

## Removing the herring-bone pattern-noise from *\*all\** STIS Side-2 CCD data: a factor $\sim 3$ enhancement in sensitivity

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STELLAR POPULATIONS IN EXTERNAL GALAXIES

Total Budget Amount: \$179,935 (Budget split over two years.)

Calibration: Yes

Legacy: Yes

### Abstract

When STIS resumed operations in July 2001 using the redundant "Side-2" electronics, the read-noise of the CCD detector appeared to have increased by  $\sim 1$  e- due to a superimposed and highly variable "herring-bone" pattern-noise. For the majority of programs aiming to detect signals near the STIS design limits, the impact of this noise is far more serious than implied by a mere 1 e- increase in the amplitude of the read-noise, as it is of a systematic nature.

We have perfected a method to cleanly remove this pattern-noise from raw STIS CCD frames. It is robust, but too costly in terms of CPU time and overhead to incorporate into the regular HST/STIS OTFR-pipeline. Systematic application therefore demands a one-time dedicated off-line effort beyond the scope of the work outlined in the STIS close-out calibration plan. As a service to the STIS user community, we propose to fully remove this excess noise from *\*all\** raw, un-binned, "Side-2" STIS/CCD frames, and so significantly augment the potential of the STIS data base for future NUV--NIR archival research. The noise characteristics and effective sensitivity of the resulting cleaned data, to be delivered back to the HST Archive, will closely match those of CCD data taken during operations with the primary electronics --- representing a gain of a factor  $\sim 3$  in sensitivity at faint flux levels, at low surface-brightness levels, as well as at small spatial scales. All software will be documented and made available to the community.

This archival calibration legacy program requests a modest, but necessary, investment of resources to assure a long-lasting STIS legacy. Science programs that will benefit include: (1) *\*all\** STIS/CCD spectroscopy of faint point- or extended sources; (2) *\*all\** STIS/CCD imaging of faint point sources or low surface-brightness extended sources; and (3) *\*all\** STIS/CCD programs that combine data obtained with both primary and redundant electronics.

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### Investigators:

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Number of investigators: 4

### Dataset Summary:

Instrument	No. of Datasets	Retrieval Method	Retrieval Plan
STIS	54628	DVD	~6 Gb per week for ~50 weeks via DVD; alternatively, if more convenient to the Archive, we can ingest up to the full ~300 Gb via external harddisk