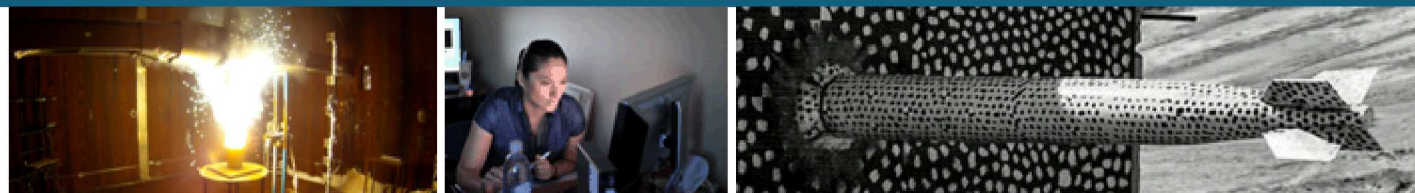


# Si Diode Speed Enhancements



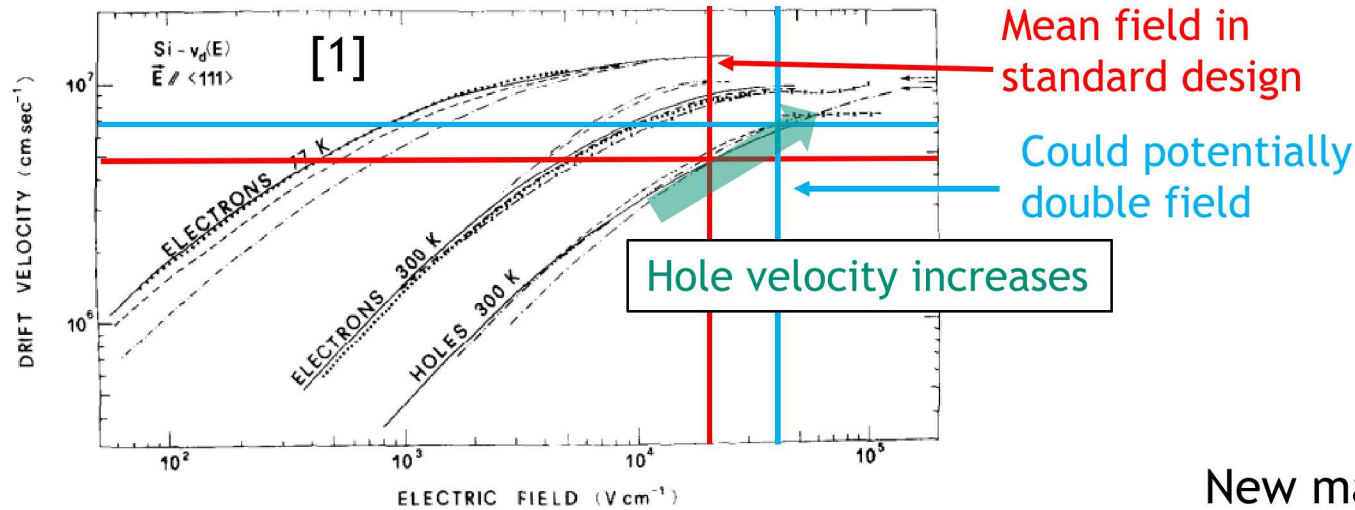
*PRESENTED BY*

Q. Looker, M. Sanchez



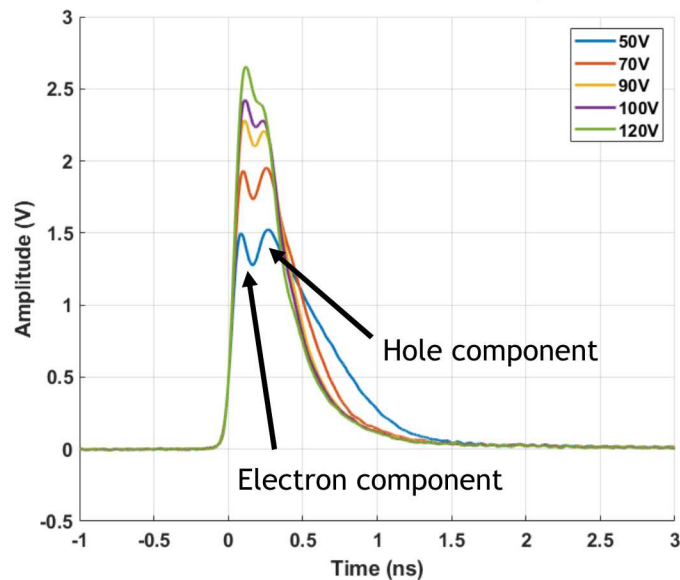
Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

# Increasing Electric Field Magnitude Can Speed Up Existing Designs

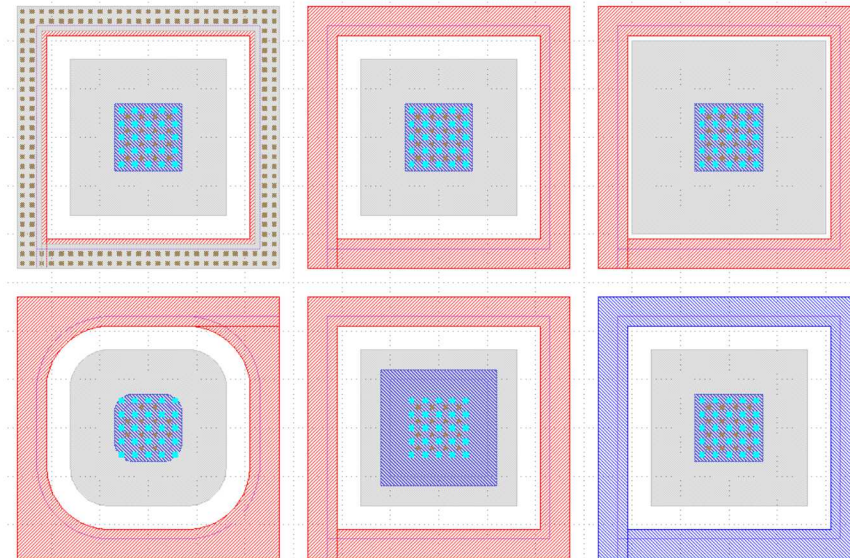


- Increasing applied bias increases carrier velocity
- Applied bias limited by diode breakdown voltage

