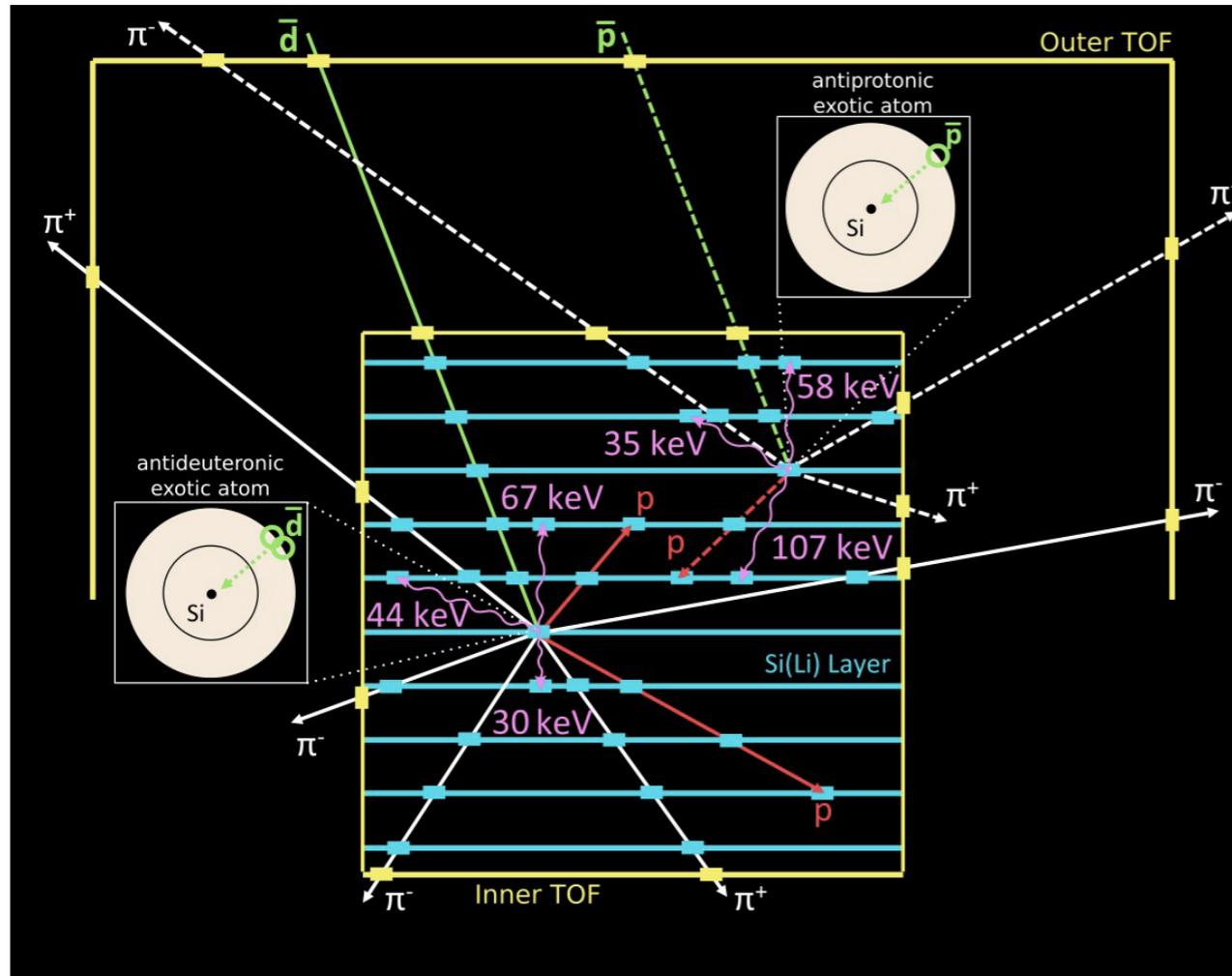
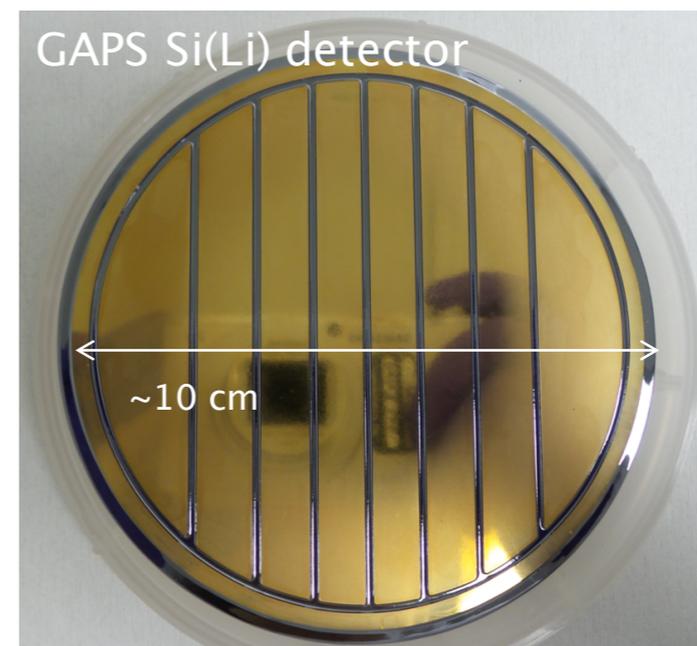


