

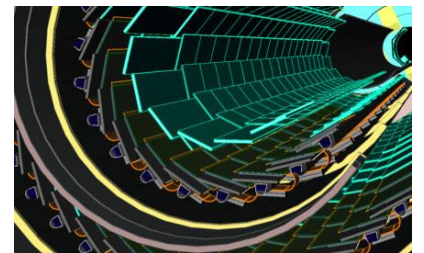
L. Pancheri<sup>1</sup>, G.-F. Dalla Betta<sup>1</sup>, L. Ratti<sup>2</sup>

<sup>1</sup>University of Trento & TIFPA-INFN, Italy

<sup>2</sup> University of Pavia and INFN, Italy

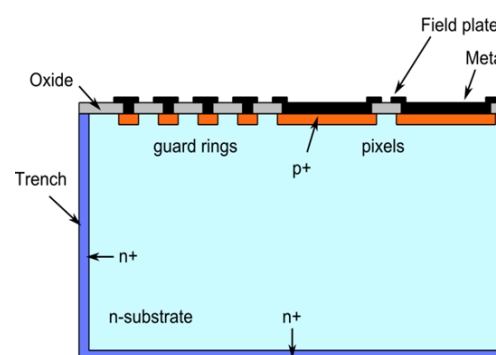
## Introduction

- Large area photon and particle detectors are required in many application fields
- Small detectors are combined by **tiling** to cover large areas
- At high bias voltage, conventional sensors require a **large peripheral region** (~ mm) to deal with high electric fields: large tiling **dead space**

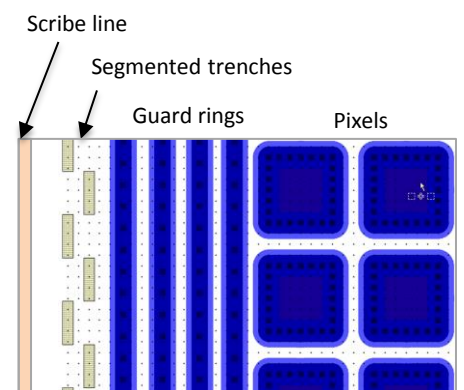


## The Idea/Concept

- Doped trenches:** signals generated near the trenches is collected
- Trench segmentation:** wafer integrity is maintained during processing
- No handle wafer: enables **optimization of entrance window** for low x-ray energies
- Can be used in both planar and 3D detector process



Cross section

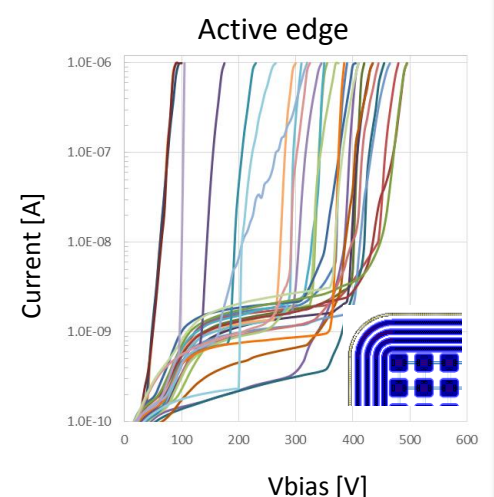
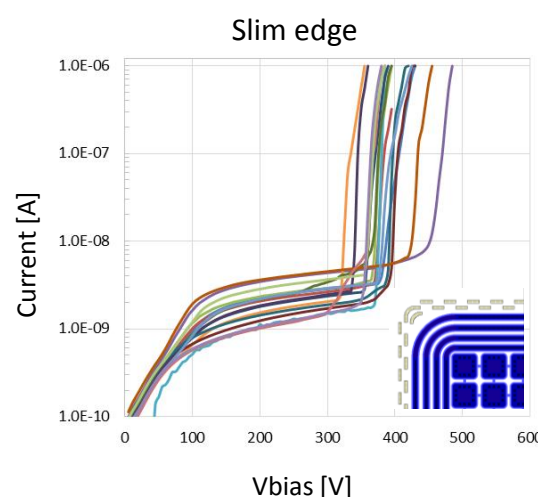


Layout

## Preliminary demonstration

### INFN PixFEL project: sensors for XFEL

- Optimized for up to 1GGy radiation dose and high photon rates (up to 10 kph. at 10 keV per pixel per pulse)
- n-type substrate, **450um thickness** with n+ **handle wafer**
- Active and slim-edge structures
- 32x32 and 64x64 pixel arrays with 100um pitch



Slim-edge sensors: **reduced defectivity**

## Potential Impact

- Improved efficiency** for large-area tiled hybrid pixel sensors
- Support advancements in several **application fields**:
  - synchrotron and XFEL radiation imaging,
  - particle tracking detectors
  - medical imaging applications

