



Laboratory Support Services and Operations
Kennedy Space Center, Florida

High Contrast Imaging for Astrophysics



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SURA, LASSO-URS Federal Services Inc.
Kennedy Space Center

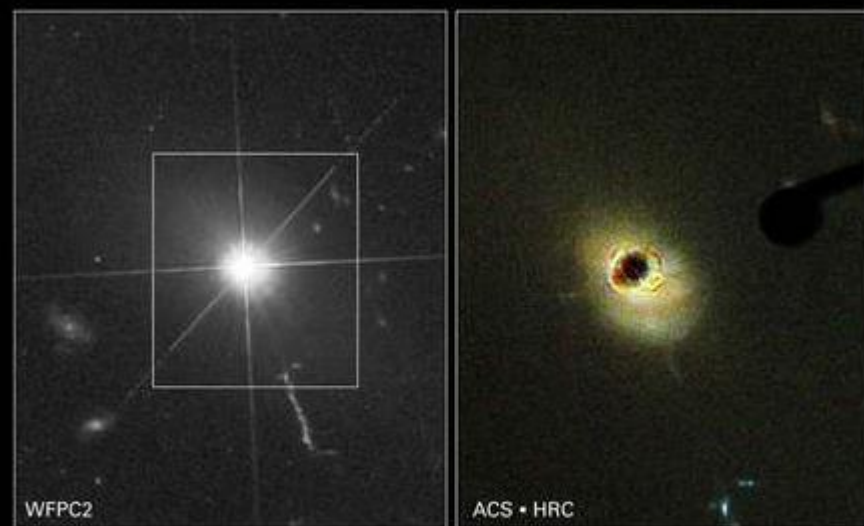


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High Contrast Objects

- AGN and their host galaxies.
- Binary stars.
- Debris disks.
- Exoplanets.



Quasar 3C 273
Hubble Space Telescope • ACS HRC Coronagraph

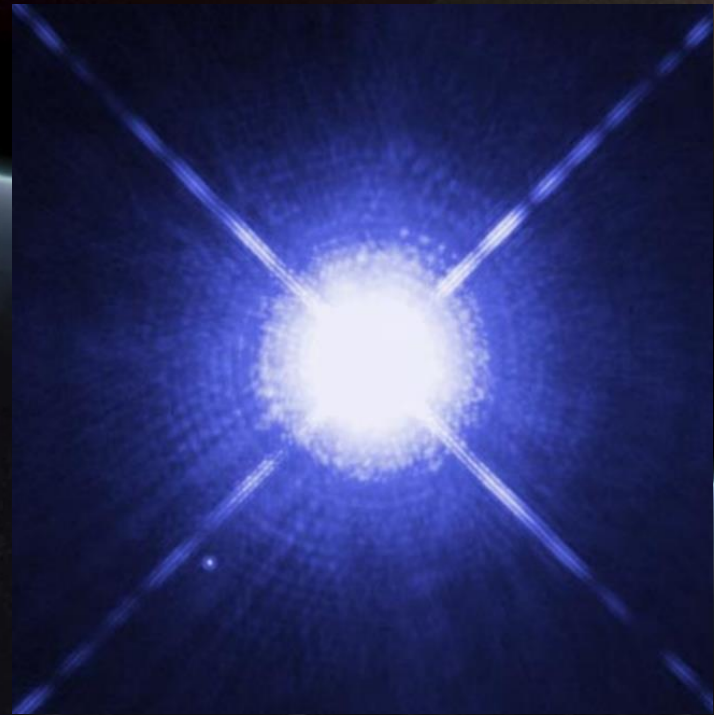
NASA, A. Martel (JHU), the ACS Science Team, J. Bahcall (IAS) and ESA • STScI-PRC03-03