Large Area Si(Li) detectors for GAPS

K. Perez, MIT



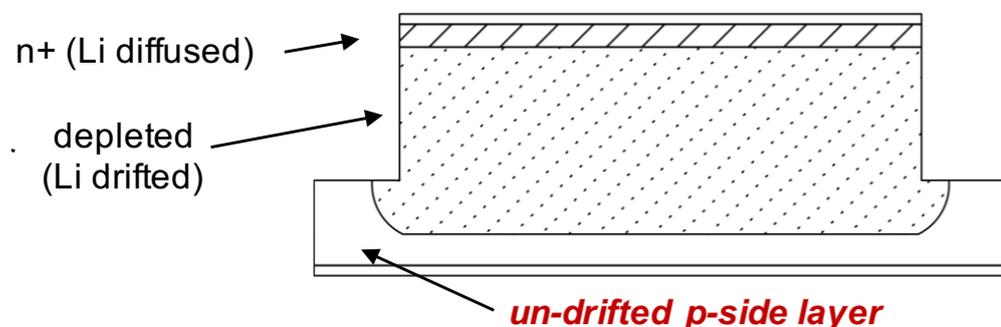
- ▶ Si(Li) tracker to look for cosmic antideuterons from dark matter annihilation.
- ▶ Thick detectors (2.5 mm) to stop cosmic rays.
- ▶ >10 m² active area. Low cost!
- ▶ 4 keV (FWHM) energy resolution for X-ray identification.



