



Vera C. Rubin Observatory  
Camera Technical Note

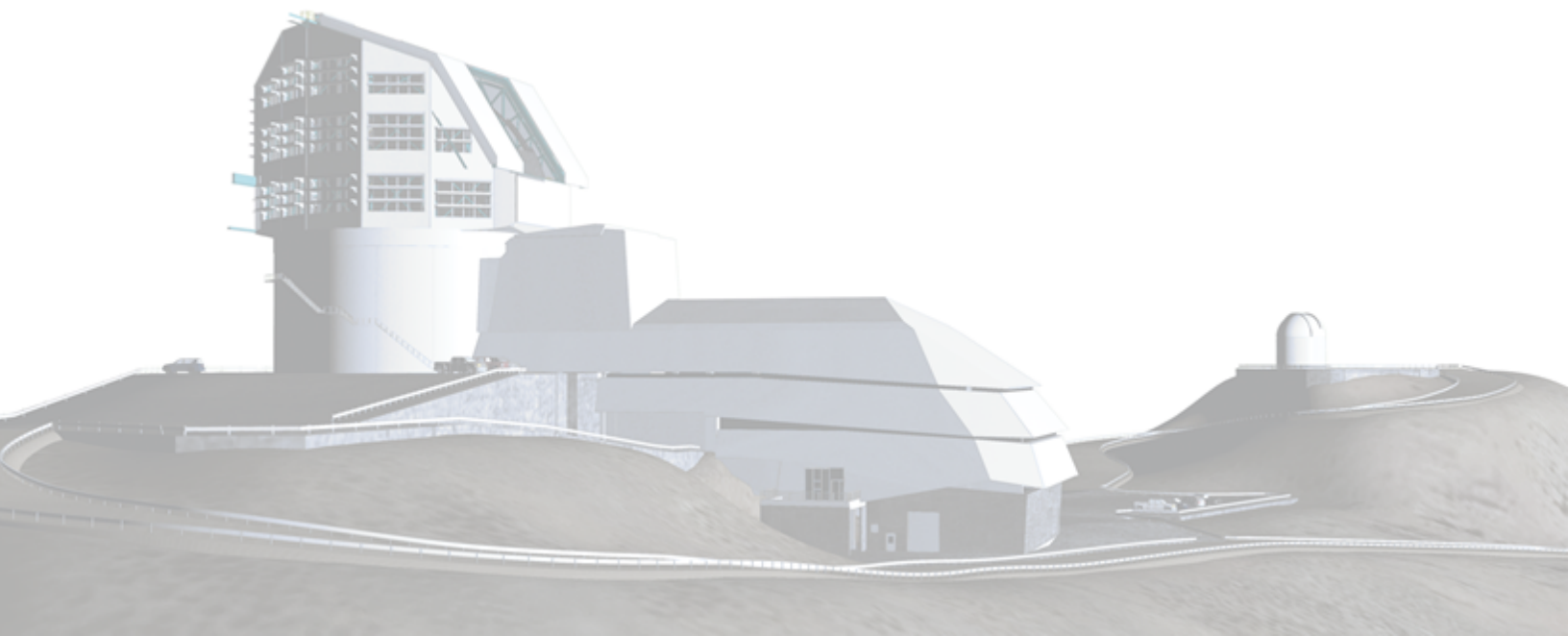
# LSSTCam and LSSTComCam Focal Plane Layouts

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CTN-001

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## Abstract

This document includes figures depicting the layouts of the LSST Camera and LSST Commissioning Camera, highlighting the arrangement and identification of science, wavefront, and guider sensors, as well as their individual readout image segments.

## Change Record

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*Document source location:* <https://github.com/lsst/ctn-001>

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# LSSTCam and LSSTComCam Focal Plane Layouts

## 1 Focal Plane Layouts

This document provides an overview of the LSSTCam (SLAC National Accelerator Laboratory & NSF-DOE Vera C. Rubin Observatory, 2025) and LSSTComCam (SLAC National Accelerator Laboratory & NSF-DOE Vera C. Rubin Observatory, 2024) focal plane layouts. Figures 1 and 2 below illustrate the placement of science, wavefront, and guider sensors of the LSST Camera, from both ITL and e2v. The view is looking down from above the focal plane, i.e., through the LSSTCam lenses.

Figure 2 also includes the serial numbers of the raft tower modules (RTM-###), the corner raft tower modules (CRTM-###), and the individual CCDs. The latter are the three-digit numbers immediately below the positional designator of the CCD. For example, R11\_S10 is E2V-CCD-354) and R20\_S10 is ITL-CCD-351. The raft and CCD serial numbers come from the *eTraveler* database accessed using `datacat-utilities`<sup>1</sup>. Appendix A tabulates the mapping of raft and sensor slots to serial numbers.

The set of dead segments and high-noise segments is somewhat dynamic; dead or high-noise segments sometimes revive/recover and functioning segments sometimes die or become noisy. The set of bad segments indicated in the figures is current as of the end of Run 7 electro-optical testing.

Figure 3 shows the LSSTCam photographed in the LSST clean room, with the camera rotated 90 deg clockwise with respect to the diagrams in Figures 1 and 2. For more comprehensive technical details on the layout of the CCDs in the focal plane, consult the reference document LCA-13381

Corresponding diagrams and a photo for ComCam are shown in Figures 4, 5, and 6.

