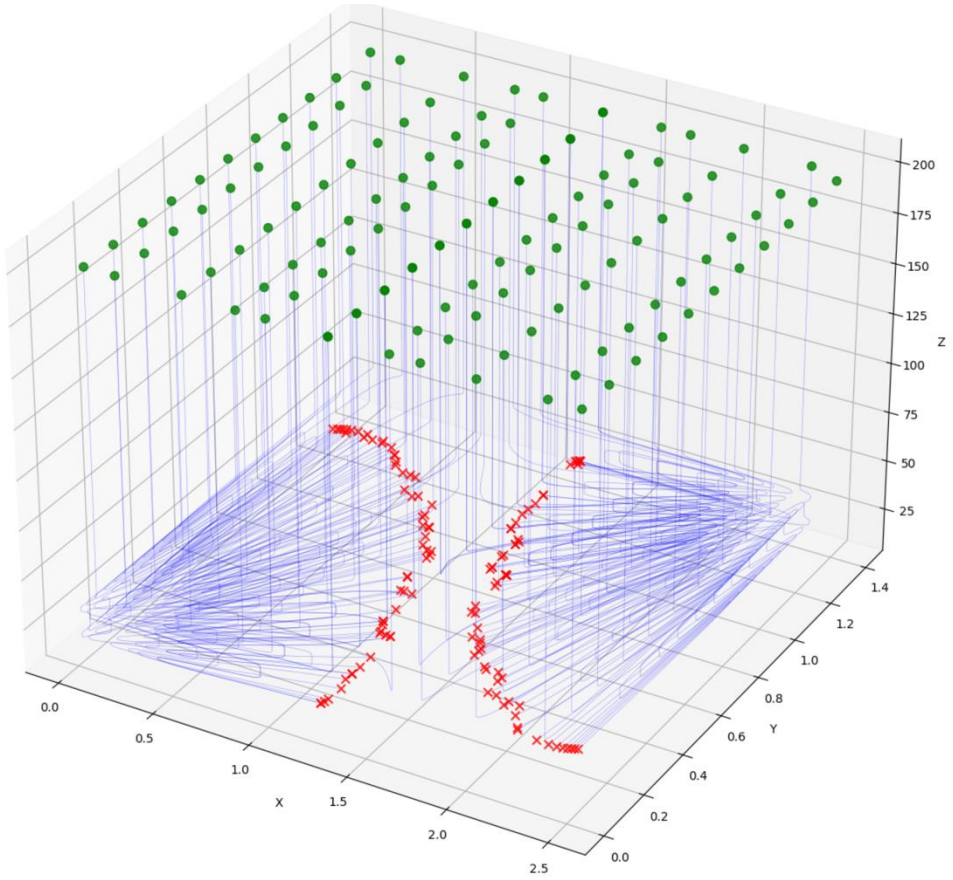
ground

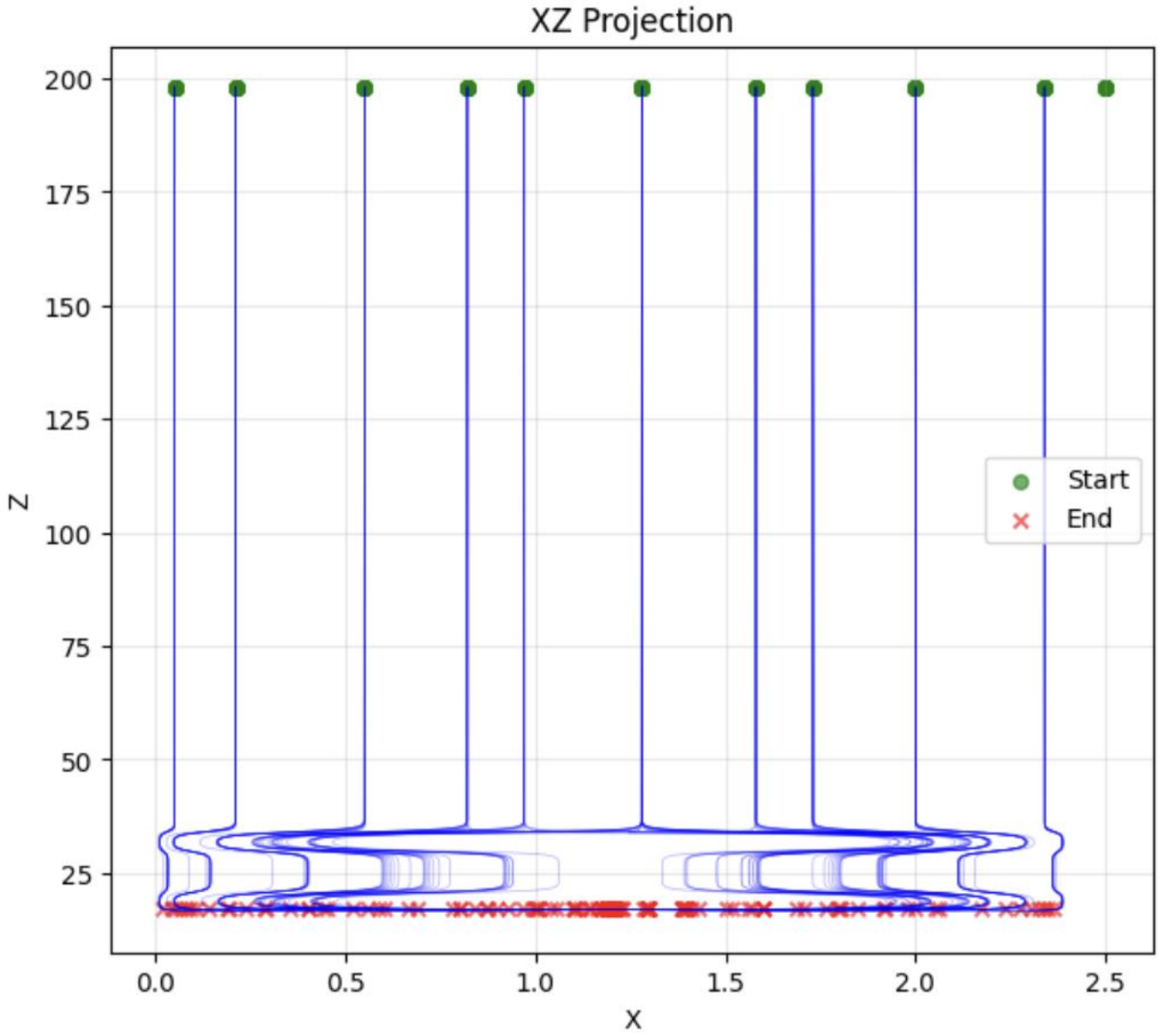


3D weighting field



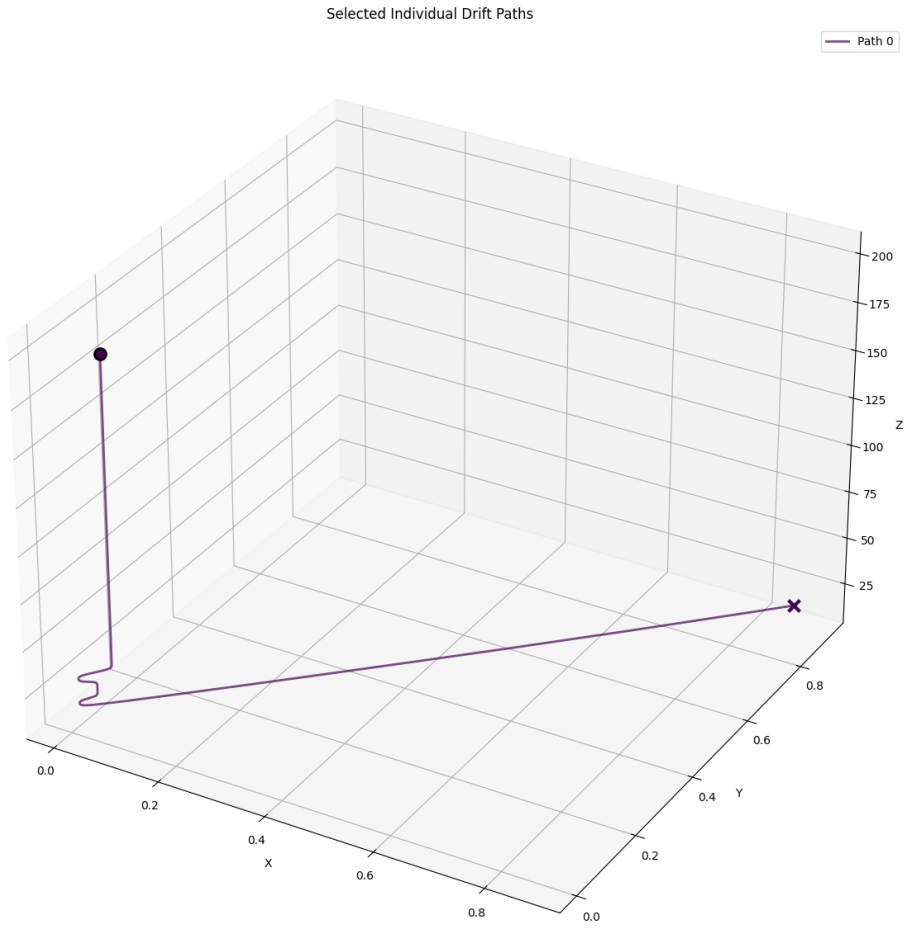
electron paths