>1000 detectors

8 strips / detector

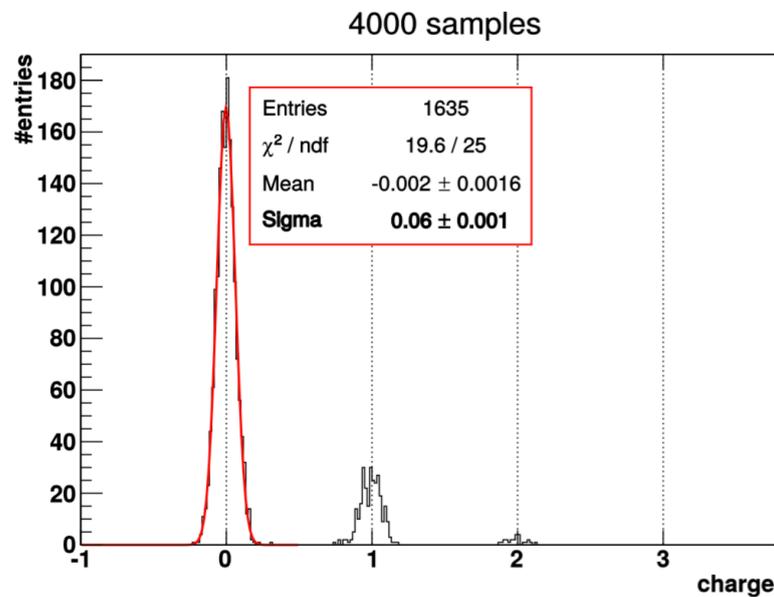
\$100s / detector



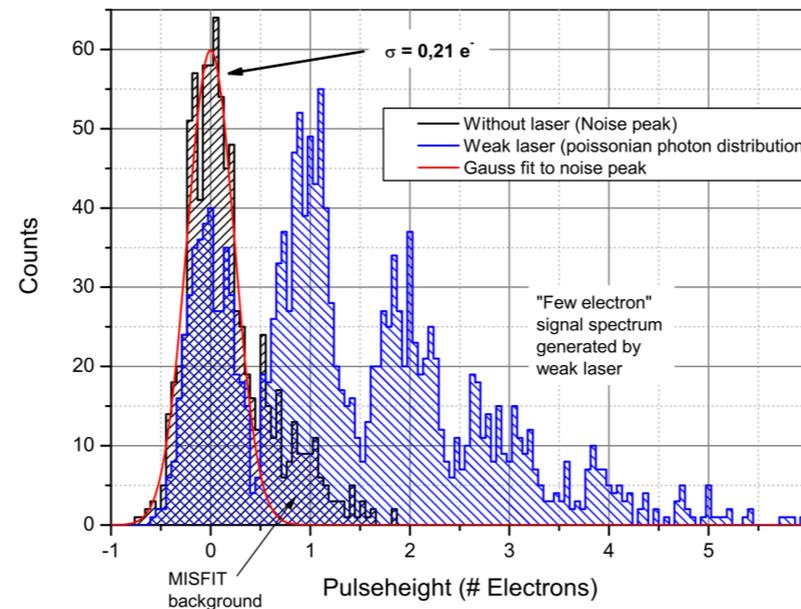
Silicon devices to resolve single e^-

P. Mitra, U. Washington

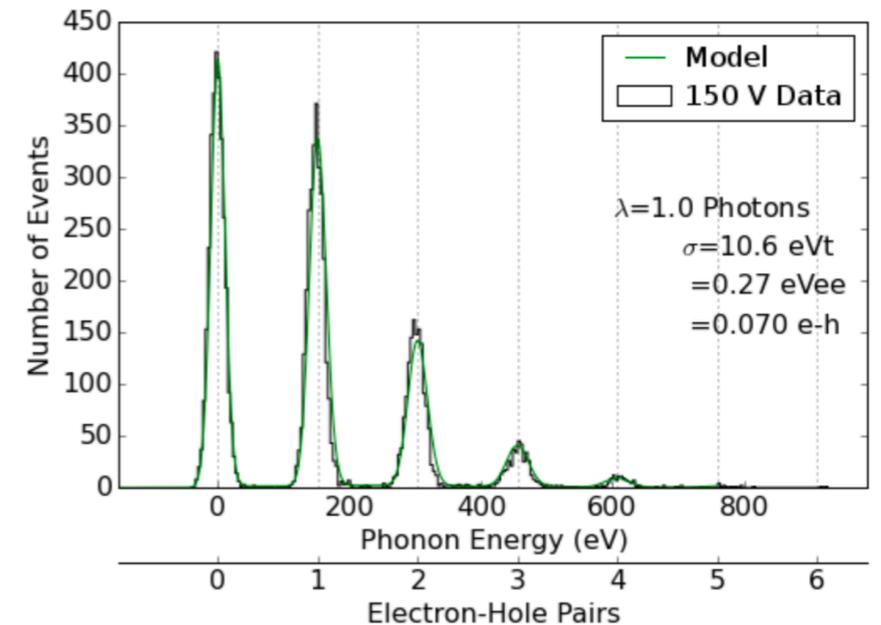
Small silicon sensors ($\sim 1\text{g}$) developed with single e^- response to search for electronic recoils from dark matter scattering