The source code used to generate the figures is available in the GitHub repository associated with this Camera Technical Note.

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<sup>1</sup><https://github.com/lsst-camera-dh/datacat-utilities>

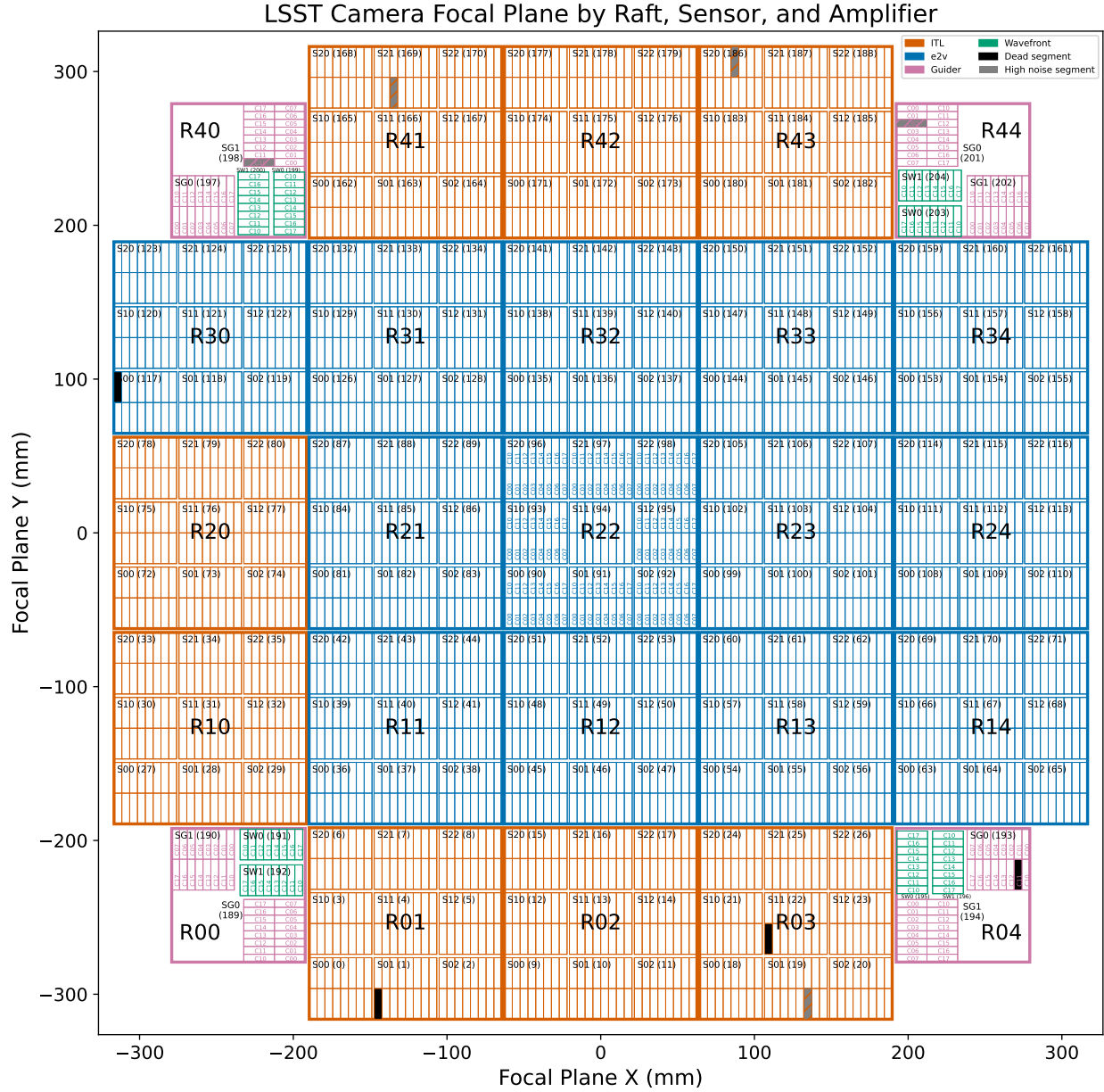


FIGURE 1: LSSTCam focal plane layout. The following amplifiers (segments) are identified as either “dead” or “sometimes dead” due to readout noise being less than  $4 e^-$  or an anomalous Photon Transfer Curve gain: R30\_S00\_C10, R01\_S01\_C00, R03\_S11\_C00, R04\_SG0\_C11. Additionally, the following amplifiers exhibit high readout noise ( $> 18 e^-$ ): R41\_S21\_C02, R43\_S20\_C14, R03\_S01\_C05, R40\_SG1\_C10, R44\_SG0\_C02. These classifications are based on Tables 8 and 9 of SITCOMTN-148. Code source: <https://github.com/lstt/ctn-001>

