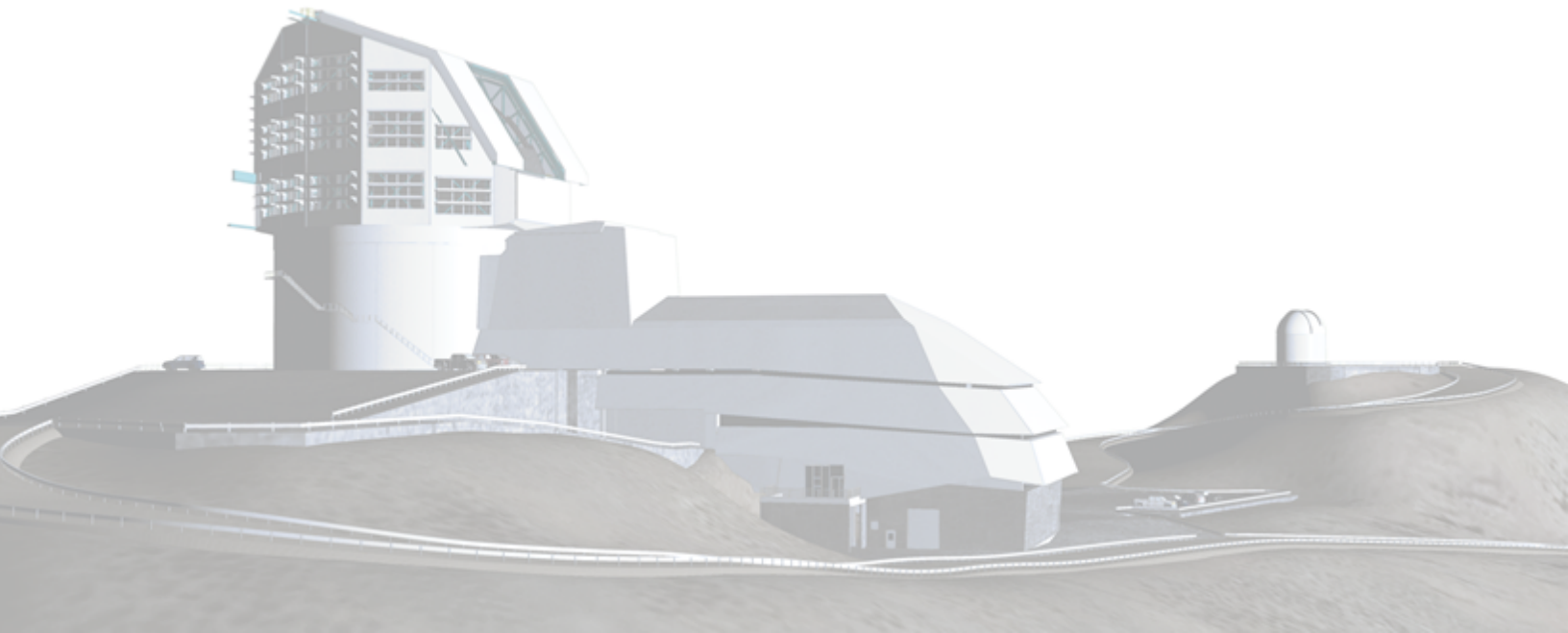

Vera C. Rubin Observatory
Rubin Observatory Operations

Study of the Photon Transfer Curve in the CCD detectors of the Vera C. Rubin Observatory

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RTN-056

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Abstract

The RECA internship program allows Colombian students to get better research skills in Astronomy, Astrophysics, and Cosmology. For three months, we developed our work in this internship program, and its main objective was to study the photon transfer curves (PTC) of the Vera C. Rubin Observatory, mainly gain, and to make comparisons with the gain obtained through pairs of flats.

We used run 13144 to construct the PTCs and 13186 to analyze the crosstalk. We use *DM stack*, which is the software in development for this observatory, and it makes all the reductions for the construction of the PTCs. Also, we implement simulations to reproduce the observed effects.

We initially found a 5 % difference between the gain by PTC and pairs of flats in a range of flows between 5000 and 10000 ADU. Simulations showed that this difference was a product of the handling of the statistics and the erroneous assumption that the distribution following the Lupton equation is Gaussian. By vendor, we found an error interval for this flow region, for E2V of $(1.8 \pm 0.7, 4.1 \pm 0.9)$ % and for ITL of $(0.85 \pm 0.7, 2.2 \pm 0.9)$ %. Also, from the PTC we found the average Full Well Capacity of LSSTCam is 130000 ± 10000 e^-.

We obtained a list of segments where we found differences with the results obtained by SLAC National Acceleration Laboratory in PTC parameters, low saturation level, or other defects. We detected and corrected the effect of statistics in the gain calculation using pairs of flats. Then, we proposed a code change for it, which was implemented in *DM stack*. In addition, we do not recommend correcting for crosstalk since it does not significantly affect the parameters and does not change the shape of the PTC; the opposite is true for the nonlinearity correction.

Change Record

Version	Date	Description	Owner name
1	YYYY-MM-DD	Unreleased.	Lina Giraldo

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Contents

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A References

B Acronyms

Acronym	Description
DM	Data Management