Skipper CCD

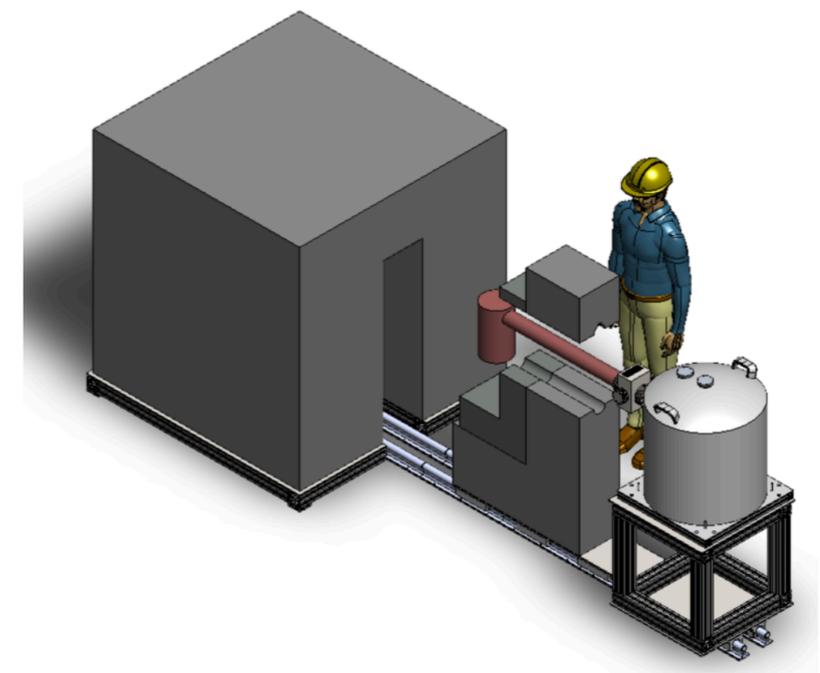


DEPFET



QET

- ▶ Leakage current important background.
- ▶ DAMIC demonstrated $< 10^{-21} \text{ A cm}^{-2}$.
- ▶ **DAMIC-M**: first kg-scale search under construction.
- ▶ Tower of fifty 36 Mpix skipper CCDs in Modane Underground laboratory.



Technical challenges of LSST

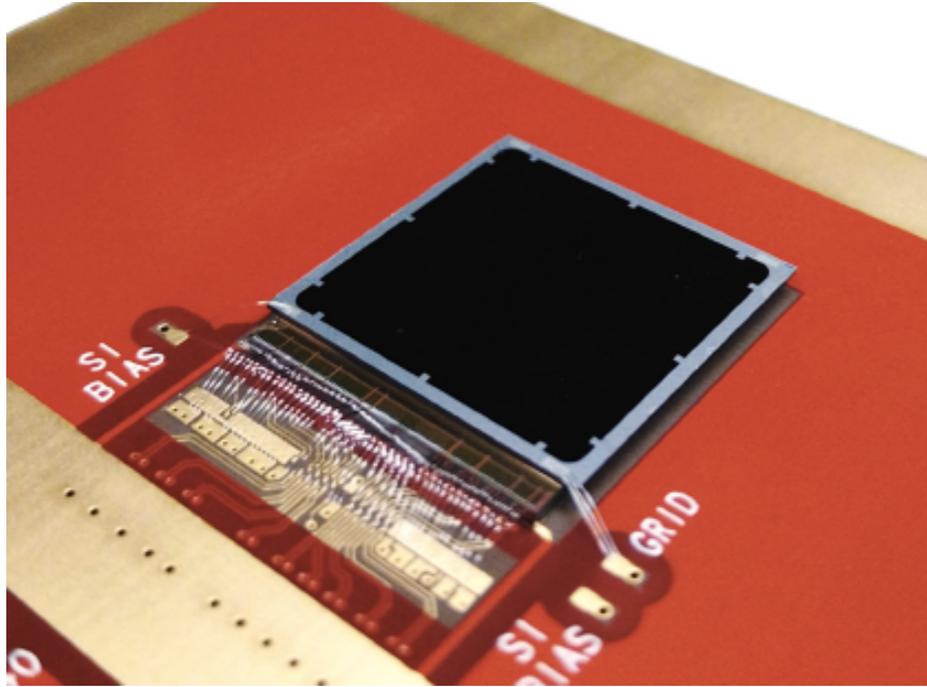
S. Herrmann, BNL

Imaging arrays are getting bigger!

