

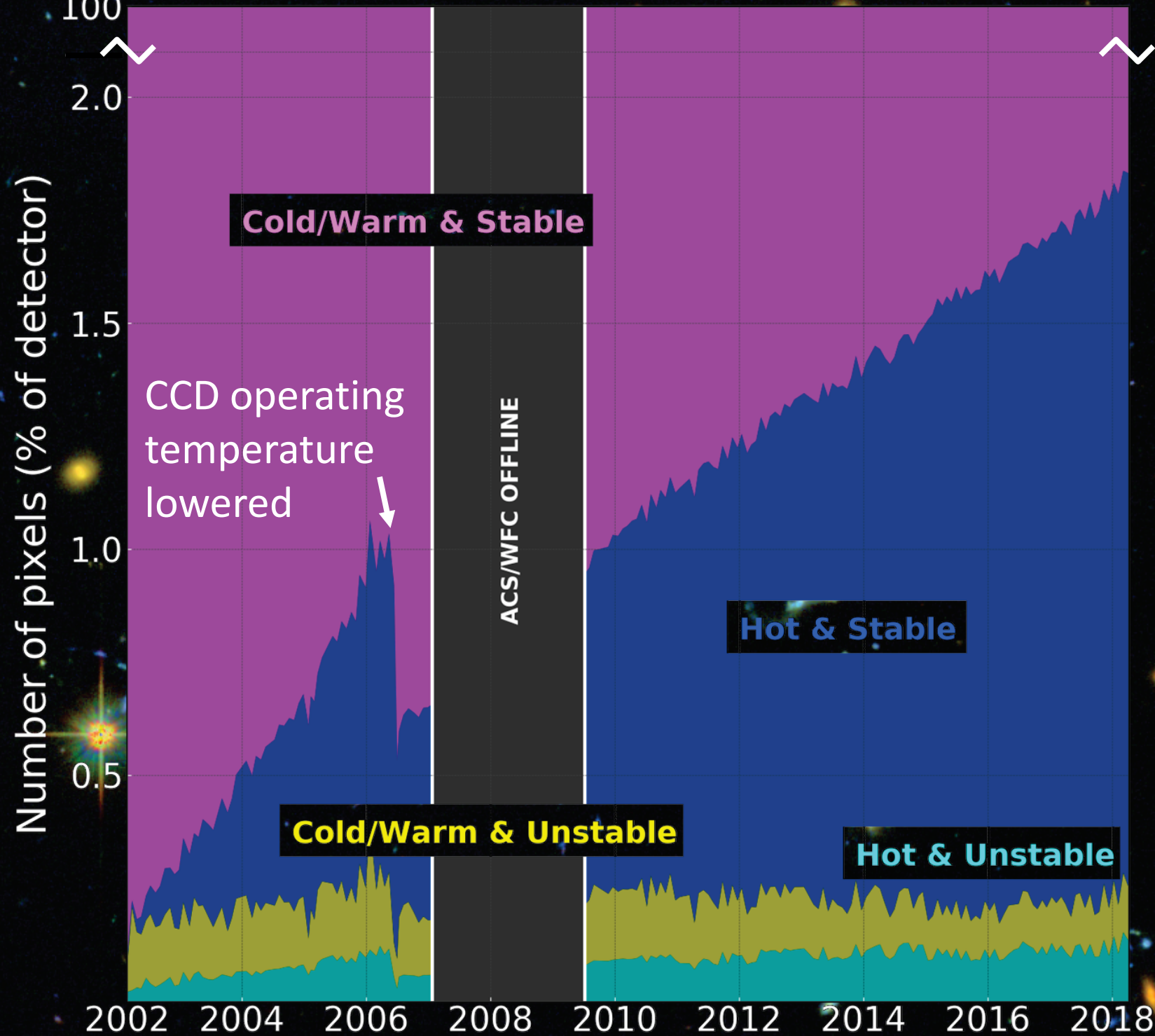
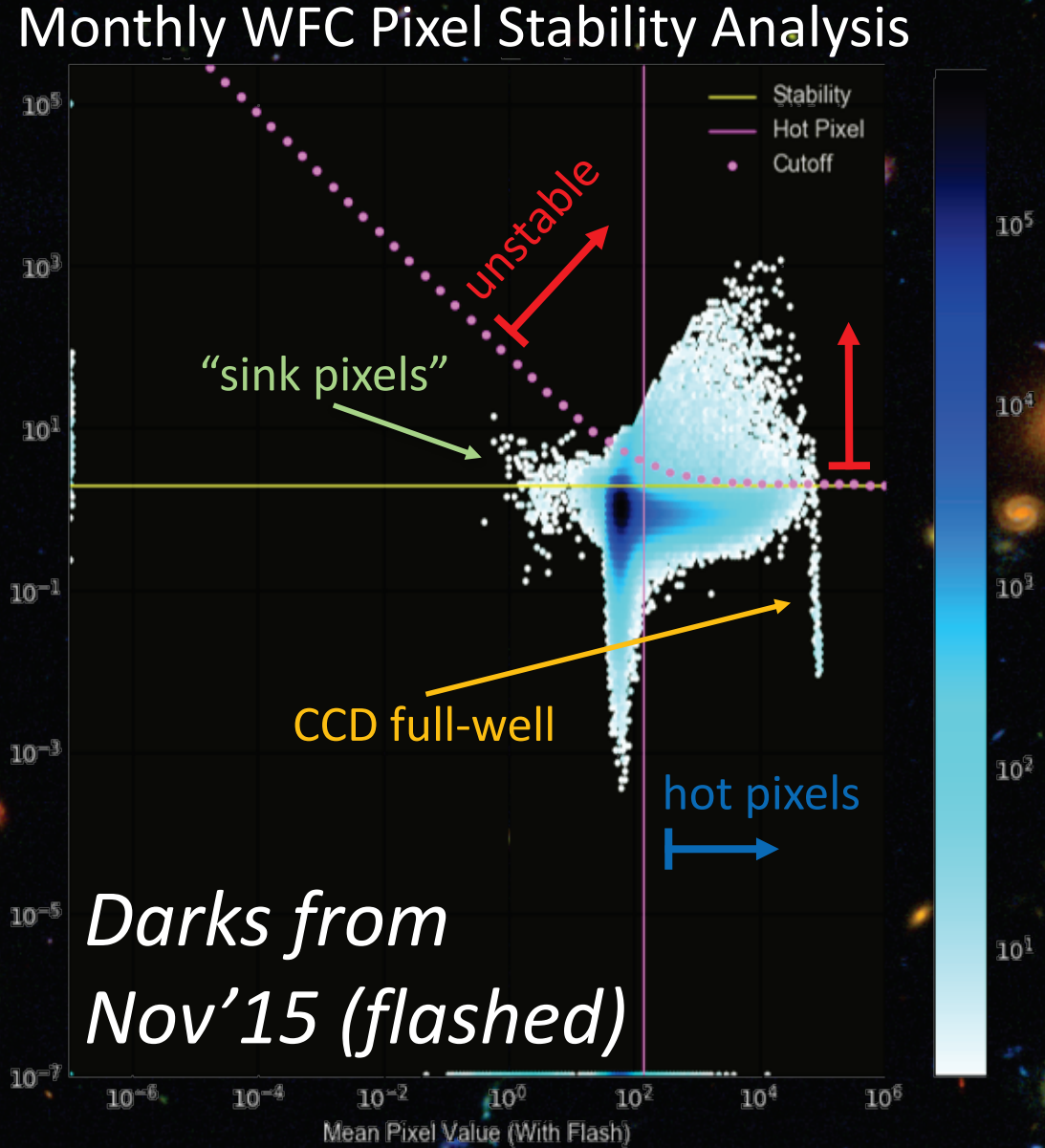
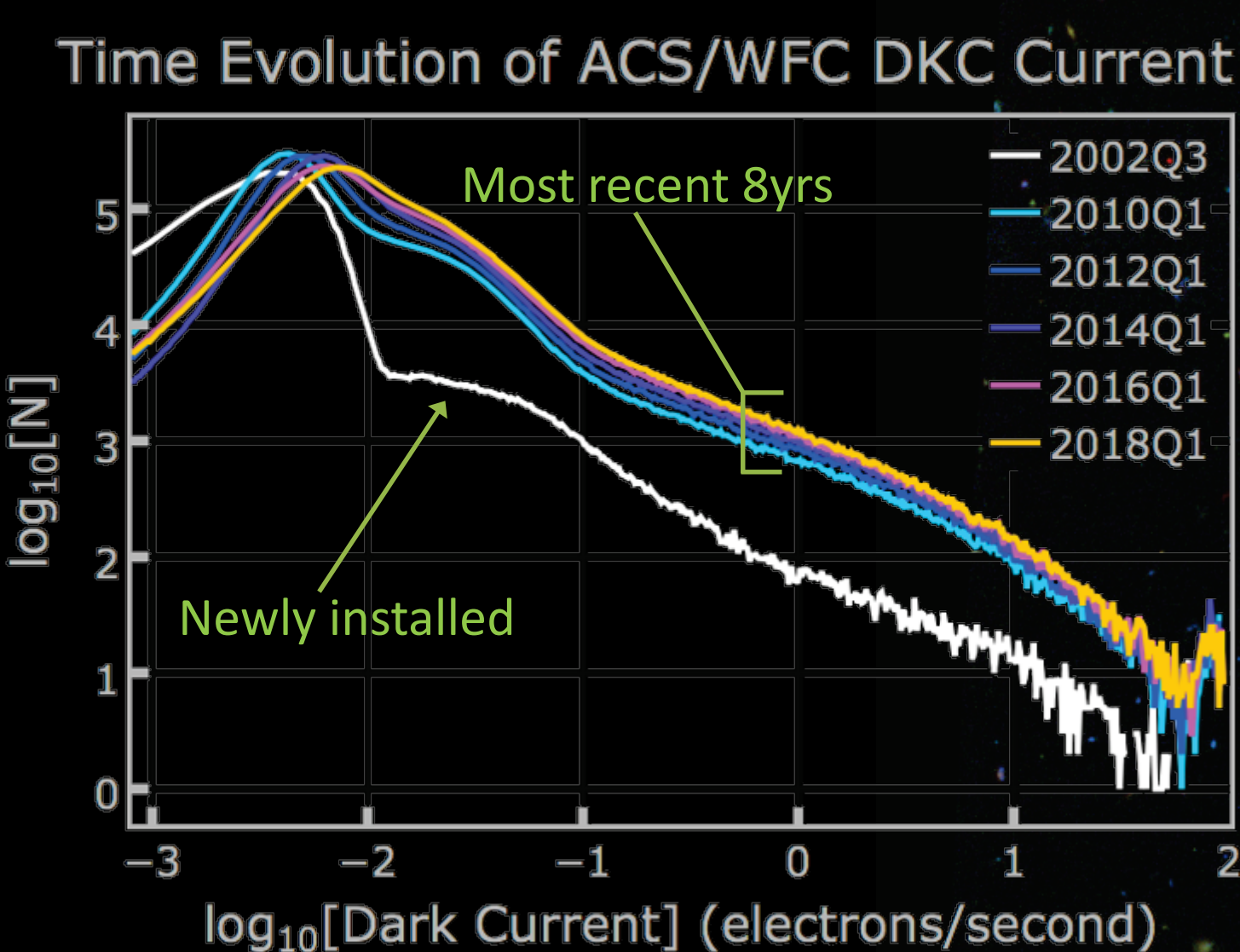
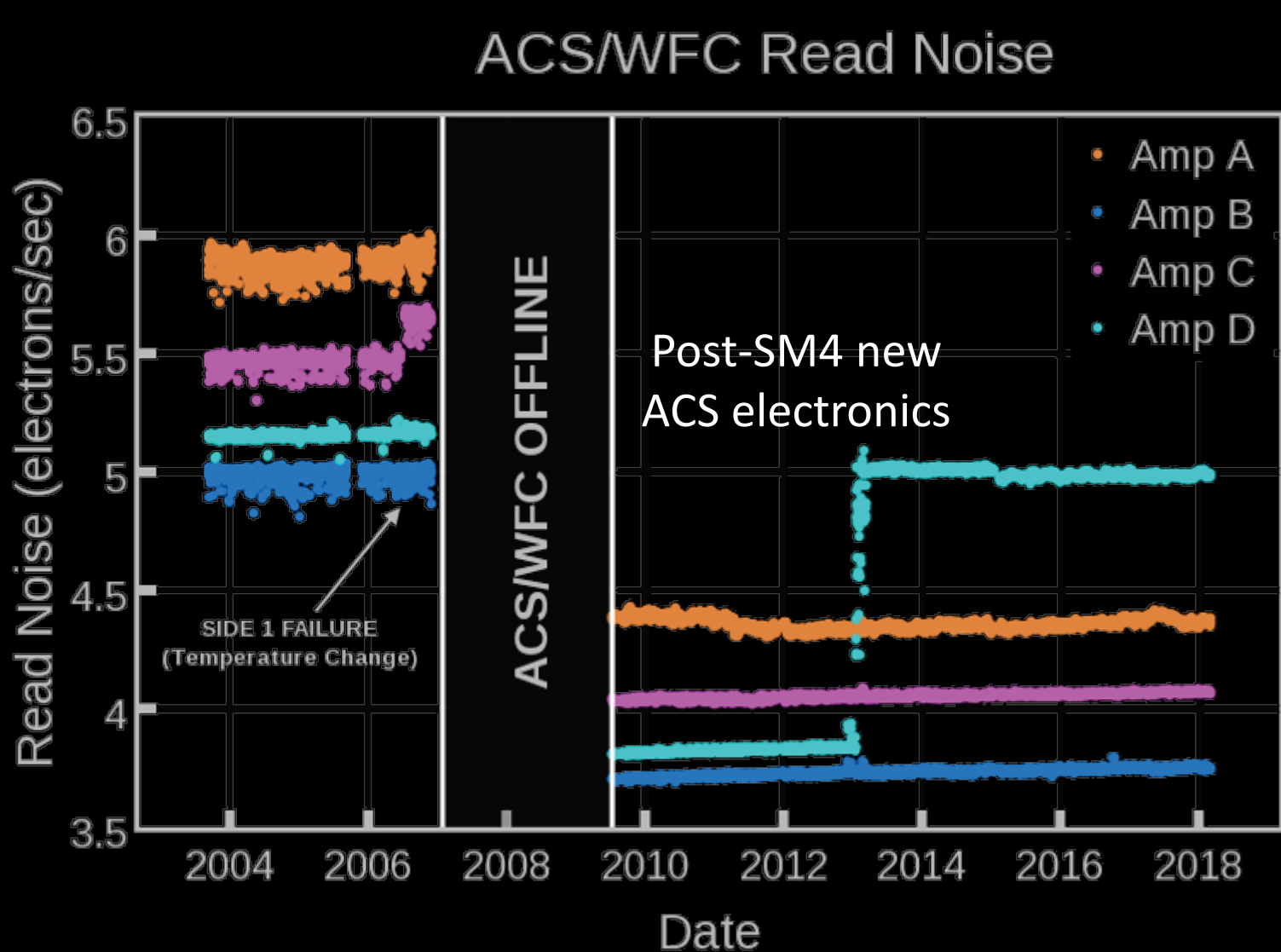
Sixteen Years of the HST Advanced Camera for Surveys : Calibration Update

Norman A. Grogin and the ACS Team (Space Telescope Science Institute)



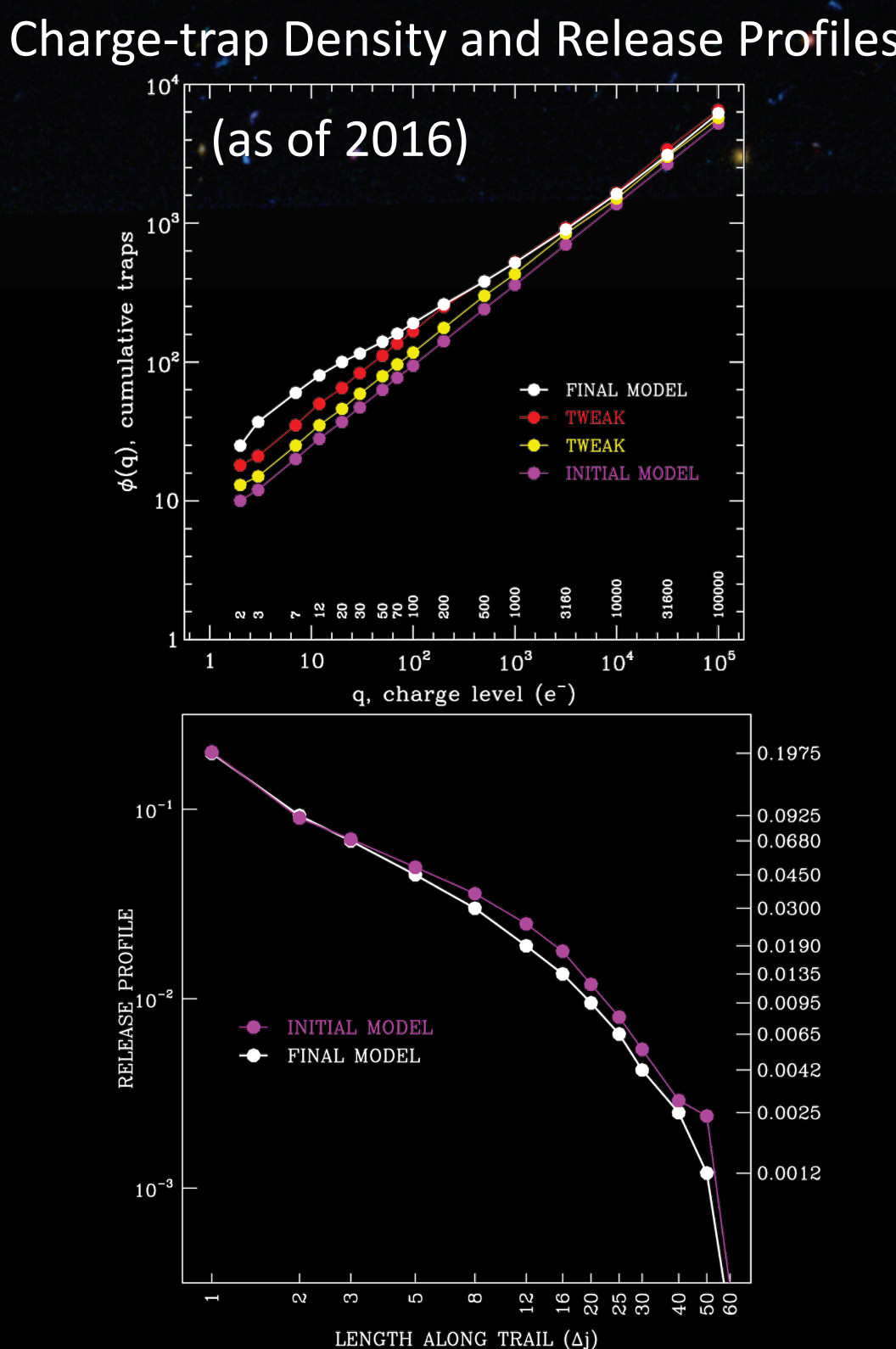
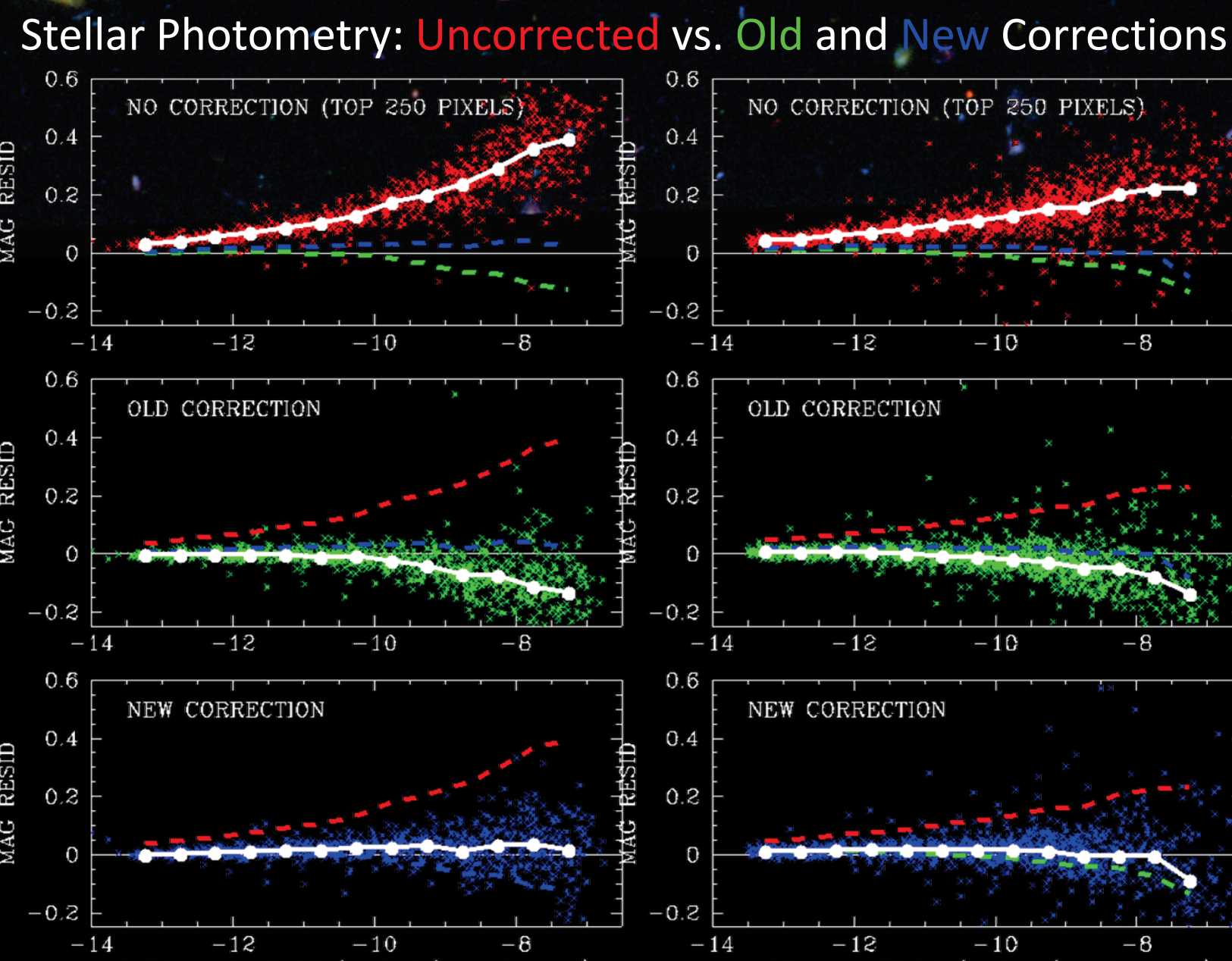