High Contrast Objects

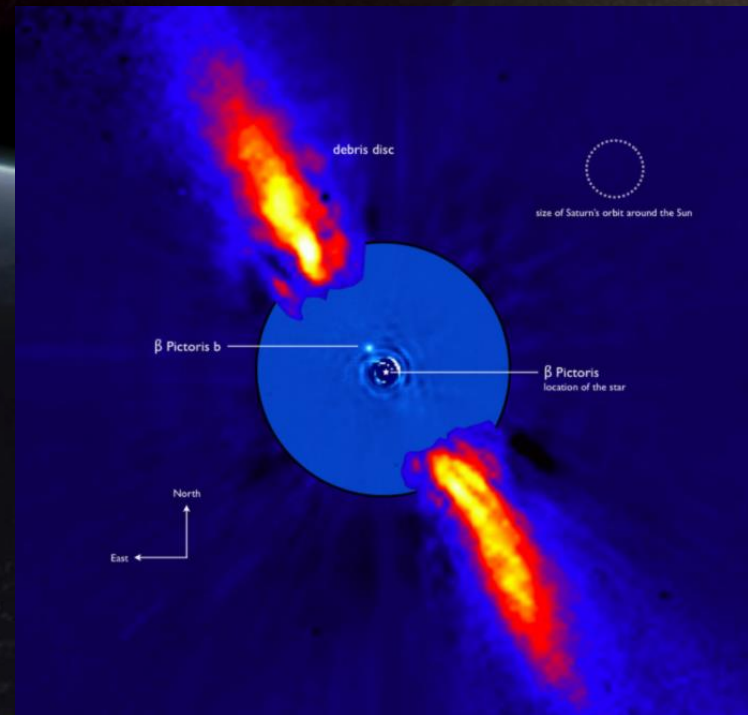
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High Contrast Objects

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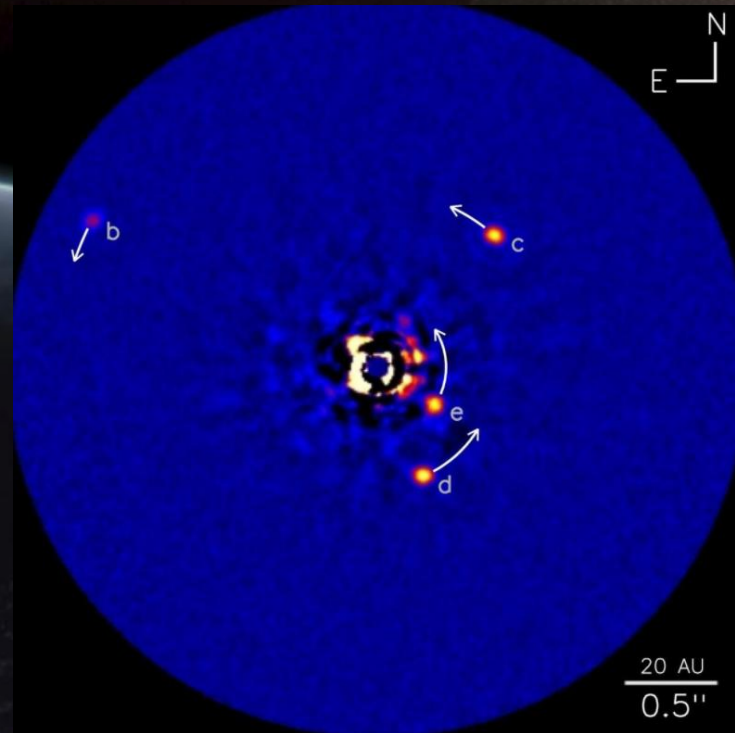