- ▶ Large Synoptic Survey Telescope has a 3.2 Gpix camera.
- ▶ Each CCD is 16 Mpix and 16 amp/CCD readout.
- ▶ ASICs used for CCD readout and controller.
- ▶ CCDs from two different companies for risk mitigation.
- ▶ Considerations to decrease thermal IR radiation from controller into camera.

BI imagers with ns resolution

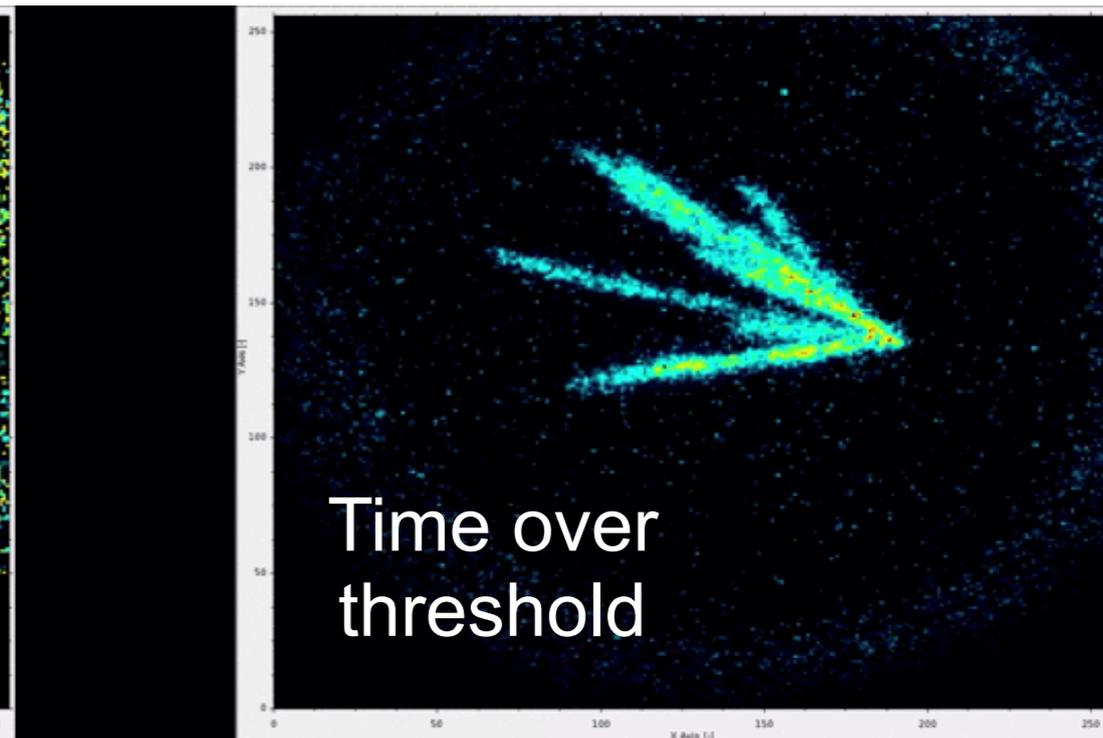
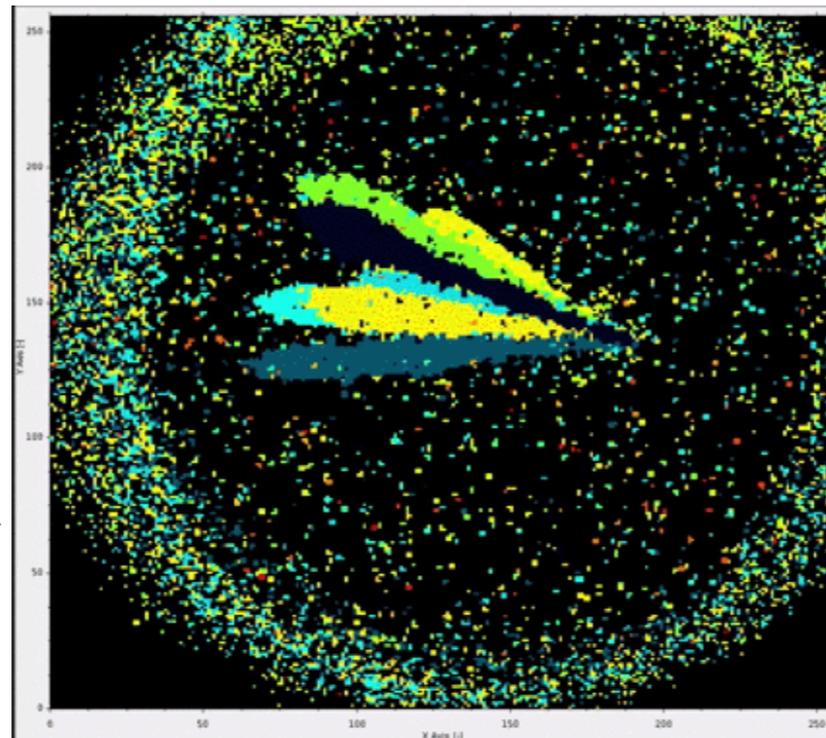
A. Nomerotski, BNL