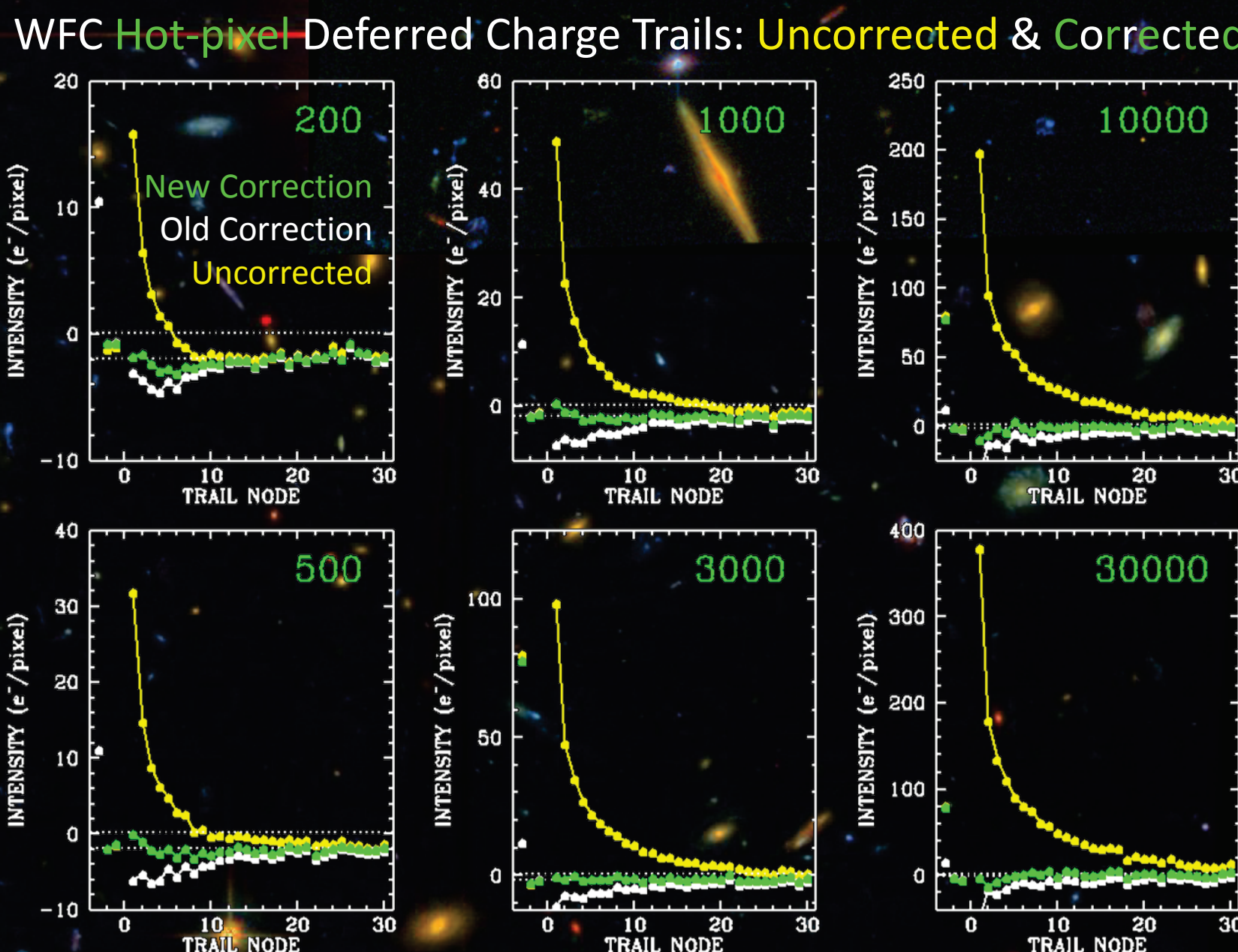
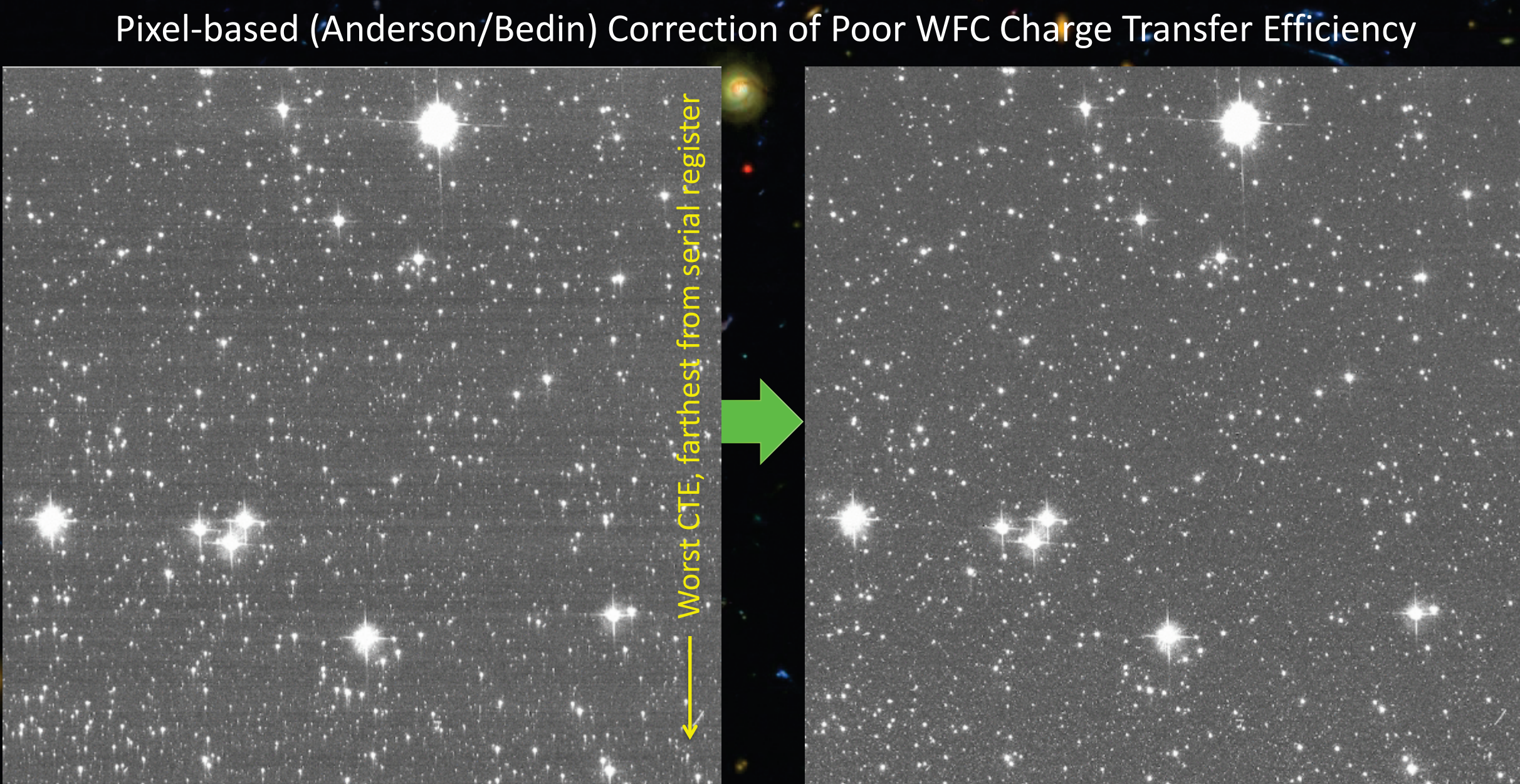
I. Long-term Monitoring to Optimize ACS Detector Calibrations

On orbit for sixteen years, the Advanced Camera for Surveys (ACS) remains a crucial workhorse imager for *HST*. The Wide Field Channel (WFC) has now been operating roughly twice as long (>9yrs) since its 2009 repair as before