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High Contrast Objects

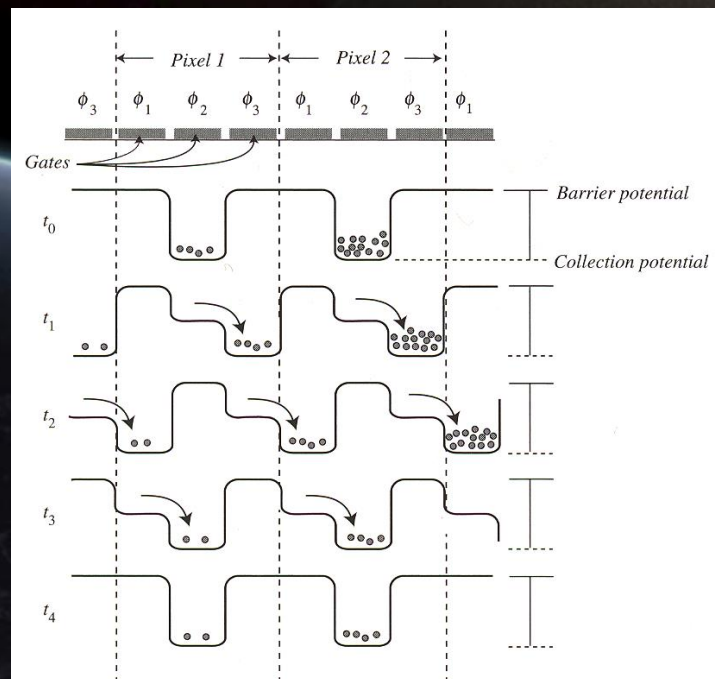
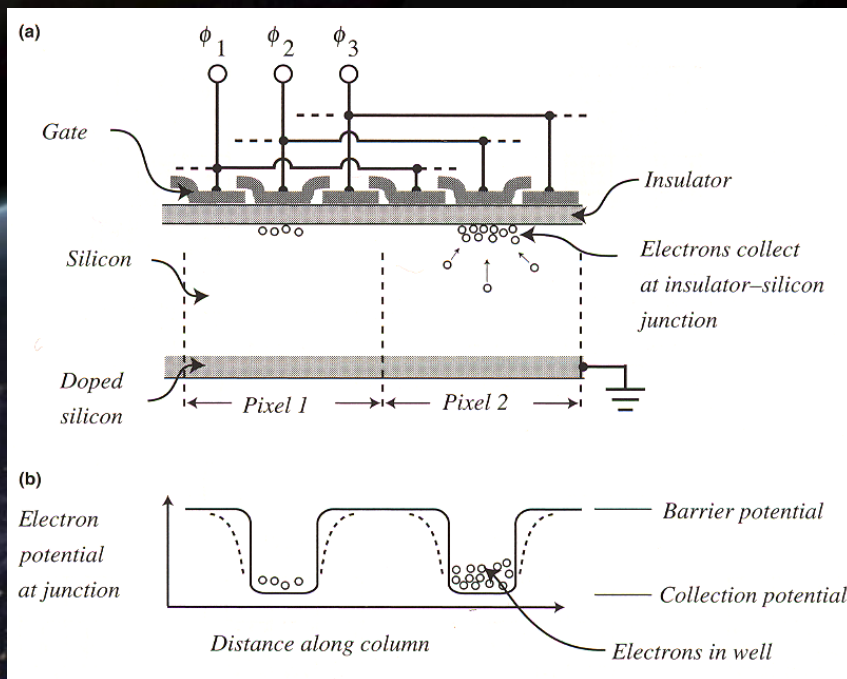
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Typical Imaging Devices

