ANSYS and Garfield simulations of the LEM border impact on collection efficiency

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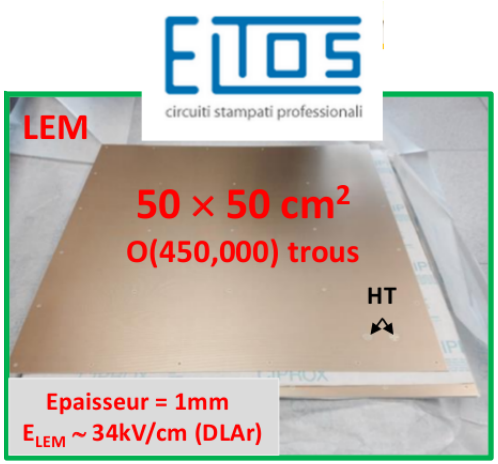
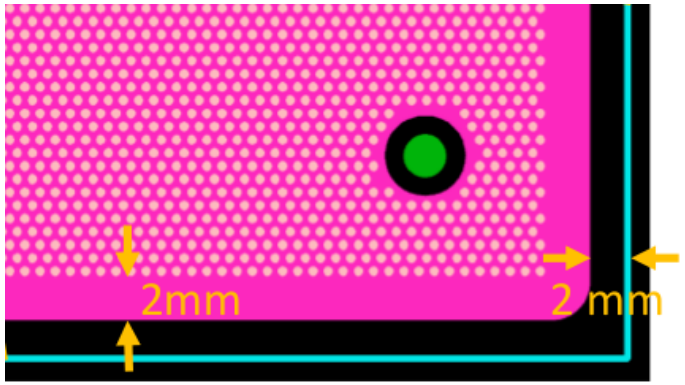
Main question (reminder and update)





4mm without holes on LEM border + 0.5mm gap between anodes + screws and other imperfections

⇒ **Can influence the path of drifting electrons : some might be lost**

Study

What is the impact on charge collection?

Goal

What had already been done

Qscan's *projection on CRP* has been pixelized

Most recent work

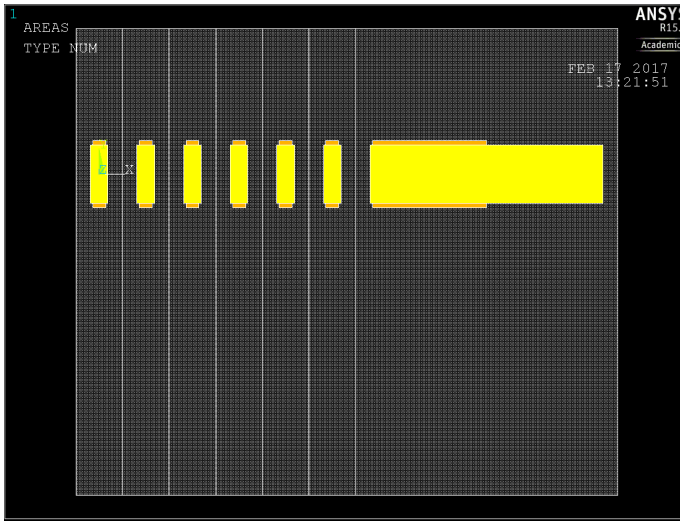
Determination of the collection efficiency depending on the $x - y$ charge position at CRP with ANSYS and Garfield

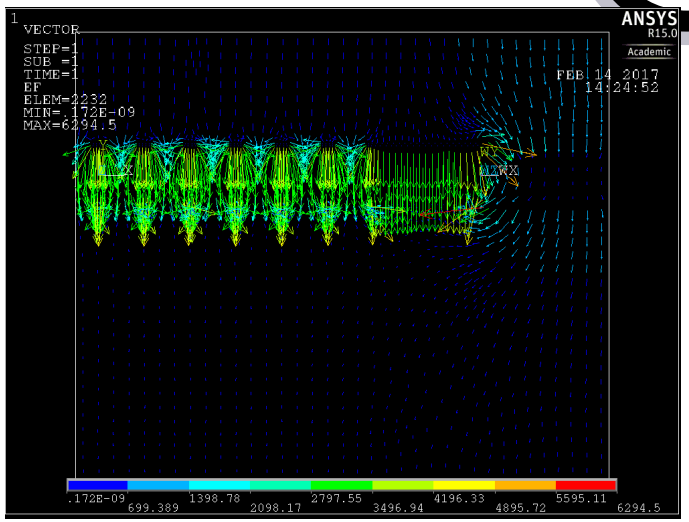
Done by:

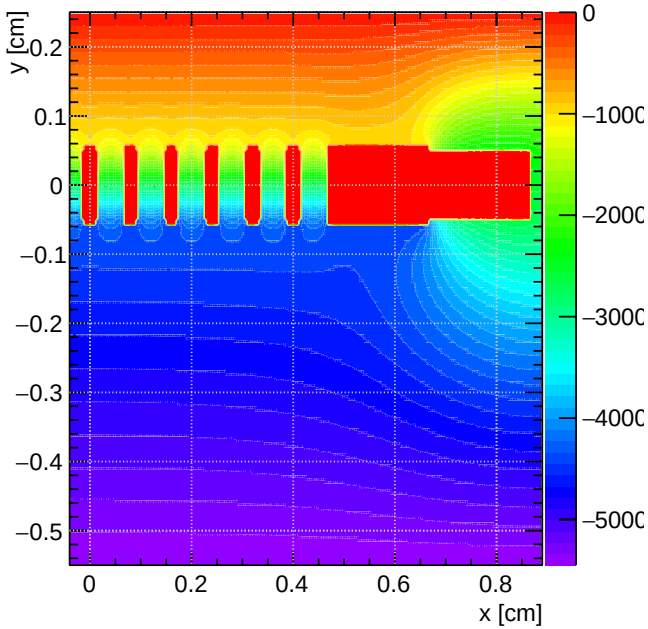
Looking at the fraction of electrons reaching amplification zone (between LEM and anode)