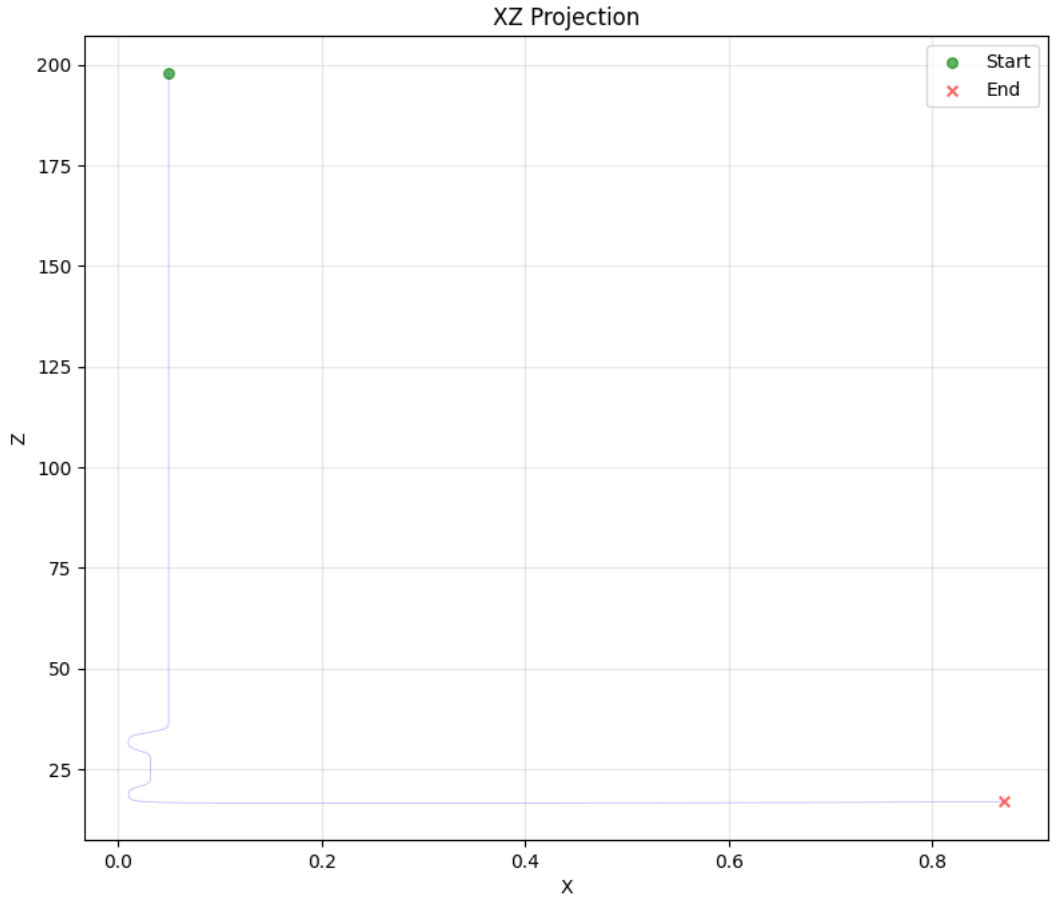




All electrons are collected at collection plane

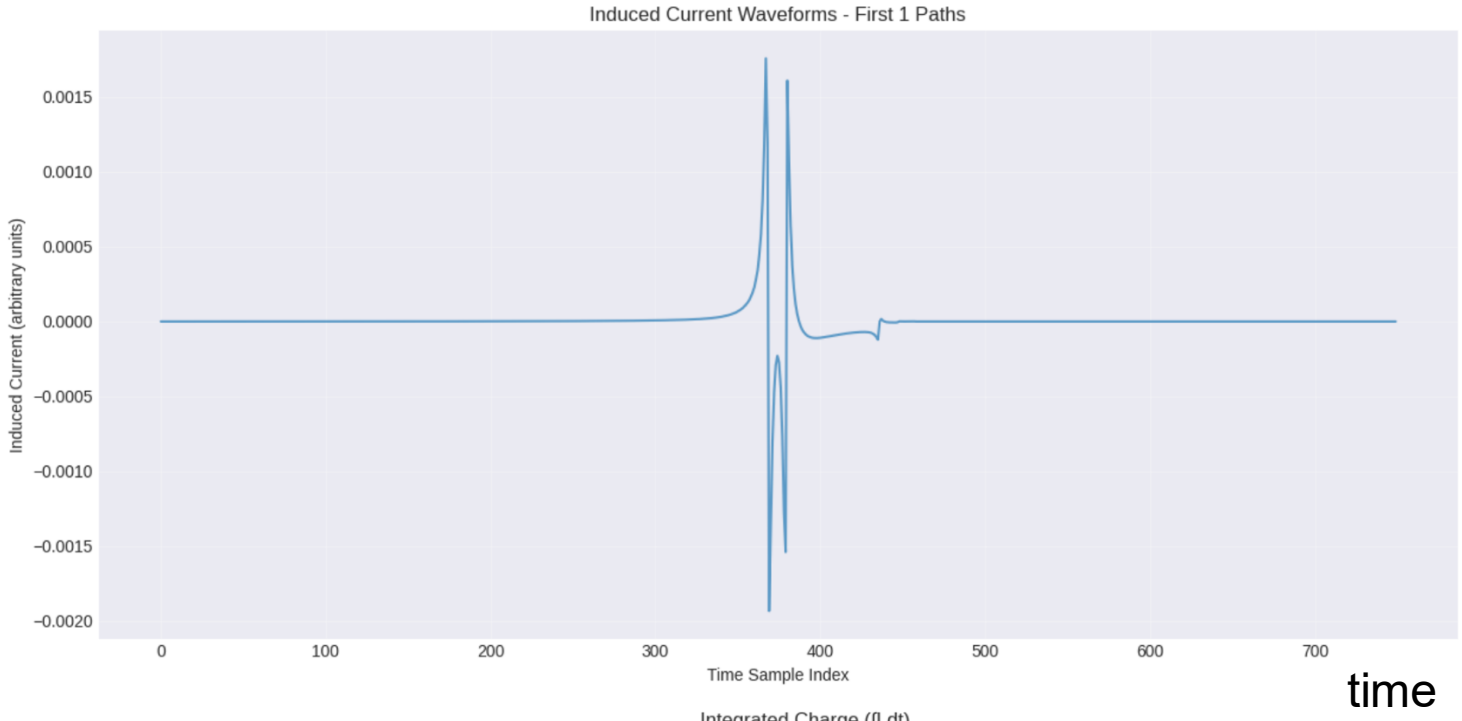
Check a single path