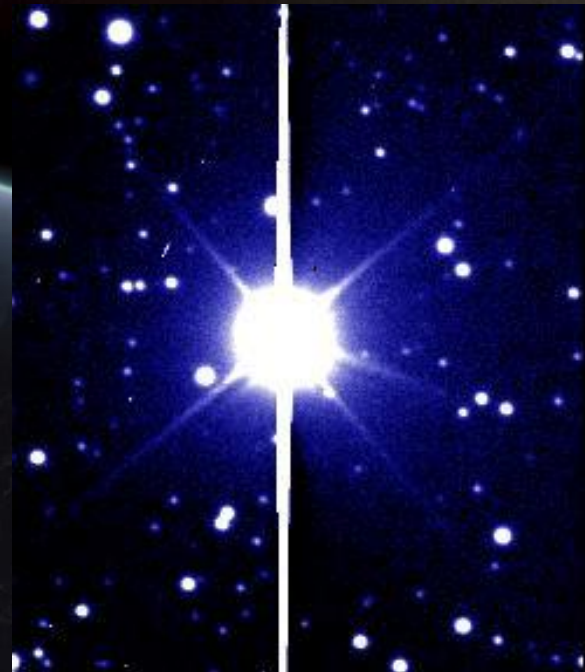
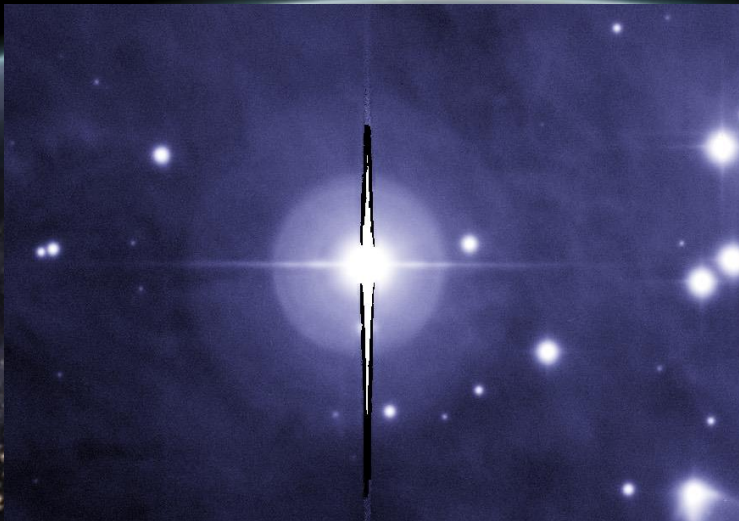
- Charge-Coupled Metal Oxide Semiconductors...





Typical Imaging Devices

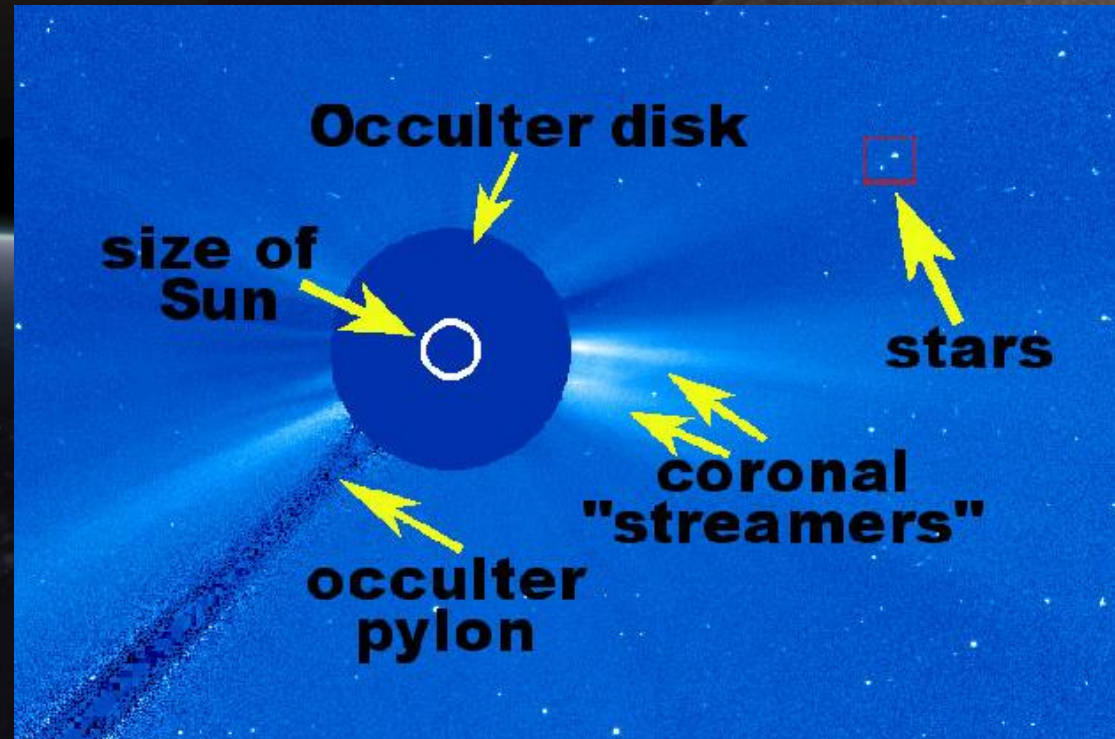
- Charge-Coupled Metal Oxide Semiconductors...
- Saturation and blooming.





