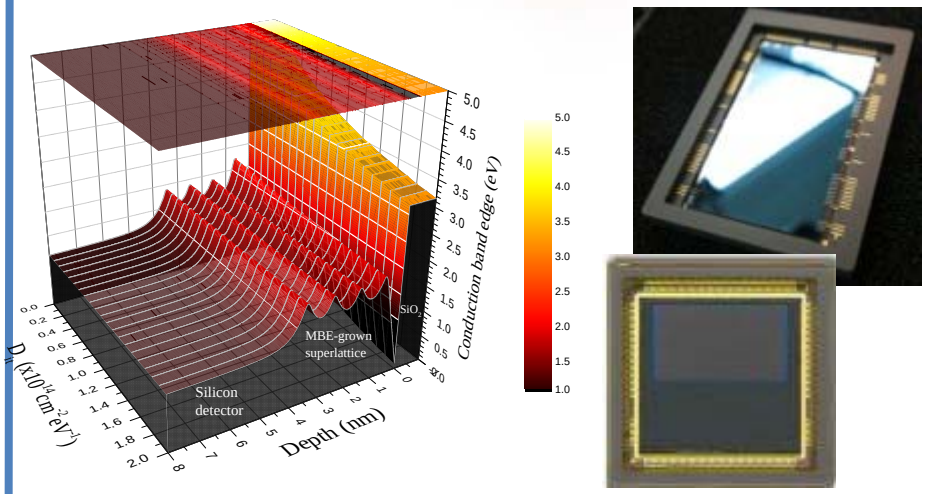
Advanced FUVUV/Visible Photon Counting and Ultralow Noise Detectors

PI: Shouleh Nikzad/JPL

Objectives and Key Challenges:

- Objective Develop and advance TRL of solar blind, high efficiency, photon counting, and ultralow noise solid-state detectors esp. in FUV ($\lambda < 200$ nm).
- Key challenges: solar blind silicon, large format arrays, reliable and stable high response in the FUV



Significance of Work:

- Key innovation of work are: high and stable response in the ultraviolet through atomic level control of surface and interfaces; the breakthrough in rendering Si detectors with optimized in-band response and out of band rejection. Versatility with CMOS and CCD.

Approach:

- Fabricate & Process UV detectors by SuperLattice (SL) doping Electron Multiplying CCDs(EMCCDs) and ultralow noise CMOS wafers
- Develop multistack integrated solar blind filters using atomic layer deposition (ALD)
- Combine integrated SB filters and SL, with sCMOS and EMCCDs
- Characterize, and validate

Key Collaborators:

- Chris Martin, Caltech
- David Schiminovich, Columbia University
- Michael Hoenk, JPL
- e2v

Current Funded Period of Performance:

- December 2015 – December 2018

Recent Accomplishments:

✓ New task

Next Milestones:

- Procure two megapixel EMCCD wafers (Feb 2016)
- Procure sCMOS wafers (March 2016)
- Begin design of FUV integrated filters (July 2016)
- Process wafers by thinning and bonding (June 2016)

Application:

- Large UV/Optical/NIR Telescope
- Probes, Explorers

TRL $_{In}$ = 3 TRL $_{PI\text{-}Asserted}$ = 3 TRL $_{Target}$ = 4-5