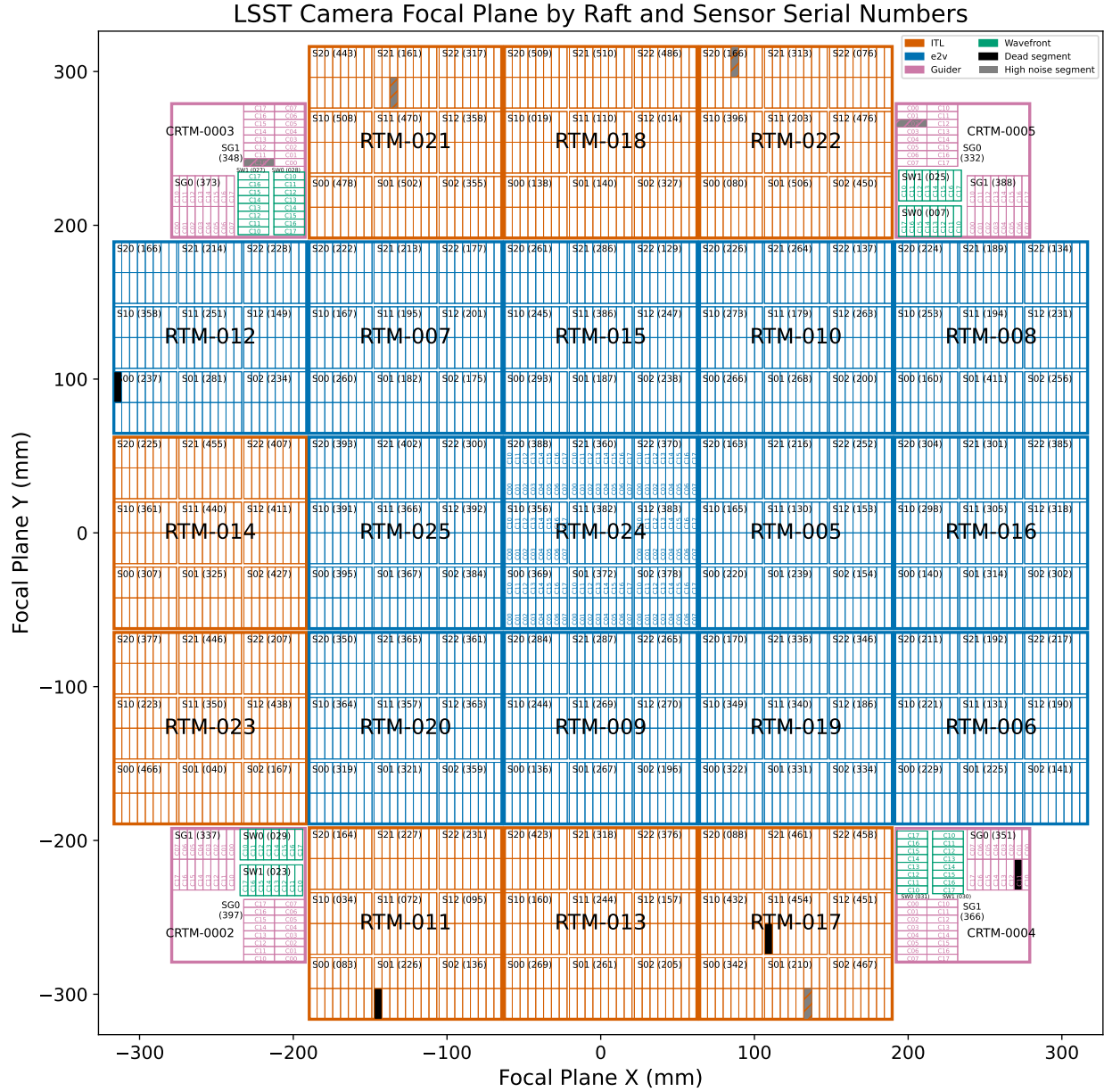


FIGURE 2: LSSTCam focal plane layout including raft and CCD serial numbers (see text). The raft and CCD serial numbers come from the *eTraveler* database accessed using *datacat-utilities* (<https://github.com/lsst-camera-dh/datacat-utilities>). The bad segment list is as in 1.