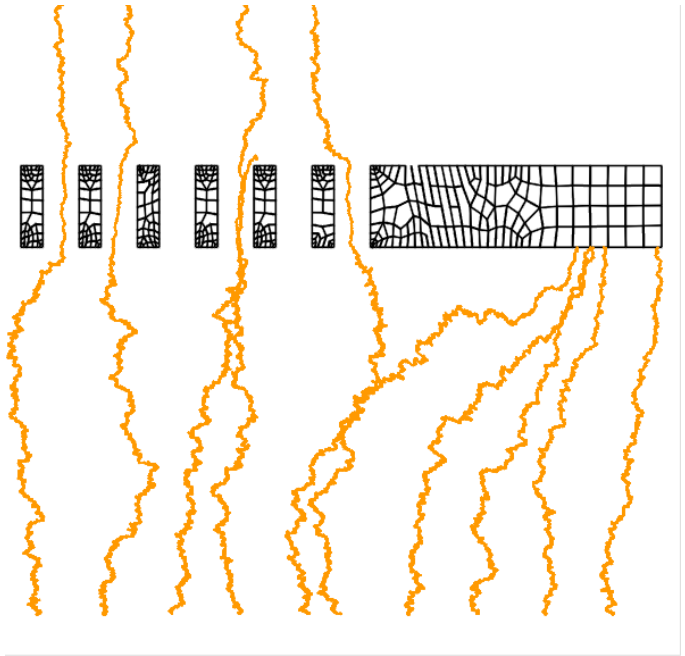
Geometry : 2D model

field, potential and drift of 10 electrons

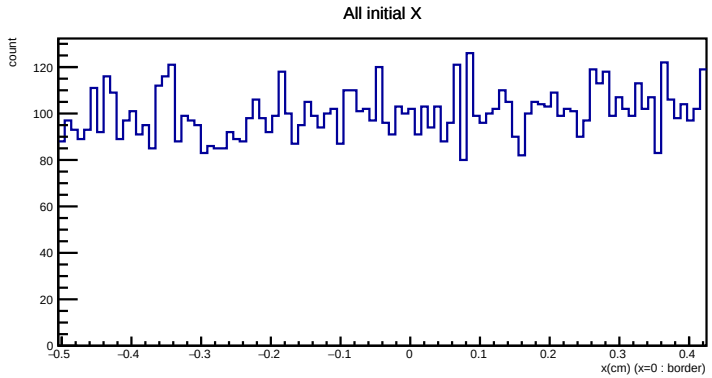


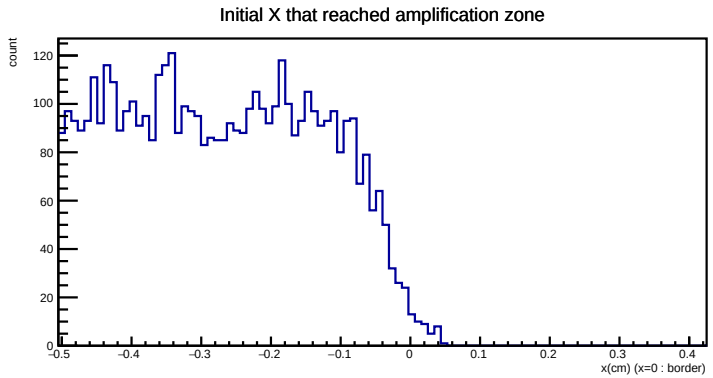






Drift of 10000 electrons
uniformly distributed at bottom of the geometry





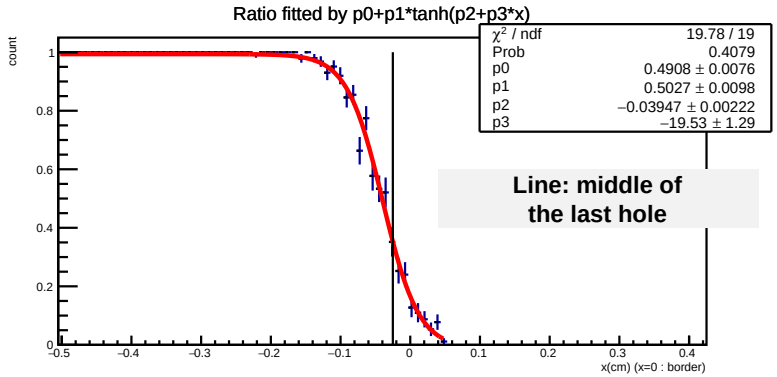
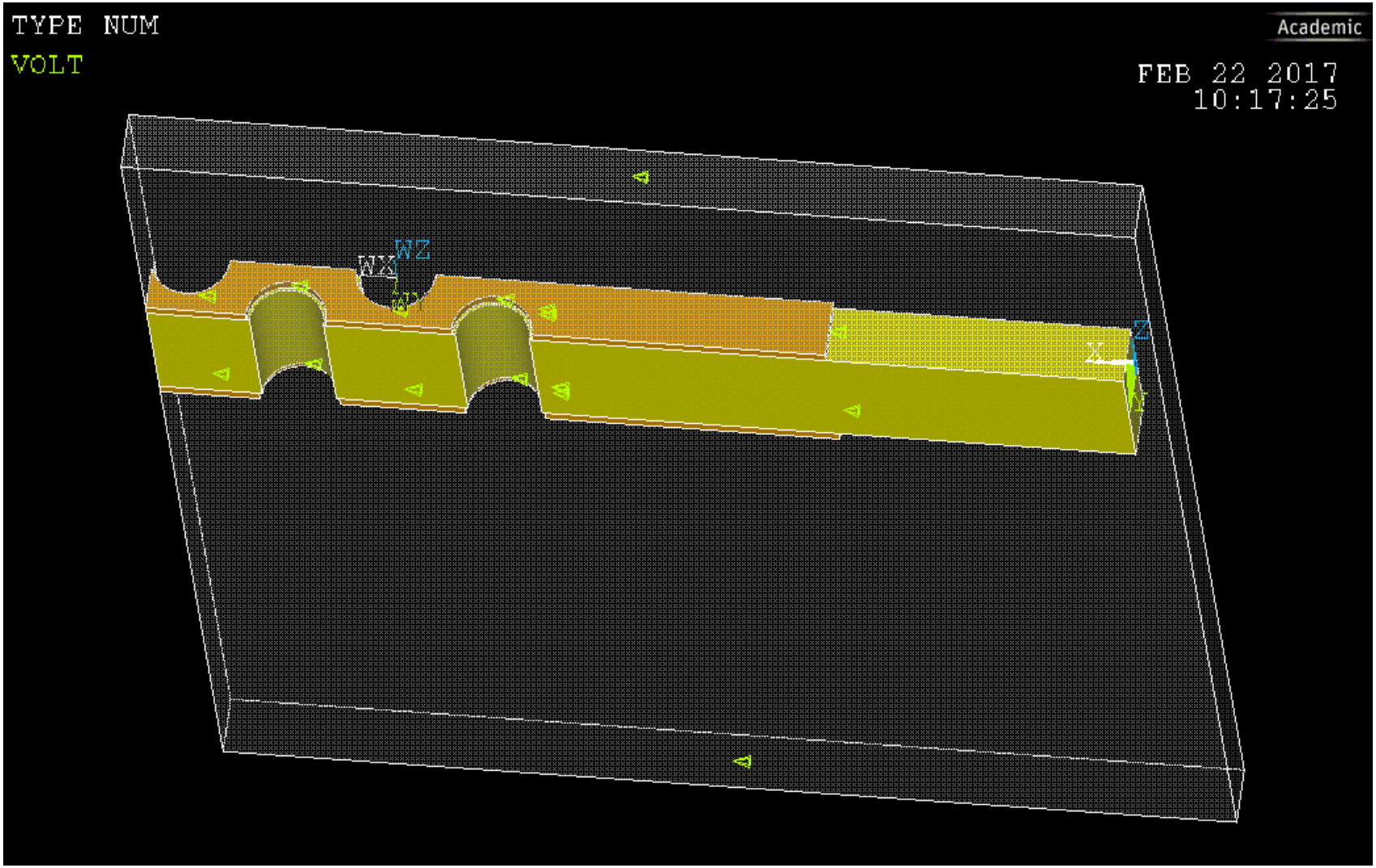


