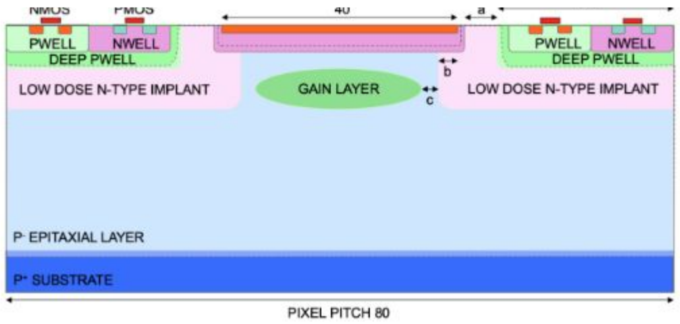
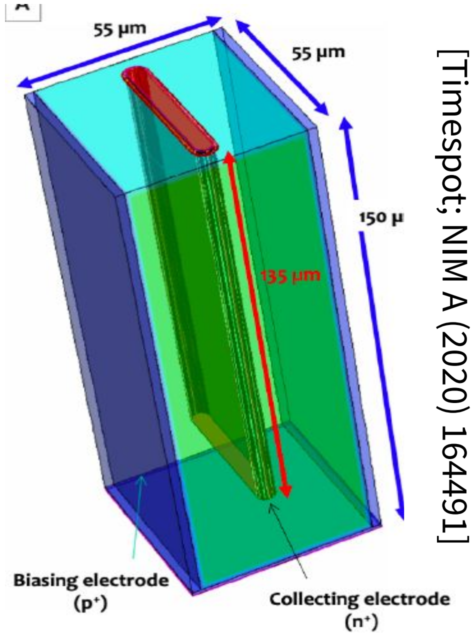
Motivations
State of the art technologies

[CASSIA1, A. Kotsokechagia, 4th DRD3 week]



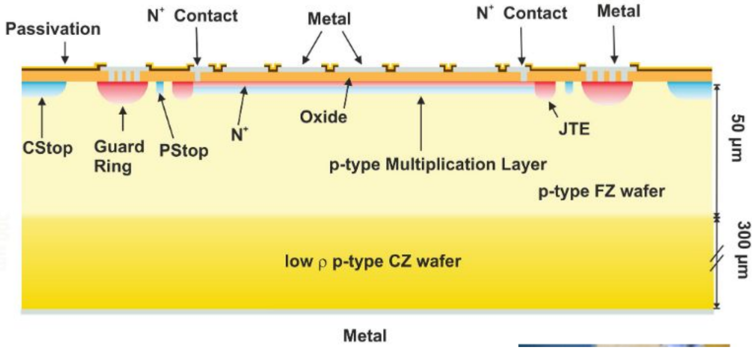


[Timespot; NIM A (2020) 164491]

- **Monolithic sensors:**
  - **PRO:** resolution (spatial & temporal), material budget
  - **CONS:** radiation hardness, data rate (but could be bonded to CMOS), temporal resolution
- **3D sensors :**
  - **PRO:** radiation hardness, temporal resolution, spatial resolution
  - **CONS:** spatial resolution, fill factor, capacitance
- **LGAD familly:**
  - **PRO:** temporal resolution
  - **CONS:** radiation hardness, spatial resolution (solved by AC-LGAD, Ti-LGAD or iLGAD)
- **Internal gain and low pitch?**

  Achieve high segmentation of the electric field
- **Internal gain without radiation sensitivity?**

  Achieve high field without "radiation sensitive" doping



[AC-LGAD; S. Mazza, 4th DRD3 week]

High E-field generation
In gas detector

- **Not a new feature in gas detector**
  - mainly driven by the electrodes geometry

- **Wires:**
  - straw tubes
  - MPWC

- **Grids:**
  - GEM
  - Micromega

[F. Sauli, Academic Training Lecture, 77, CERN]