its 2007 failure. The ACS Team at STScI has been exploiting this long history to characterize instrument performance better than ever, resulting in excellent calibrations for the ACS users. Examples shown here include: trending in WFC read noise (1st panel) and dark current (2nd panel), as well as WFC normal- and hot-pixel stability monitoring (3rd and 4th panels).



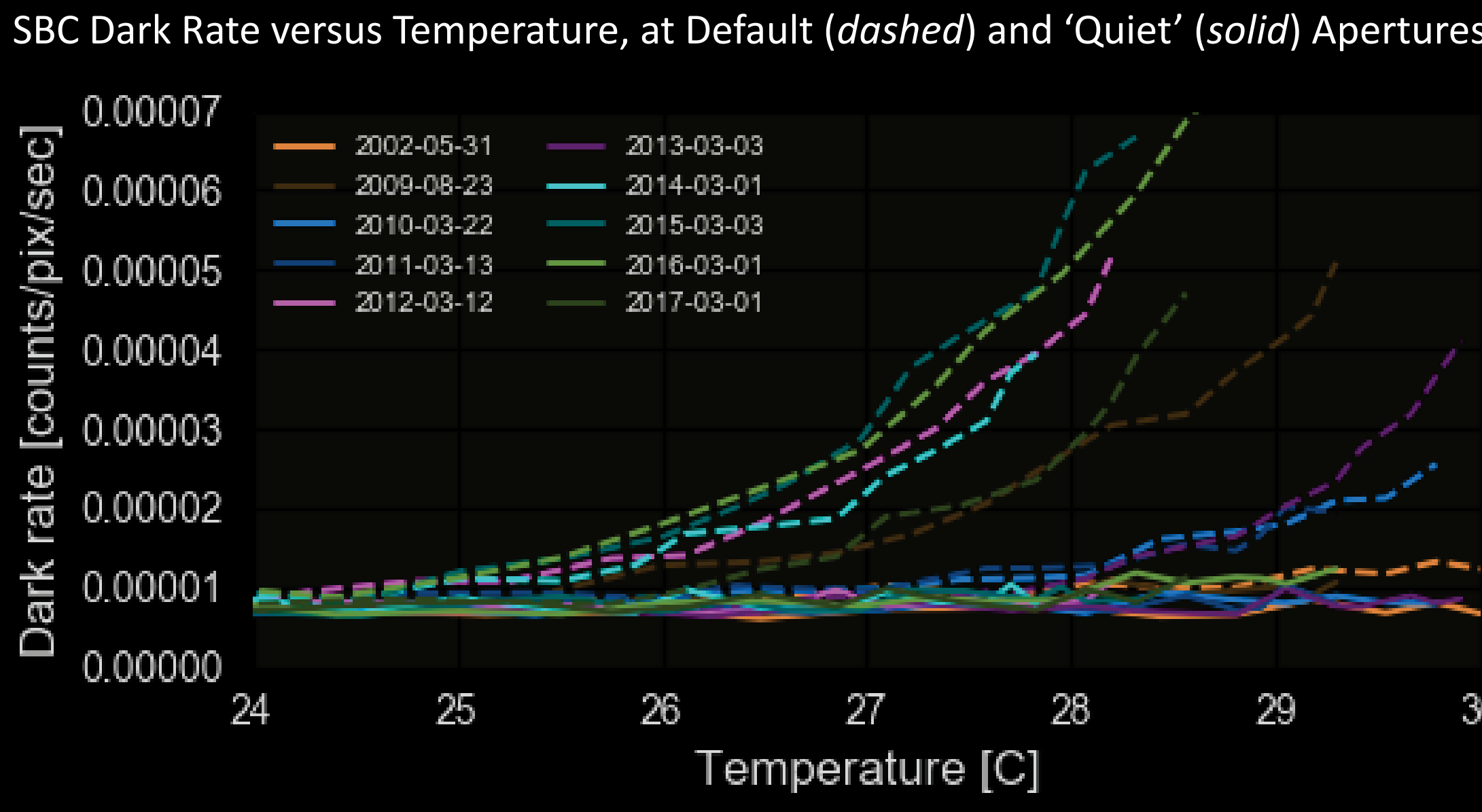
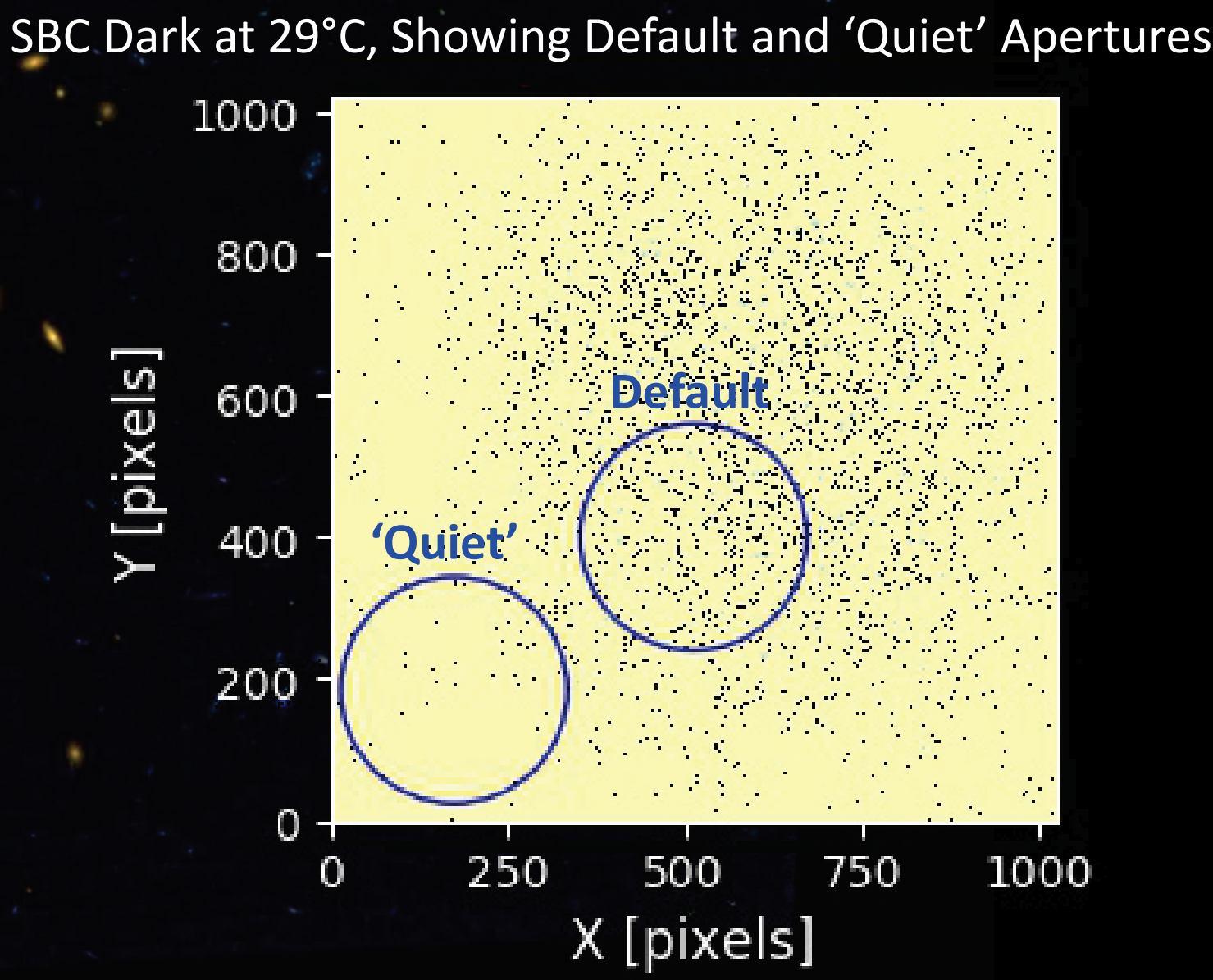
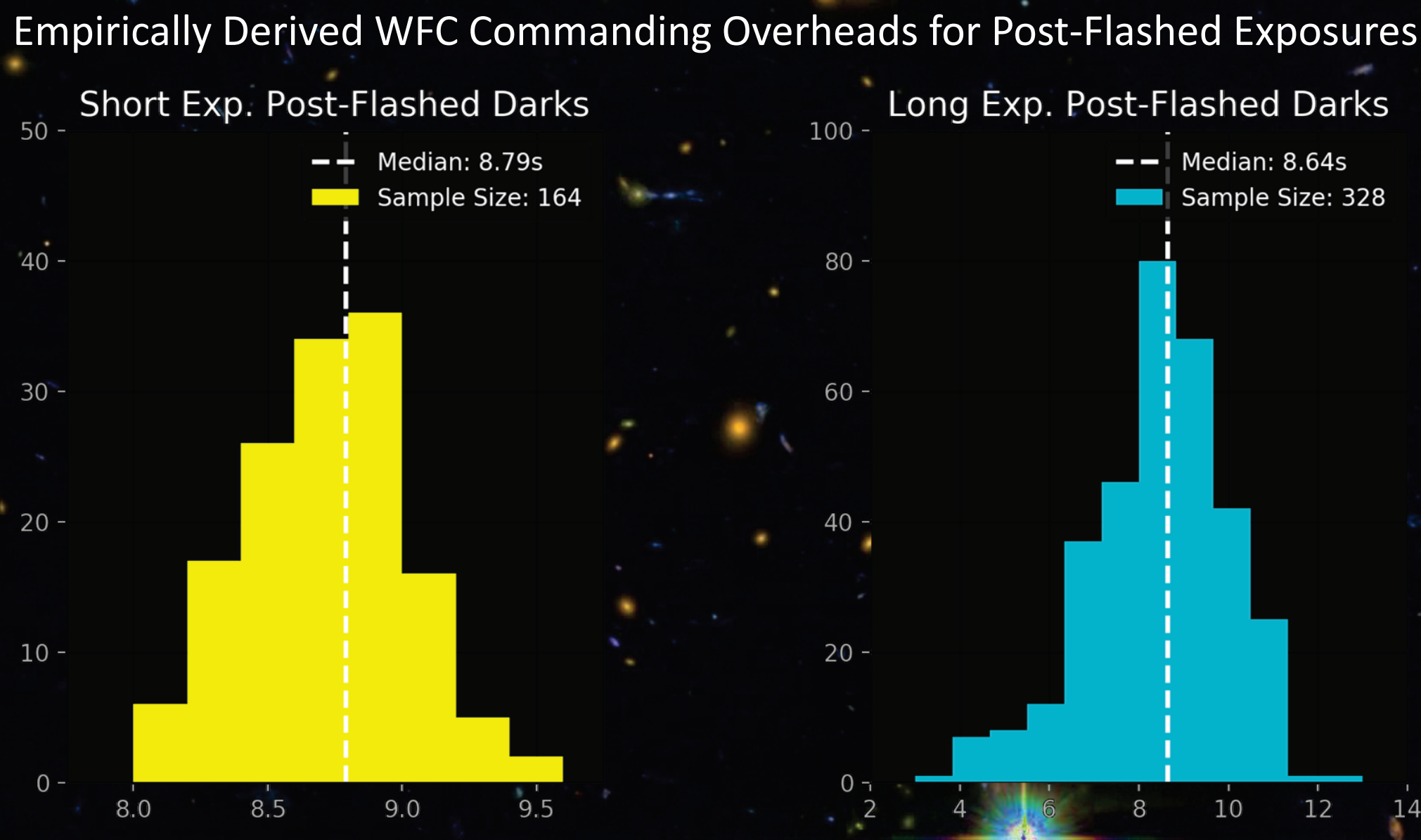
II. Updated Pixel-based CTE Correction in the CALACS Pipeline

Cumulative radiation damage to the WFC CCDs steadily worsens their charge transfer efficiency (CTE). After sixteen years, the WFC CTE has become problematic for faint targets against low WFC backgrounds. The