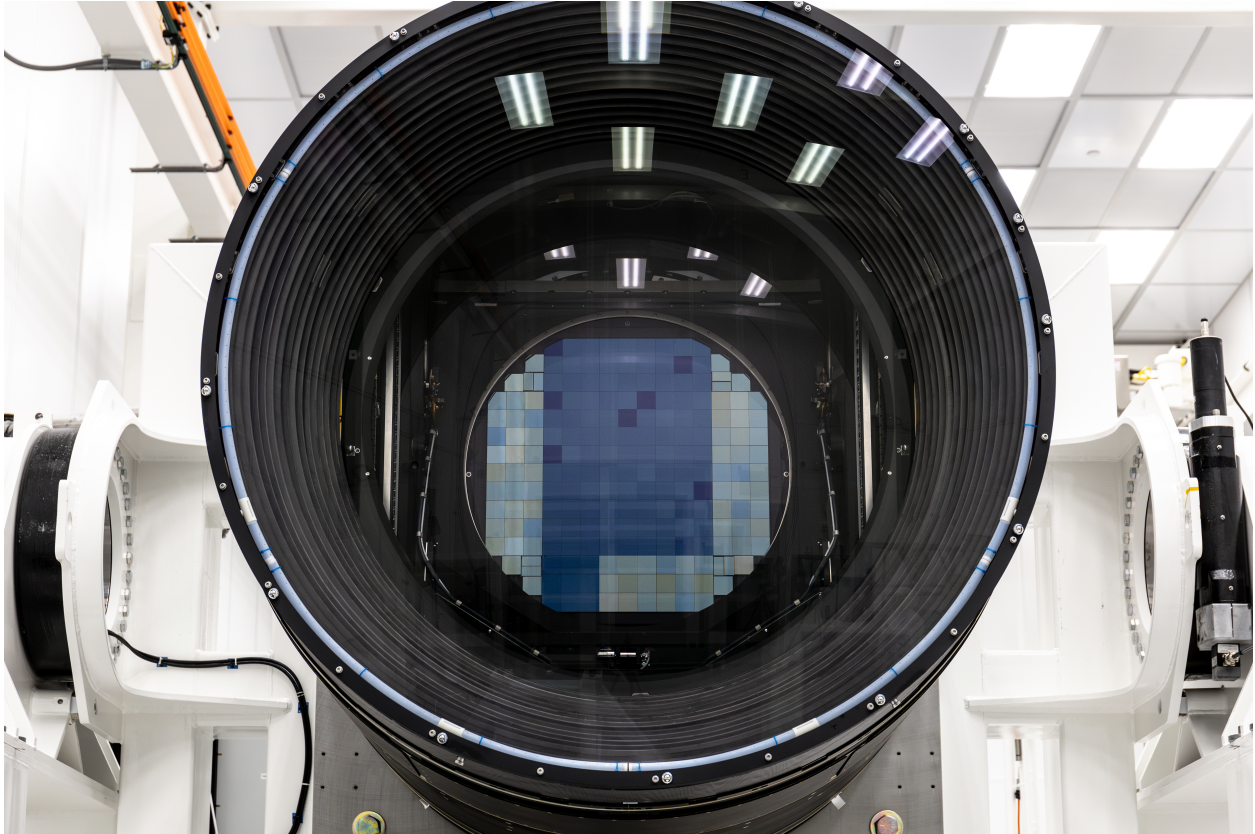


FIGURE 3: LSSTCam photographed in the LSST clean room on January 16, 2024. (Jacqueline Ramseyer Orrell/SLAC National Accelerator Laboratory). The camera is rotated 90 deg counter-clockwise with respect to the diagrams in Figures 1 and 2. Image and caption source: <https://rubinobservatory.org/gallery/>

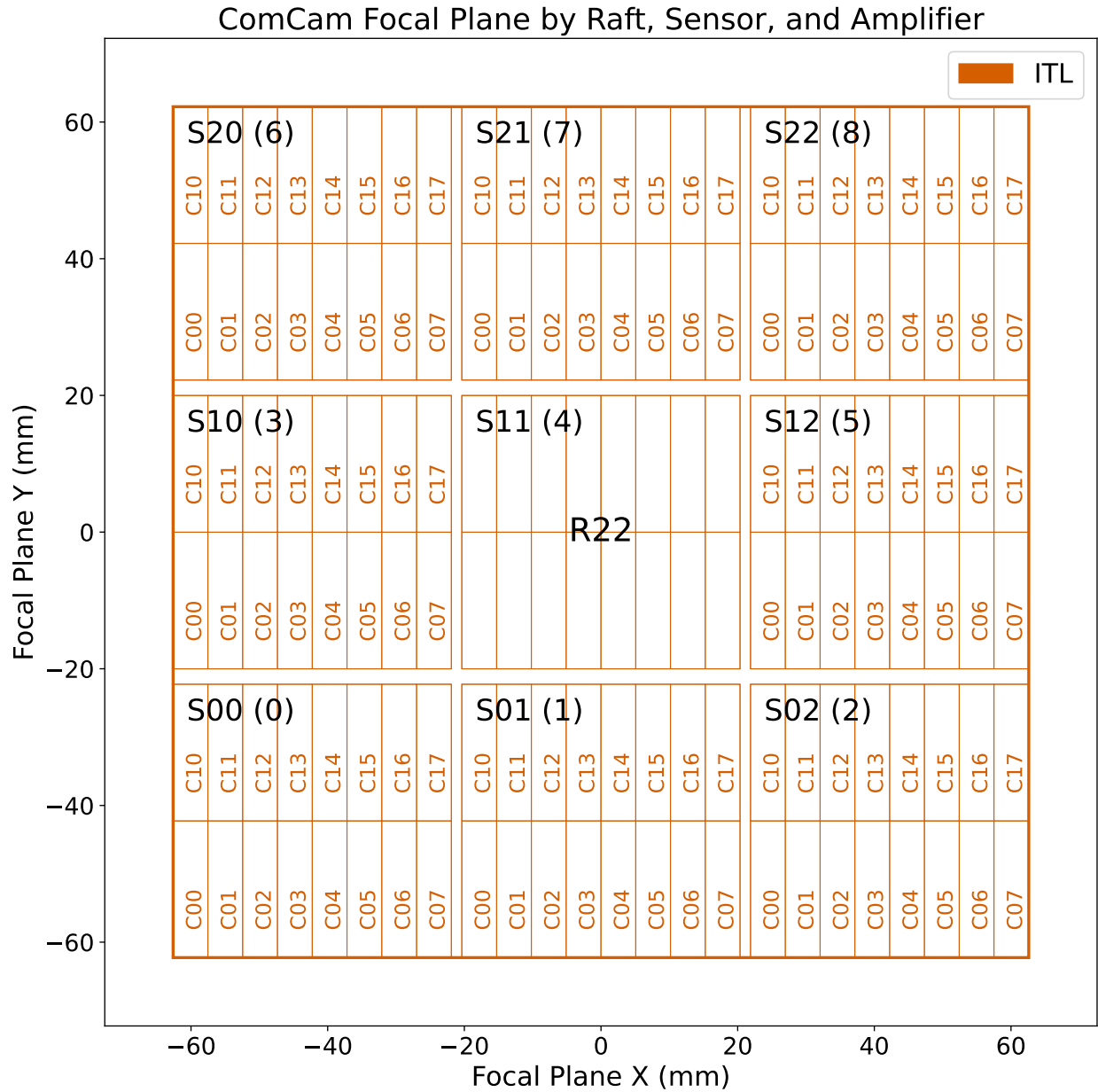


FIGURE 4: ComCam focal plane layout. Code source: <https://github.com/lst/ctn-001>