Figure: initial horizontal position of electrons reached amplification zone (right), of all electrons (left), and ratio of both (i.e collection efficiency, bottom). Fitted with a tanh.

Geometry : 3D model

Mirror symmetry conditions on Y borders



Drift of 10000 electrons
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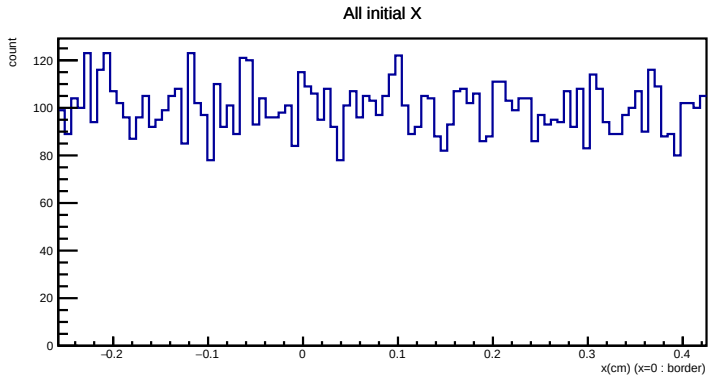

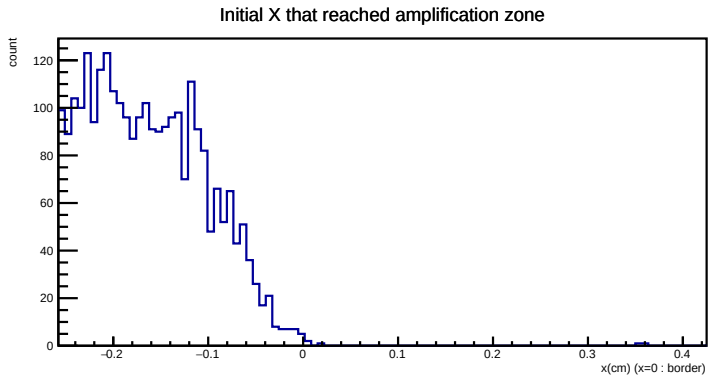

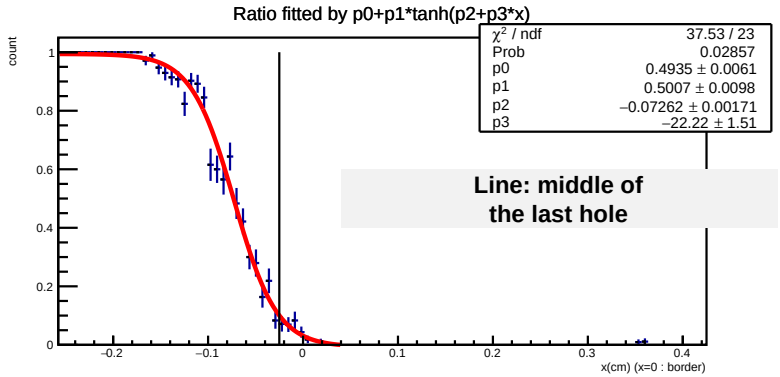

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Conclusion and next work

- $\sim$ 2*mm* of decreasing efficiency: not an abrupt gap from 1 to 0
  - Do same work for corner, screw holes and HV connectors 
  - Add to Qscan

The End

Thank you!