Typical High Contrast Techniques

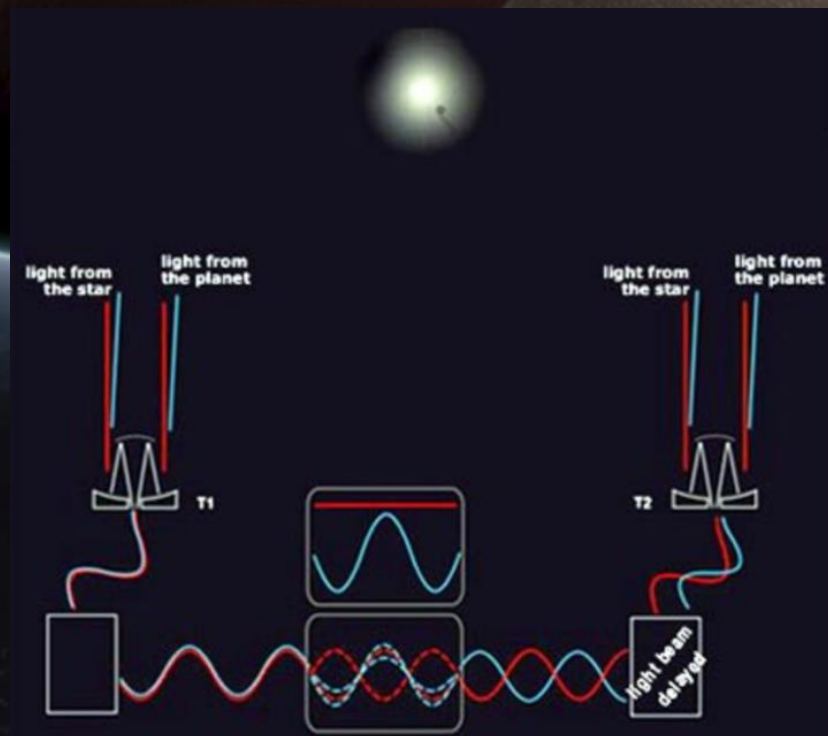
- Coronagraphy.
 - Single objects.
 - Precise pointing.
 - Blocks signal.





Typical High Contrast Techniques

- Nulling interferometry.
 - Single object.
 - Complex.
 - Multiple detectors.