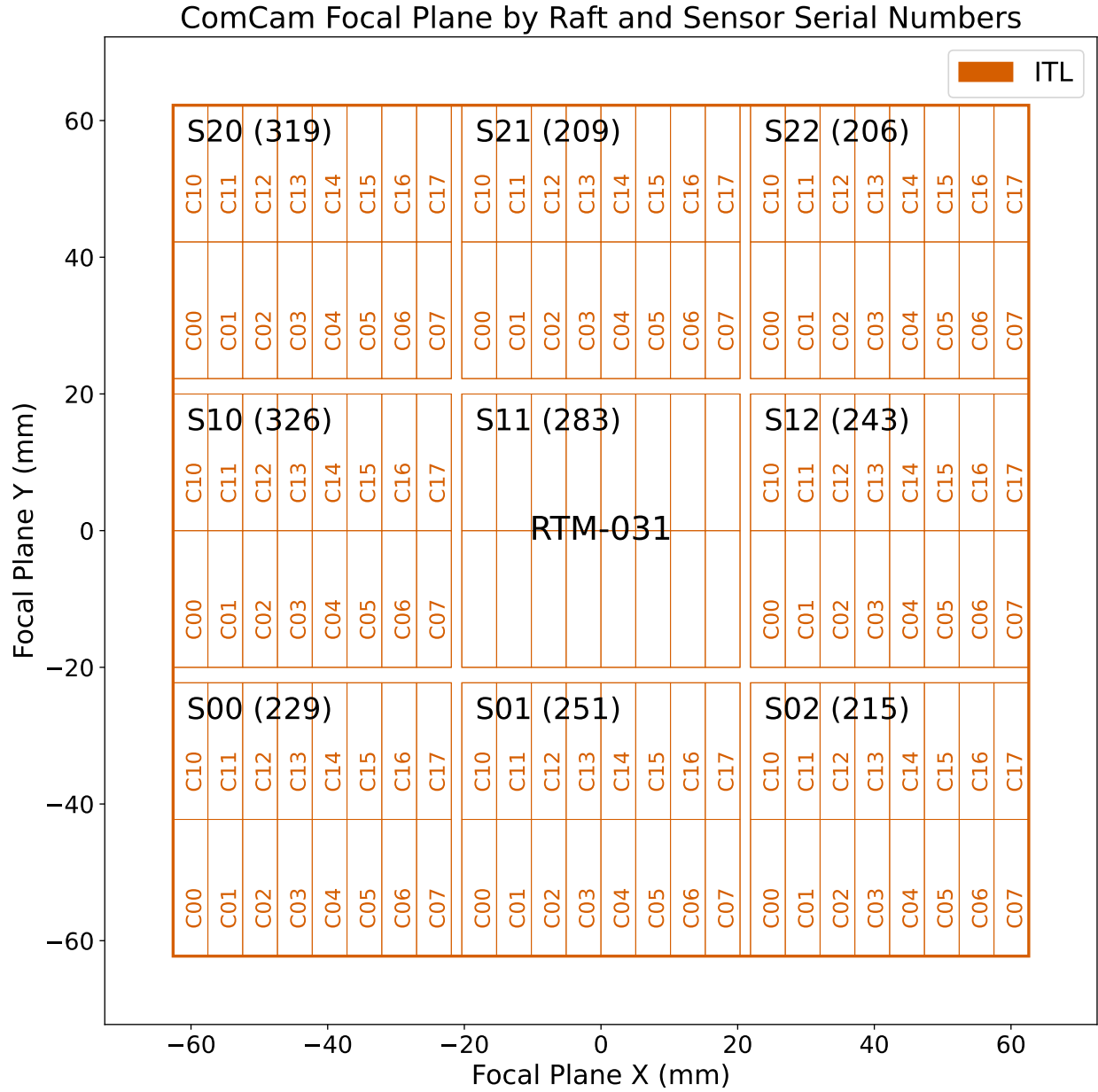


FIGURE 5: ComCam focal plane layout including raft and CCD serial numbers (see text). The raft and CCD serial numbers come from the *eTraveler* database accessed using datacat-utilities (<https://github.com/lsst-camera-dh/datacat-utilities>).



FIGURE 6: In one of the early images taken with Rubin's 144-megapixel test camera, Rubin staff gathered for a group photo inside the observatory dome, with the Simonyi Survey Telescope pointed at horizon. This "pinhole" image was created using the camera's sensors but without using lenses or mirrors to focus light. Instead of forming a detailed, zoomed-in picture, this technique gives a soft, unfocused image. The visible grid pattern of the camera's sensor array overlays the image. Image and caption source: <https://rubinobservatory.org/gallery/>

## A Raft and Sensor Serial Numbers

Table 1 provides the mapping between the rafts, corner rafts, sensors, and their respective serial numbers for LSSTCam. See the caption of the table for details. The information for the table was extracted from the eTraveler database using the datacat-utilities<sup>2</sup>.