Pulsed Laser Measurement on 25  $\mu\text{m}$  Thick Si

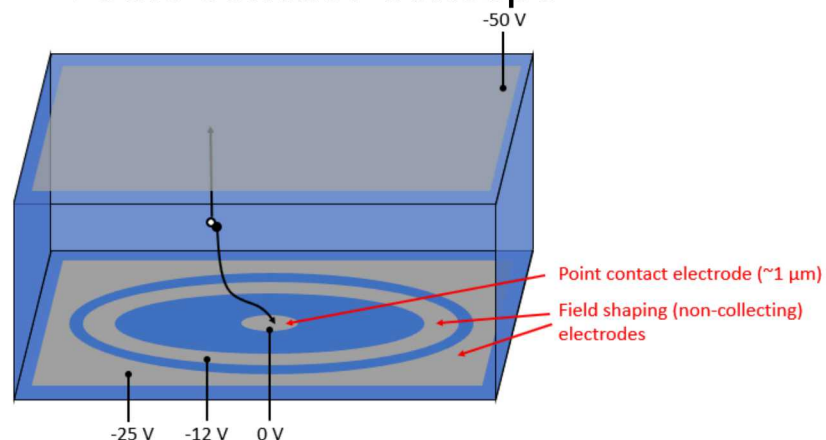


New mask design with pixel design variants

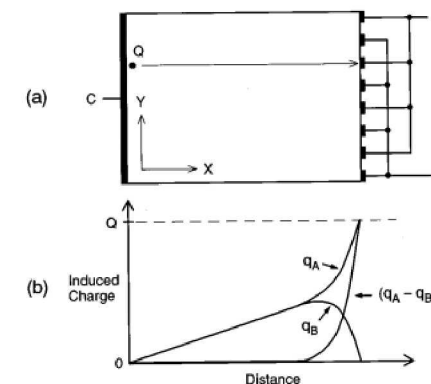
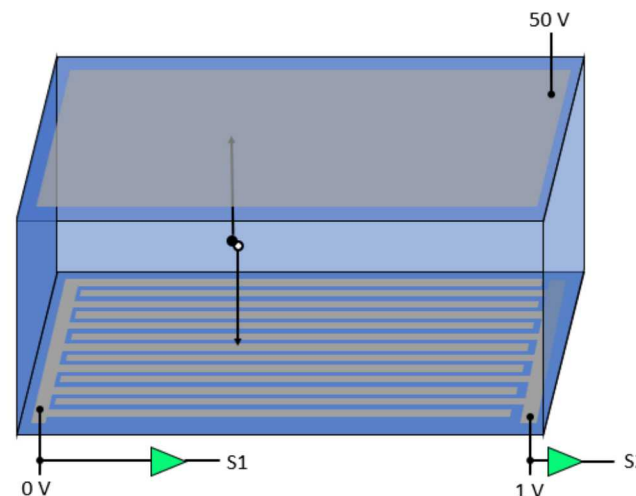


# Alternate Electrode Configurations Could Potentially Compress Charge Collection Time

## Point Contact Concept

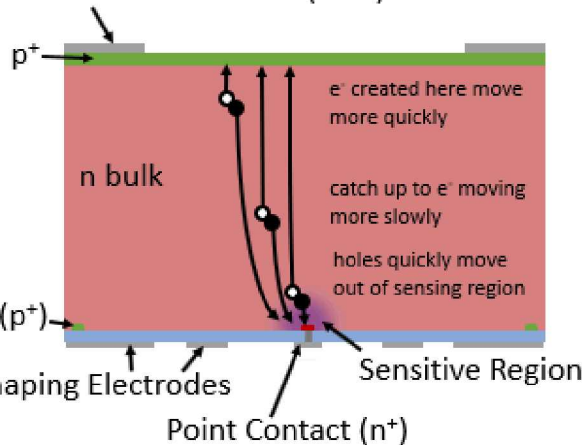


## Coplanar Grid Concept



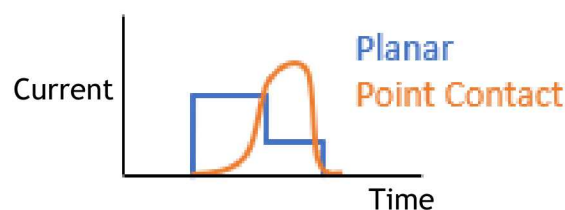
P. Luke, APL 65, p.2884 (1994)

## Common Electrode (Grid)



- Can operate as typical pixel when  $PV=S1+S2$
- Can increase dynamic range when  $PV=S1$  .  $S2$  shunted to VRST.
- Can reduce sensitive volume when  $PV=S1-S2$  , similar to point contact

## Anticipated Impulse Response



# A New Fabrication Process Could Yield a More Optimal Geometry

Doped polyfill column structures described in Parker 1997, Kenney 1999, Kok 2006, etc.