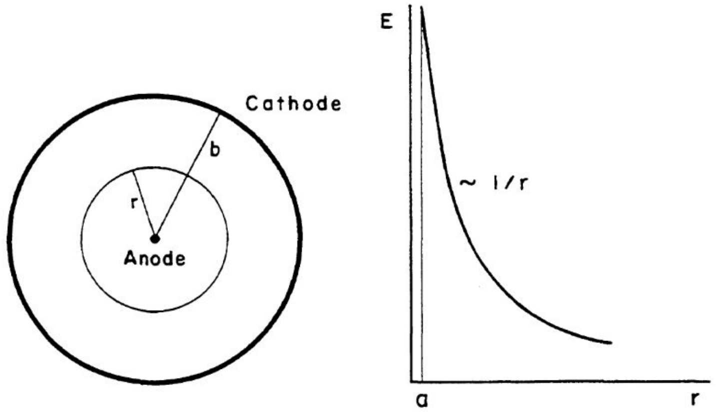
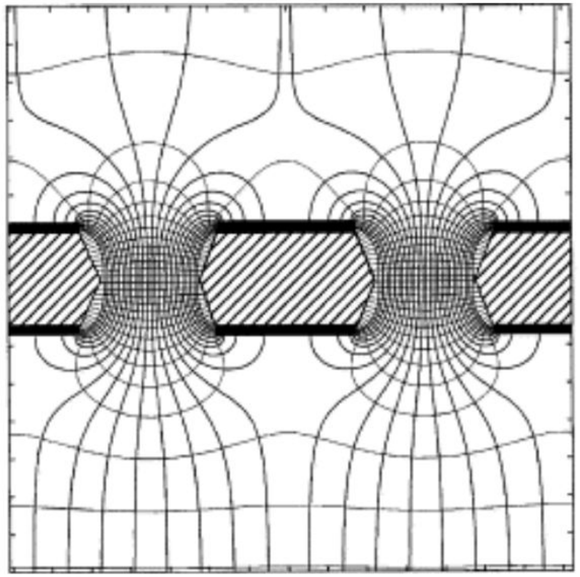
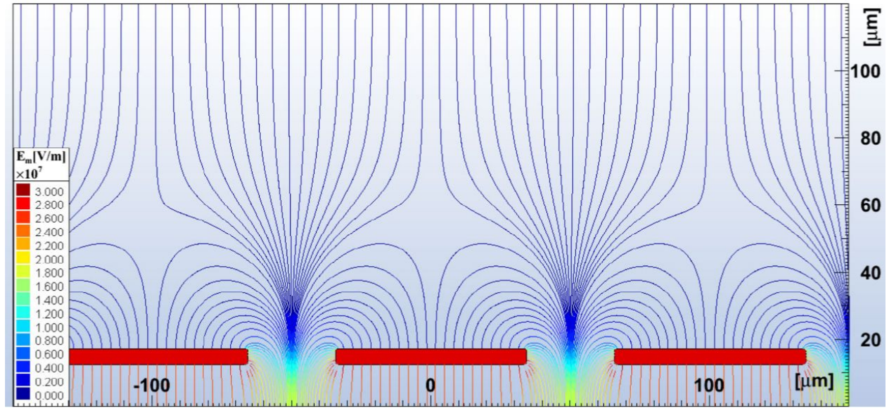


Fig. 48 The coaxial cylindrical proportional counter, and the shape of the electric field around the thin anode. Only very close to the anode the field grows high enough to allow avalanche multiplication.

[F. Sauli, NIM A 386 (1997) 531]





[Attié, D et. al. JINST 9 (2014)C04013]

How to implement grid geometries in Silicon

- **Discussion with CEA-LETI microfabrication expert [O. Girard]**

- **Covalent wafer bonding:**
  - difficult alignment
  - amorphous interface problematic
  - complex process

- **Etching:**
  - “self-aligned”
  - only silicon under the gaps
  - more standard process

- **Will re-discuss the “wire geometries”...**