Table 2 provides the sensor serial numbers for the ComCam raft.

### R00 CRTM-0002 ITL

|     |     |             |
|-----|-----|-------------|
| SG0 | 189 | ITL-CCD-397 |
| SG1 | 190 | ITL-CCD-337 |
| SW0 | 191 | ITL-CCD-029 |
| SW1 | 192 | ITL-CCD-023 |

### R01 RTM-011 ITL

|     |     |             |
|-----|-----|-------------|
| S00 | 000 | ITL-CCD-083 |
| S01 | 001 | ITL-CCD-226 |
| S02 | 002 | ITL-CCD-136 |
| S10 | 003 | ITL-CCD-034 |
| S11 | 004 | ITL-CCD-072 |
| S12 | 005 | ITL-CCD-095 |
| S20 | 006 | ITL-CCD-164 |
| S21 | 007 | ITL-CCD-227 |
| S22 | 008 | ITL-CCD-231 |

### R02 RTM-013 ITL

|     |     |             |
|-----|-----|-------------|
| S00 | 009 | ITL-CCD-269 |
| S01 | 010 | ITL-CCD-261 |
| S02 | 011 | ITL-CCD-205 |
| S10 | 012 | ITL-CCD-160 |
| S11 | 013 | ITL-CCD-244 |
| S12 | 014 | ITL-CCD-157 |
| S20 | 015 | ITL-CCD-423 |
| S21 | 016 | ITL-CCD-318 |
| S22 | 017 | ITL-CCD-376 |

<sup>2</sup><https://github.com/lsst-camera-dh/datacat-utilities>

### R03 RTM-017 ITL

|     |     |             |
|-----|-----|-------------|
| S00 | 018 | ITL-CCD-342 |
| S01 | 019 | ITL-CCD-210 |
| S02 | 020 | ITL-CCD-467 |
| S10 | 021 | ITL-CCD-432 |
| S11 | 022 | ITL-CCD-454 |
| S12 | 023 | ITL-CCD-451 |
| S20 | 024 | ITL-CCD-088 |
| S21 | 025 | ITL-CCD-461 |
| S22 | 026 | ITL-CCD-458 |

### R04 CRTM-0004 ITL

|     |     |             |
|-----|-----|-------------|
| SG0 | 193 | ITL-CCD-351 |
| SG1 | 194 | ITL-CCD-366 |
| SW0 | 195 | ITL-CCD-031 |
| SW1 | 196 | ITL-CCD-030 |

### R10 RTM-023 ITL

|     |     |             |
|-----|-----|-------------|
| S00 | 027 | ITL-CCD-466 |
| S01 | 028 | ITL-CCD-040 |
| S02 | 029 | ITL-CCD-167 |
| S10 | 030 | ITL-CCD-223 |
| S11 | 031 | ITL-CCD-350 |
| S12 | 032 | ITL-CCD-438 |
| S20 | 033 | ITL-CCD-377 |
| S21 | 034 | ITL-CCD-446 |
| S22 | 035 | ITL-CCD-207 |

### R11 RTM-020 E2V

|     |     |             |
|-----|-----|-------------|
| S00 | 036 | E2V-CCD-319 |
| S01 | 037 | E2V-CCD-321 |
| S02 | 038 | E2V-CCD-359 |
| S10 | 039 | E2V-CCD-364 |
| S11 | 040 | E2V-CCD-357 |
| S12 | 041 | E2V-CCD-363 |

|     |     |             |
|-----|-----|-------------|
| S20 | 042 | E2V-CCD-350 |
| S21 | 043 | E2V-CCD-365 |
| S22 | 044 | E2V-CCD-361 |

#### **R12 RTM-009 E2V**

|     |     |             |
|-----|-----|-------------|
| S00 | 045 | E2V-CCD-136 |
| S01 | 046 | E2V-CCD-267 |
| S02 | 047 | E2V-CCD-196 |
| S10 | 048 | E2V-CCD-244 |
| S11 | 049 | E2V-CCD-269 |
| S12 | 050 | E2V-CCD-270 |
| S20 | 051 | E2V-CCD-284 |
| S21 | 052 | E2V-CCD-287 |
| S22 | 053 | E2V-CCD-265 |

#### **R13 RTM-019 E2V**

|     |     |             |
|-----|-----|-------------|
| S00 | 054 | E2V-CCD-322 |
| S01 | 055 | E2V-CCD-331 |
| S02 | 056 | E2V-CCD-334 |
| S10 | 057 | E2V-CCD-349 |
| S11 | 058 | E2V-CCD-340 |
| S12 | 059 | E2V-CCD-186 |
| S20 | 060 | E2V-CCD-170 |
| S21 | 061 | E2V-CCD-336 |
| S22 | 062 | E2V-CCD-346 |

#### **R14 RTM-006 E2V**

|     |     |             |
|-----|-----|-------------|
| S00 | 063 | E2V-CCD-229 |
| S01 | 064 | E2V-CCD-225 |
| S02 | 065 | E2V-CCD-141 |
| S10 | 066 | E2V-CCD-221 |
| S11 | 067 | E2V-CCD-131 |
| S12 | 068 | E2V-CCD-190 |
| S20 | 069 | E2V-CCD-211 |
| S21 | 070 | E2V-CCD-192 |
| S22 | 071 | E2V-CCD-217 |