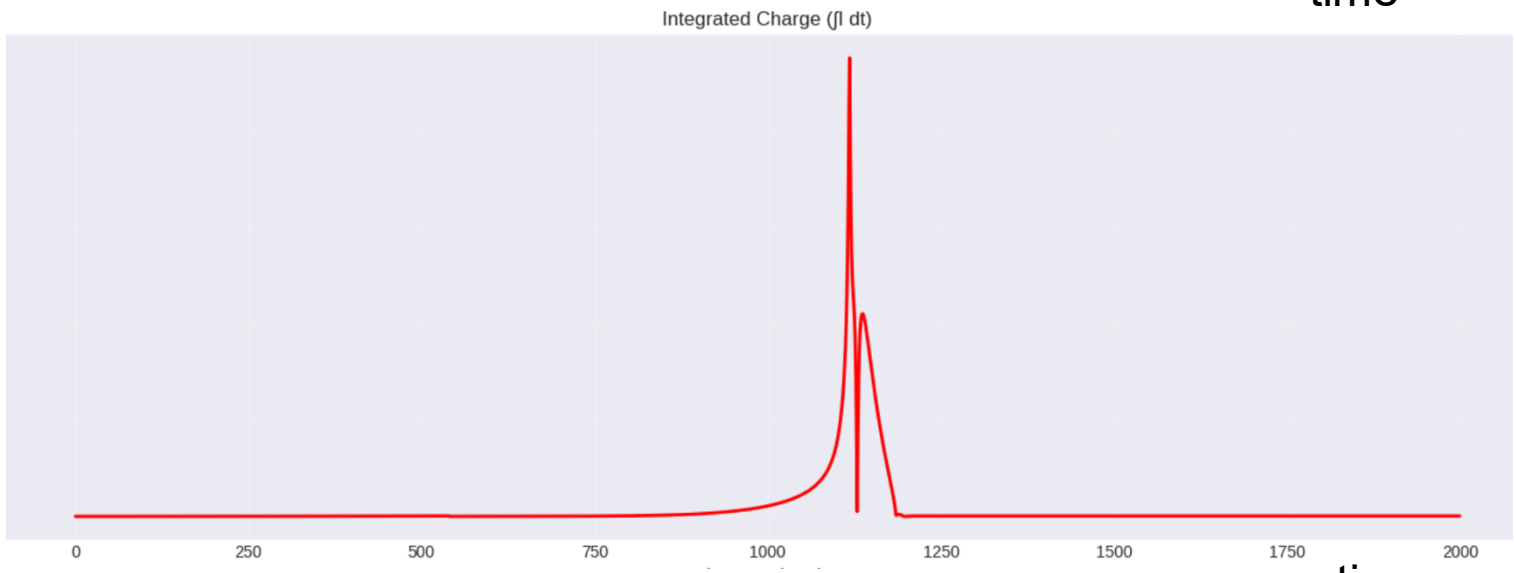
Current; u

Current



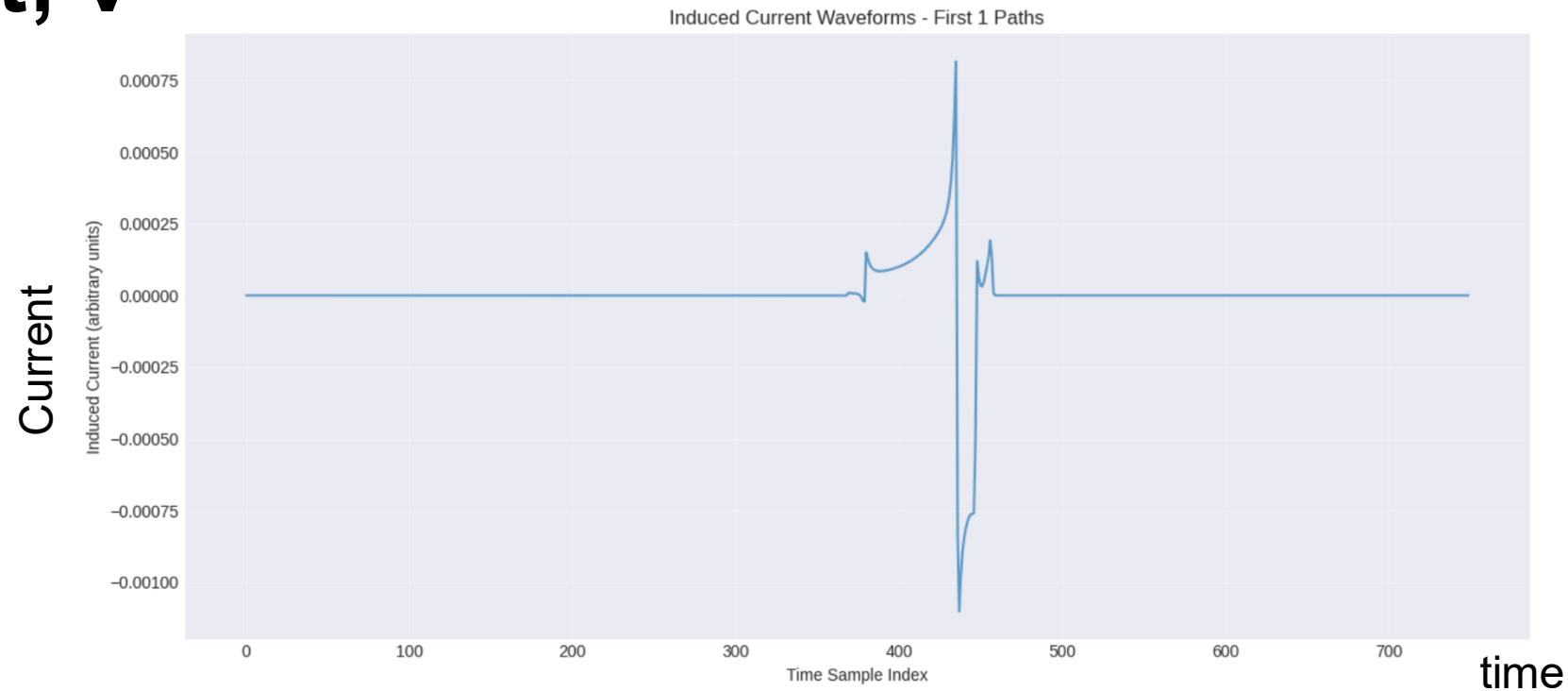
time

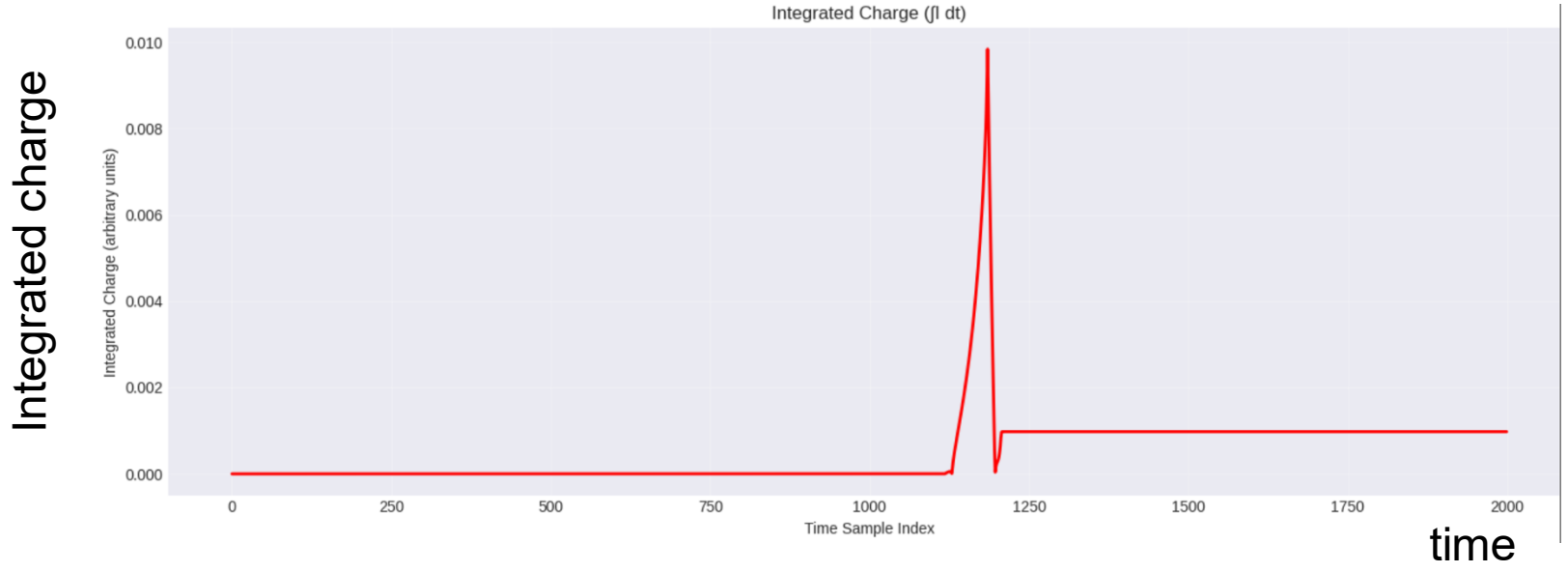
Integrated charge



