

## **WFIRST IR Detectors TAC Report on Milestone #4 Review**

A telecon review of Milestone #4 for the WFIRST instrument detector technology program was held on September 22, 2016. Milestone #4 is a continuation of the same H4RG detector development effort characterized by the previous Milestones #1, #2, and #3. Full-array lots of both the PV2A and PV3 passivation detectors were fabricated by Teledyne, but only the PV3 detectors were used here to demonstrate having met the Milestone #4. 10 of the 13 PV3 devices delivered by Teledyne met the specific performance requirements of Milestone #4. This Milestone required a lot yield of greater than 20% of detectors that met the following requirements: 95% operability, dark currents less than 0.1 electrons/pixel/sec, noise less than 20 electrons CDS, quantum efficiency (QE) greater than 60% over the WFI bandpass, interpixel capacitance of less than 3% for nearest neighbors, and charge persistence less than 0.1% of full well 150 sec after illumination, at the nominal operating temperature of 100 K. In practice, 77% of the PV3 detectors met the Milestone #4 requirements, when interpreted as median values, though certain devices had significant numbers of pixels that failed at least one of the requirements, in spite of the overall success of the median values. Nevertheless, the TAC unanimously agrees that the WFIRST team members presented persuasive evidence that the requirements for Milestone #4 have been met. However, as also noted by the detector development team, it was clear that a far smaller percentage of arrays would be deemed flight quality.

In our Milestone #2 report, the TAC requested to learn more about the effort underway with NIST to understand why measured QE values exceeded the physical bound of 100% for certain devices at certain wavelengths. The TAC notes that the QEs in the Milestone #4 presentation (chart #19) show that only one of the 10 devices plotted still seems to have a QE greater than 100% at a few wavelengths, so evidently this problem has been largely resolved.

We thank Dave Content and the other WFIRST and Teledyne team members for their presentations and comments during the review. We also commend the team for beginning efforts to develop a more rigorous set of requirements for the flight detectors.

### **WFIRST IR Detectors TAC Members**

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