### R20 RTM-014 ITL

|     |     |             |
|-----|-----|-------------|
| S00 | 072 | ITL-CCD-307 |
| S01 | 073 | ITL-CCD-325 |
| S02 | 074 | ITL-CCD-427 |
| S10 | 075 | ITL-CCD-361 |
| S11 | 076 | ITL-CCD-440 |
| S12 | 077 | ITL-CCD-411 |
| S20 | 078 | ITL-CCD-225 |
| S21 | 079 | ITL-CCD-455 |
| S22 | 080 | ITL-CCD-407 |

### R21 RTM-025 E2V

|     |     |             |
|-----|-----|-------------|
| S00 | 081 | E2V-CCD-395 |
| S01 | 082 | E2V-CCD-367 |
| S02 | 083 | E2V-CCD-384 |
| S10 | 084 | E2V-CCD-391 |
| S11 | 085 | E2V-CCD-366 |
| S12 | 086 | E2V-CCD-392 |
| S20 | 087 | E2V-CCD-393 |
| S21 | 088 | E2V-CCD-402 |
| S22 | 089 | E2V-CCD-300 |

### R22 RTM-024 E2V

|     |     |             |
|-----|-----|-------------|
| S00 | 090 | E2V-CCD-369 |
| S01 | 091 | E2V-CCD-372 |
| S02 | 092 | E2V-CCD-378 |
| S10 | 093 | E2V-CCD-356 |
| S11 | 094 | E2V-CCD-382 |
| S12 | 095 | E2V-CCD-383 |
| S20 | 096 | E2V-CCD-388 |
| S21 | 097 | E2V-CCD-360 |
| S22 | 098 | E2V-CCD-370 |

### R23 RTM-005 E2V

|     |     |             |
|-----|-----|-------------|
| S00 | 099 | E2V-CCD-220 |
|-----|-----|-------------|

|     |     |             |
|-----|-----|-------------|
| S01 | 100 | E2V-CCD-239 |
| S02 | 101 | E2V-CCD-154 |
| S10 | 102 | E2V-CCD-165 |
| S11 | 103 | E2V-CCD-130 |
| S12 | 104 | E2V-CCD-153 |
| S20 | 105 | E2V-CCD-163 |
| S21 | 106 | E2V-CCD-216 |
| S22 | 107 | E2V-CCD-252 |

#### **R24 RTM-016 E2V**

|     |     |             |
|-----|-----|-------------|
| S00 | 108 | E2V-CCD-140 |
| S01 | 109 | E2V-CCD-314 |
| S02 | 110 | E2V-CCD-302 |
| S10 | 111 | E2V-CCD-298 |
| S11 | 112 | E2V-CCD-305 |
| S12 | 113 | E2V-CCD-318 |
| S20 | 114 | E2V-CCD-304 |
| S21 | 115 | E2V-CCD-301 |
| S22 | 116 | E2V-CCD-385 |

#### **R30 RTM-012 E2V**

|     |     |             |
|-----|-----|-------------|
| S00 | 117 | E2V-CCD-237 |
| S01 | 118 | E2V-CCD-281 |
| S02 | 119 | E2V-CCD-234 |
| S10 | 120 | E2V-CCD-358 |
| S11 | 121 | E2V-CCD-251 |
| S12 | 122 | E2V-CCD-149 |
| S20 | 123 | E2V-CCD-166 |
| S21 | 124 | E2V-CCD-214 |
| S22 | 125 | E2V-CCD-228 |

#### **R31 RTM-007 E2V**

|     |     |             |
|-----|-----|-------------|
| S00 | 126 | E2V-CCD-260 |
| S01 | 127 | E2V-CCD-182 |
| S02 | 128 | E2V-CCD-175 |
| S10 | 129 | E2V-CCD-167 |

|     |     |             |
|-----|-----|-------------|
| S11 | 130 | E2V-CCD-195 |
| S12 | 131 | E2V-CCD-201 |
| S20 | 132 | E2V-CCD-222 |
| S21 | 133 | E2V-CCD-213 |
| S22 | 134 | E2V-CCD-177 |

#### **R32 RTM-015 E2V**

|     |     |             |
|-----|-----|-------------|
| S00 | 135 | E2V-CCD-293 |
| S01 | 136 | E2V-CCD-187 |
| S02 | 137 | E2V-CCD-238 |
| S10 | 138 | E2V-CCD-245 |
| S11 | 139 | E2V-CCD-386 |
| S12 | 140 | E2V-CCD-247 |
| S20 | 141 | E2V-CCD-261 |
| S21 | 142 | E2V-CCD-286 |
| S22 | 143 | E2V-CCD-129 |

#### **R33 RTM-010 E2V**

|     |     |             |
|-----|-----|-------------|
| S00 | 144 | E2V-CCD-266 |
| S01 | 145 | E2V-CCD-268 |
| S02 | 146 | E2V-CCD-200 |
| S10 | 147 | E2V-CCD-273 |
| S11 | 148 | E2V-CCD-179 |
| S12 | 149 | E2V-CCD-263 |
| S20 | 150 | E2V-CCD-226 |
| S21 | 151 | E2V-CCD-264 |
| S22 | 152 | E2V-CCD-137 |