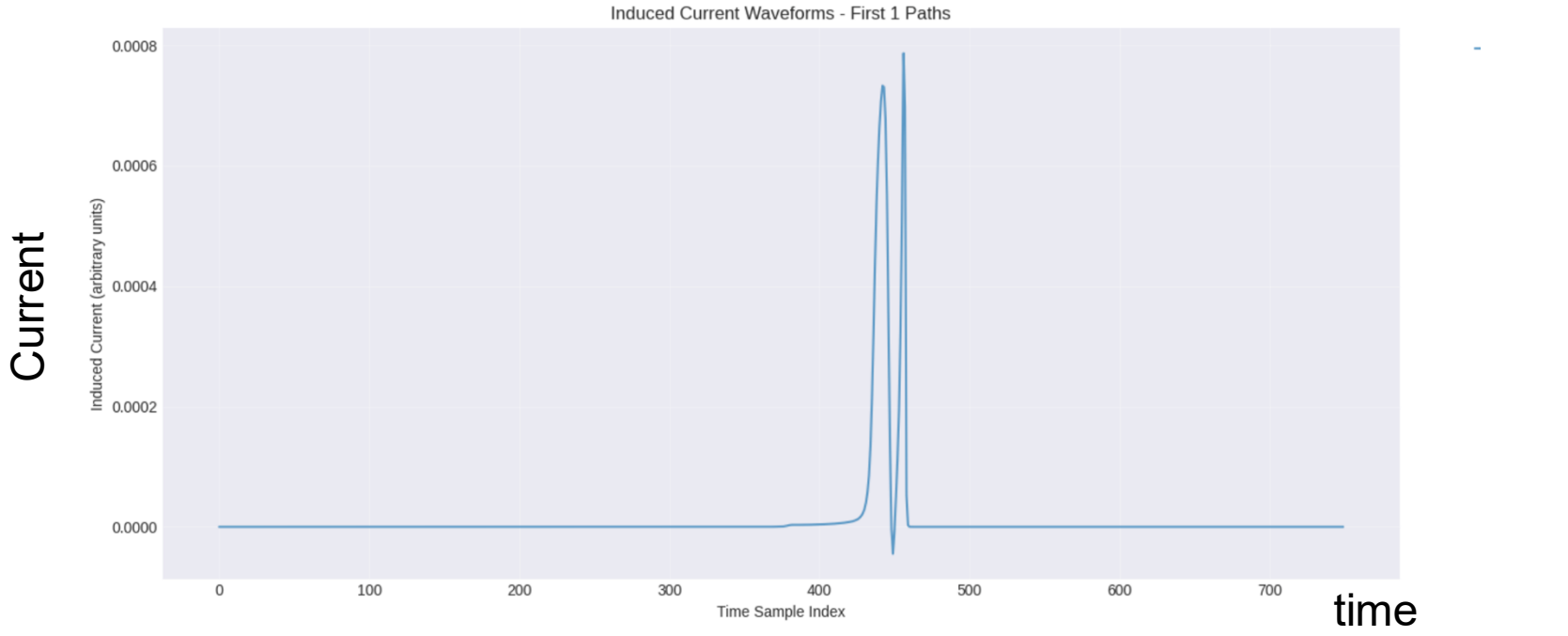
time

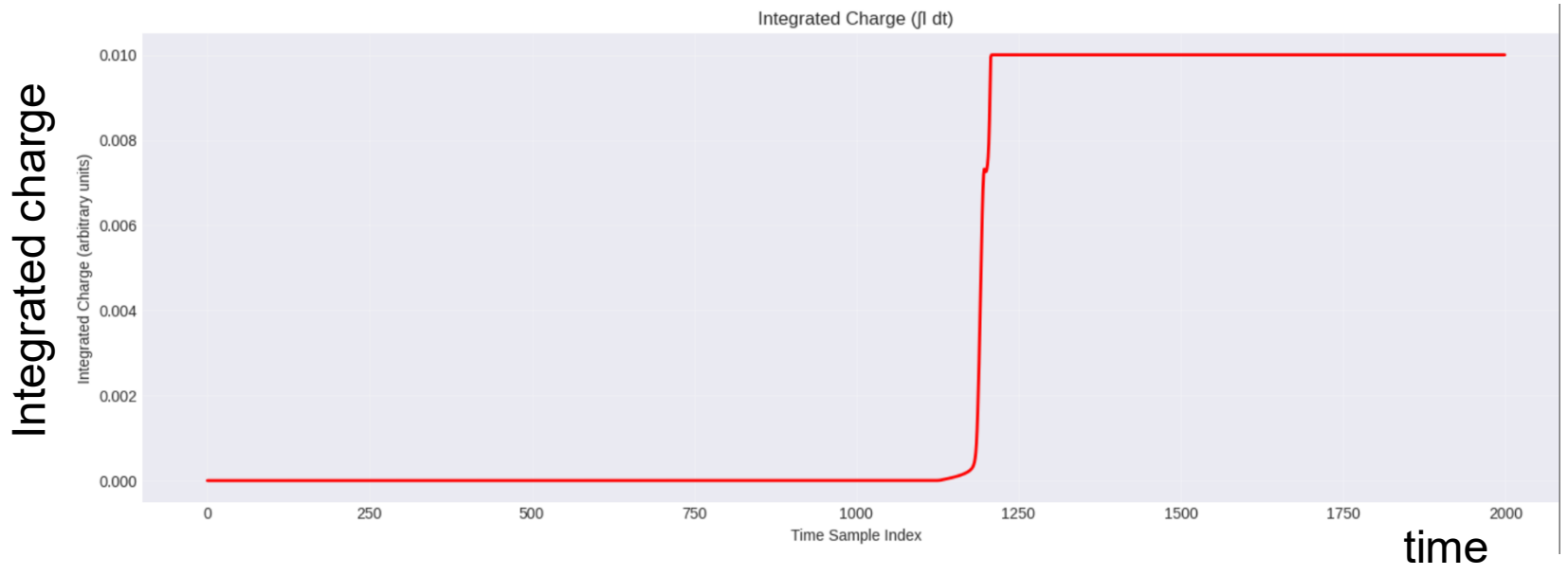
Current; v


Induced Current Waveforms - First 1 Paths
Induced Current (arbitrary units)
0.00075
0.00050
0.00025
0.00000
−0.00025
−0.00050
−0.00075
−0.00100
0
100
200
300
400
500
600
700
Time Sample Index
Current
time


Integrated Charge (∫I dt)
Integrated Charge (arbitrary units)
0.010
0.008
0.006
0.004
0.002
0.000
0
250
500
750
1000
1250
1500
1750
2000
Time Sample Index
Integrated charge
time

Current; w


Induced Current Waveforms - First 1 Paths
Induced Current (arbitrary units)
0.0008
0.0006
0.0004
0.0002
0.0000
0
100
200
300
400
500
600
700
Time Sample Index
Current
time


Integrated Charge (∫I dt)
Integrated Charge (arbitrary units)
0.010
0.008
0.006
0.004
0.002
0.000
0
250
500
750
1000
1250
1500
1750
2000
Time Sample Index
Integrated charge
time

From Sergey's original FR