ACS Team provides both corrections and mitigations of this effect, including a pixel-based correction, post-readout. The *CALACS* pipeline pixel-based CTE correction, originally added in 2012, has been extensively updated as of the Summer 2017 release. Figures below show the pixel-based correction as applied to a stellar field, the uncorrected vs. corrected WFC hot-pixel charge-trails, 47 Tucanae stellar photometry, and the derived charge-trap density profile (increasing; shown *ca.* 2016) and trapped-charge release profile.



III. Coming Attractions: WFC Overheads and SBC 'Quiet' Zone

The aging WFC CCDs have a large and increasing number of 'hot' pixels that are not healed by the monthly thermal annealing. Fortunately, the vast majority of these pixels with elevated dark current are observed to be stable over the course of any given anneal interval, and thus can be dark-subtracted if the total exposure darktime is known with precision. To this end, the ACS Team has recently used the WFC hot-pixel population to make an empirical measurement of the WFC commanding overheads associated with both LED-flashed and unflashed exposures, precise to 0.1sec. The team has also identified a region of the Solar Blind Channel (SBC) robust against the known surge in dark current at high SBC operating temperature.



HST Frontier Field : Galaxy Cluster Abell 2744
WFC Color Composite of Parallel Field in BVI Filters

HST Frontier Field : Galaxy Cluster MACS J0416.1-2403
WFC Color Composite of Cluster Center in BVI Filters