#### **R34 RTM-008 E2V**

|     |     |             |
|-----|-----|-------------|
| S00 | 153 | E2V-CCD-160 |
| S01 | 154 | E2V-CCD-411 |
| S02 | 155 | E2V-CCD-256 |
| S10 | 156 | E2V-CCD-253 |
| S11 | 157 | E2V-CCD-194 |
| S12 | 158 | E2V-CCD-231 |
| S20 | 159 | E2V-CCD-224 |

|     |     |             |
|-----|-----|-------------|
| S21 | 160 | E2V-CCD-189 |
| S22 | 161 | E2V-CCD-134 |

#### **R40 CRTM-0003 ITL**

|     |     |             |
|-----|-----|-------------|
| SG0 | 197 | ITL-CCD-373 |
| SG1 | 198 | ITL-CCD-348 |
| SW0 | 199 | ITL-CCD-028 |
| SW1 | 200 | ITL-CCD-027 |

#### **R41 RTM-021 ITL**

|     |     |             |
|-----|-----|-------------|
| S00 | 162 | ITL-CCD-478 |
| S01 | 163 | ITL-CCD-502 |
| S02 | 164 | ITL-CCD-355 |
| S10 | 165 | ITL-CCD-508 |
| S11 | 166 | ITL-CCD-470 |
| S12 | 167 | ITL-CCD-358 |
| S20 | 168 | ITL-CCD-443 |
| S21 | 169 | ITL-CCD-161 |
| S22 | 170 | ITL-CCD-317 |

#### **R42 RTM-018 ITL**

|     |     |             |
|-----|-----|-------------|
| S00 | 171 | ITL-CCD-138 |
| S01 | 172 | ITL-CCD-140 |
| S02 | 173 | ITL-CCD-327 |
| S10 | 174 | ITL-CCD-019 |
| S11 | 175 | ITL-CCD-110 |
| S12 | 176 | ITL-CCD-014 |
| S20 | 177 | ITL-CCD-509 |
| S21 | 178 | ITL-CCD-510 |
| S22 | 179 | ITL-CCD-486 |

#### **R43 RTM-022 ITL**

|     |     |             |
|-----|-----|-------------|
| S00 | 180 | ITL-CCD-080 |
| S01 | 181 | ITL-CCD-506 |
| S02 | 182 | ITL-CCD-450 |
| S10 | 183 | ITL-CCD-396 |

|     |     |             |
|-----|-----|-------------|
| S11 | 184 | ITL-CCD-203 |
| S12 | 185 | ITL-CCD-476 |
| S20 | 186 | ITL-CCD-166 |
| S21 | 187 | ITL-CCD-313 |
| S22 | 188 | ITL-CCD-076 |

#### **R44 CRTM-0005 ITL**

|     |     |             |
|-----|-----|-------------|
| SG0 | 201 | ITL-CCD-332 |
| SG1 | 202 | ITL-CCD-388 |
| SW0 | 203 | ITL-CCD-007 |
| SW1 | 204 | ITL-CCD-025 |

Table 1: Each table lists the raft serial number (CRTM-### or RTM-###), and the CCD content of each raft. For each CCD the slot S## and DM index are listed along with the vendor's serial number.

#### **ComCam RTM-031 ITL**

|     |     |               |
|-----|-----|---------------|
| S00 | 000 | ITL-3800C-229 |
| S01 | 001 | ITL-3800C-251 |
| S02 | 002 | ITL-3800C-215 |
| S10 | 003 | ITL-3800C-326 |
| S11 | 004 | ITL-3800C-283 |
| S12 | 005 | ITL-3800C-243 |
| S20 | 006 | ITL-3800C-319 |
| S21 | 007 | ITL-3800C-209 |
| S22 | 008 | ITL-3800C-206 |

Table 2: This table lists the raft serial number and the CCD content ComCam. For each CCD the slot S## and DM index are listed along with the vendor's serial number.

## **B References**

**[LCA-13381]**, Nordby, M., LSST Camera Team, 2020, *LSST Camera Detector Plane Layout*, Camera Controlled Document LCA-13381, NSF-DOE Vera C. Rubin Observatory, URL <https://ls.st/LCA-13381>

**[SITCOMTN-148]**, Roodman, A., Utsumi, Y., MacBride, S., 2024, *LSST Camera Electro-Optical Test Results*, Commissioning Technical Note SITCOMTN-148, NSF-DOE Vera C. Rubin Observatory, URL <https://sitcomtn-148.lsst.io/>, doi:10.71929/rubin/2583999

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## C Acronyms

| Acronym    | Description                                                                |
|------------|----------------------------------------------------------------------------|
| CCD        | Charge-Coupled Device                                                      |
| CTN        | Camera Technical Note                                                      |
| DM         | Data Management                                                            |
| E2V        | Teledyne                                                                   |
| ITL        | Imaging Technology Laboratory (UA)                                         |
| LCA        | Document handle LSST camera subsystem controlled documents                 |
| LSST       | Legacy Survey of Space and Time (formerly Large Synoptic Survey Telescope) |
| LSSTCam    | LSST Science Camera                                                        |
| LSSTComCam | Rubin Commissioning Camera                                                 |
| RTM        | Raft Tower Module                                                          |
| SLAC       | SLAC National Accelerator Laboratory                                       |