High Efficiency Detectors in Photon Counting and Large FPAs

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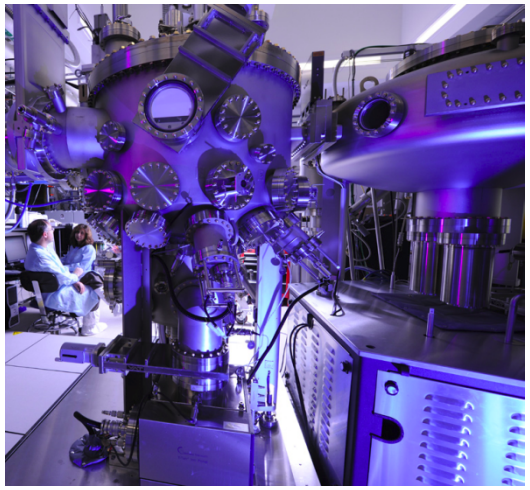
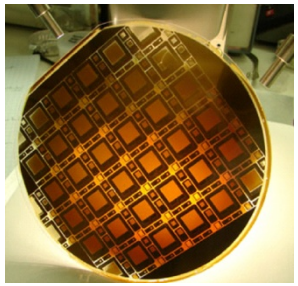
Description and Objectives:

- High efficiency, high stability imaging arrays that are affordable and stable are an efficient and cost effective way to populate UV/Optical focal planes for spectroscopic missions and 4m+ UV/Optical telescope as stated in the NWNH 2010

Key Challenge/Innovation:

- Atomic-level control of back illuminated detector surface and detector/AR coating interface produces high efficiency detectors with stable response and unique performance advantages even in the challenging UV and FUV spectral range





Approach:

- Develop and produce 2 megapixel AR-coated, delta doped electron multiplied CCDs (EMCCDs) using JPL's 8-inch capacity silicon molecular beam epitaxy (MBE) for delta doping and atomic layer deposition (ALD) for AR coating. Perform relevant environment testing, perform system-level evaluation on sky to validate performance over a wide range of signal level.

Key Collaborators:

- Chris Martin, Caltech, David Schiminovich, Columbia University, Paul Scowen, Arizona State University, Michael Hoenk, JPL

Development Period:

- Jan 2013 – Dec 2015

Accomplishments and Next Milestones:

- Wafers of 2Kx1K devices have been received and back - illumination process is underway. Wafers have been bonded to handle wafer. One wafer has been thinned to 8-10 micron. Wafer is ready for delta doping and next process steps. Complete first wafer in FY13Q4
- Characterize & validate the performance. (iterative, first in FY14Q1)
- Evaluate environmental performance. (FY14Q2 - FY15Q4)
- Evaluate performance in astrophysics-relevant and mission-relevant environments. (FY15Q3 – Q4)

Application:

- Large aperture UV/Optical Telescope, Explorers, Spectroscopy missions, UV/Optical imaging

TRLin = 4 ***TRLcurrent = 4***
TRLtarget = 5-6