- ▶ Optical imager with time-stamped photon signals (few ns resolution).
- ▶ BNL photon sensor coupled to Timepix3 readout chip: 256 x 256, 55 μm pixels.
- ▶ Can detect single photons with “image intensifier” (Photocathode+ MCP+phosphor).
- ▶ Many applications: coincidence velocity map imaging, phosphorescence lifetime imaging, quantum information science, optical readout for LAr TPC.

5.5 MeV α s
in CF_4 gas:

Time of arrival \longrightarrow

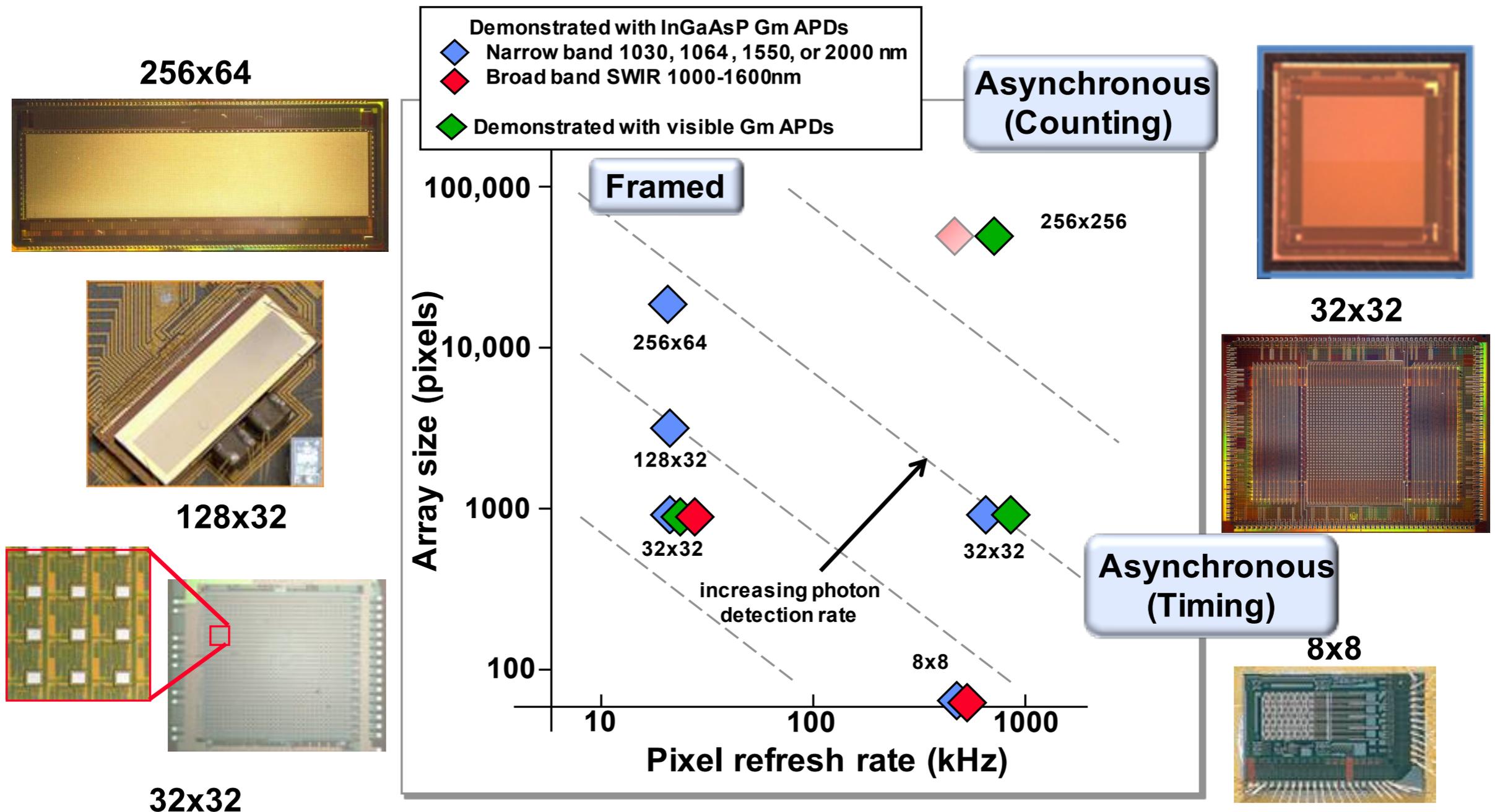


Time over
threshold

Geiger-Mode APD

R. Younger, MIT LL

- ▶ Single photon counting with avalanche process.
- ▶ Applications in laser radar and laser communications.

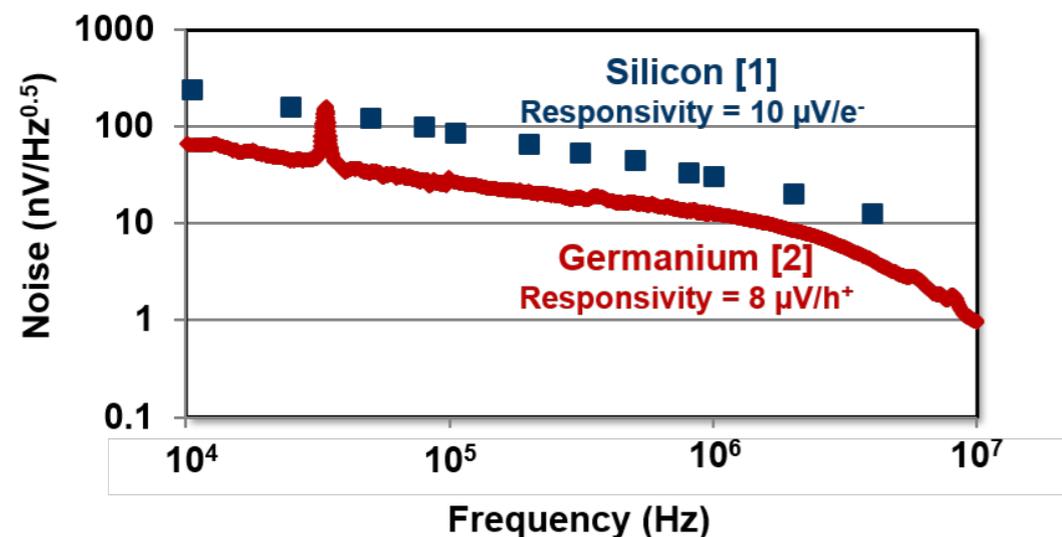
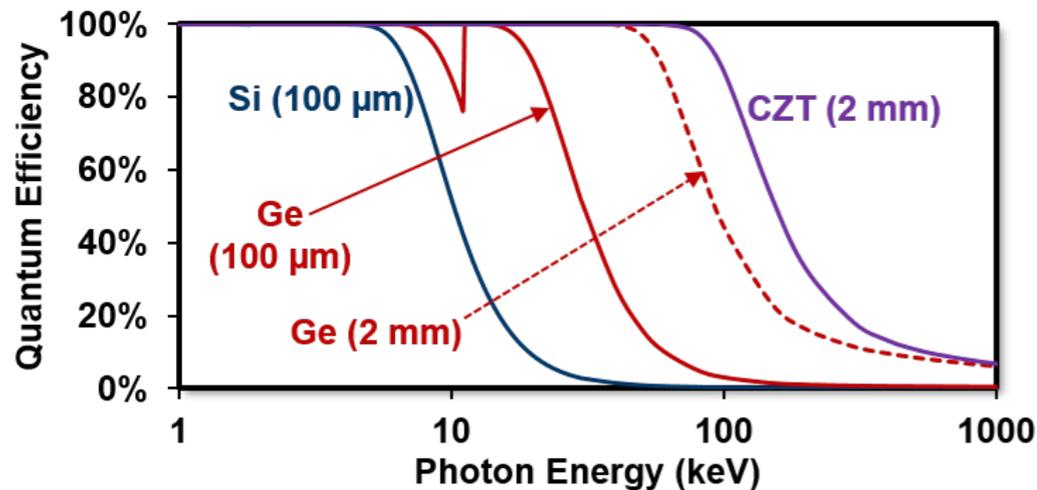


Geiger-Mode APD

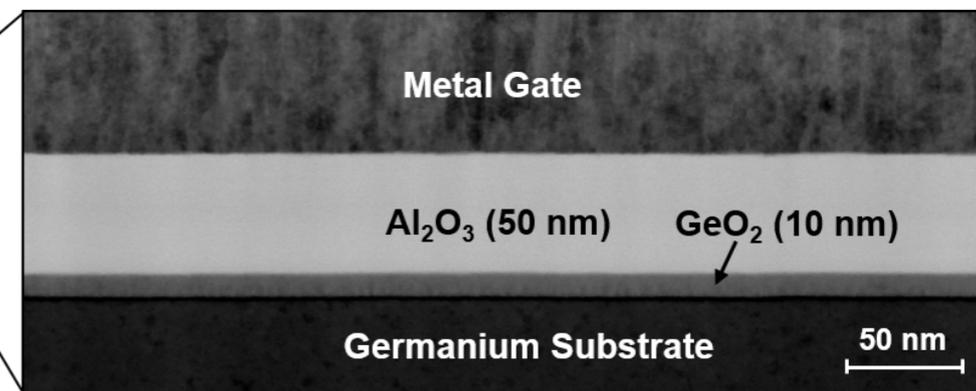
R. Younger, MIT LL

CCDs on fabrication on bulk Ge

C. Leitz, MIT LL



- ▶ Higher Q.E. to high energy photons.
- ▶ In principle, lower noise than Si.
- ▶ 200 mm wafers using Si CCD toolset.
- ▶ Challenges in fabrication of MOS structure overcome.
- ▶ On-going efforts to decrease leakage current and improve charge transfer.
- ▶ Good performance in 32 × 32, 8.1-μm pix array and 1024-pix linear devices.
- ▶ Moving to larger devices...



aSe sensors with ps resolution

A. Goldan, SUNY Stony Brook

- ▶ Microfabrication of amorphous selenium (aSe) multiple-well detector (unipolar sensing, also avalanche gain) for medical imaging applications.