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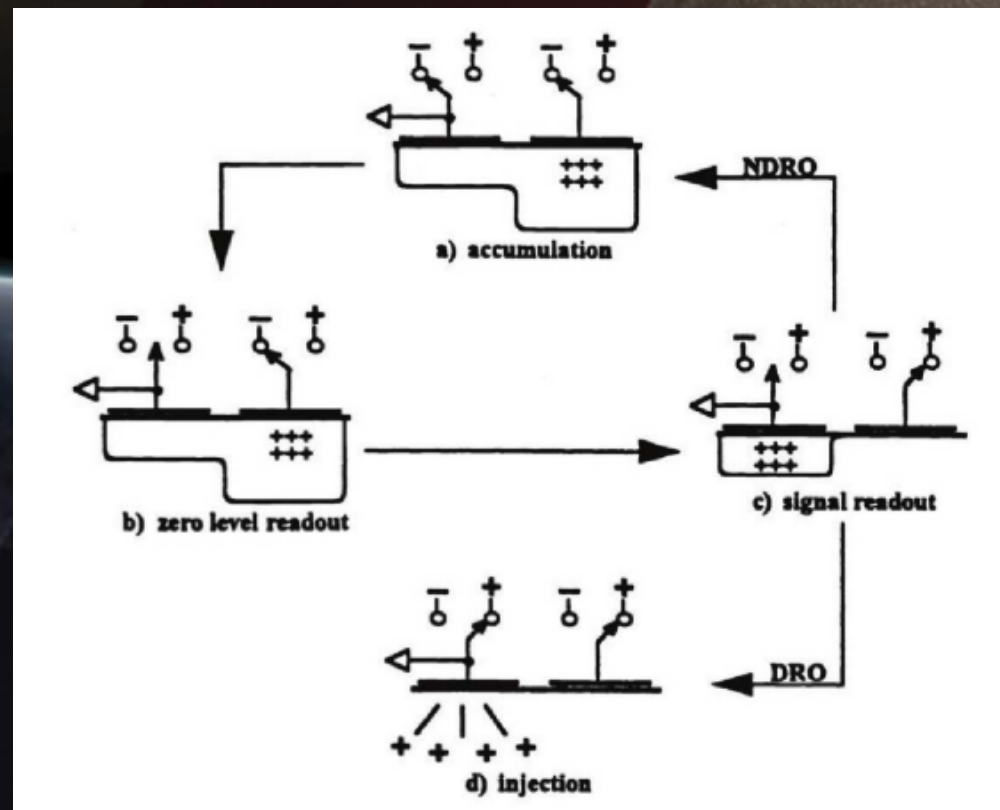
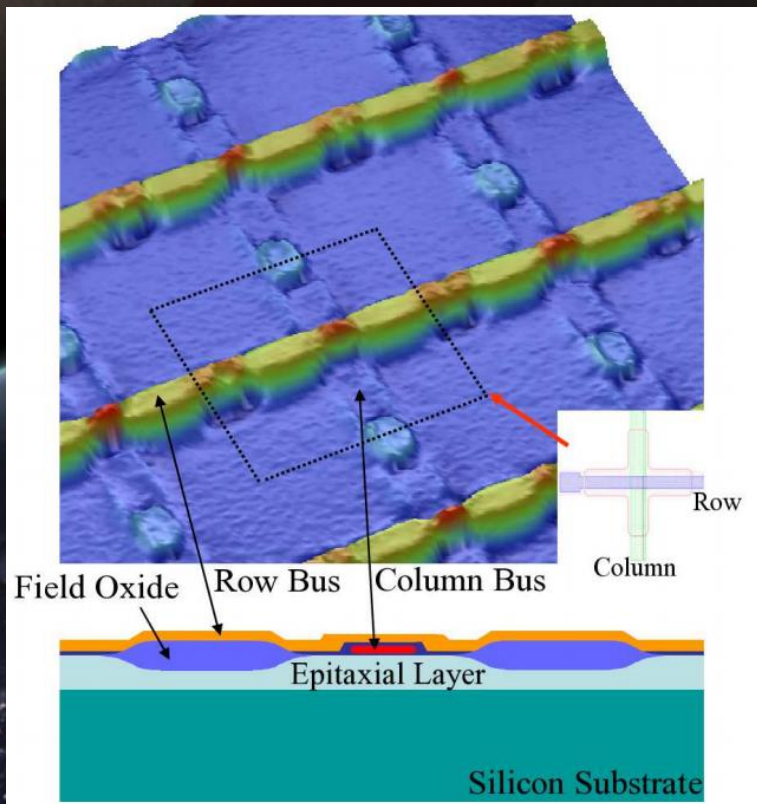
Charge Injection Devices

- Easy to use.
- Cheap.
- Multiple objects.
- No pointing requirements.



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Charge Injection Devices

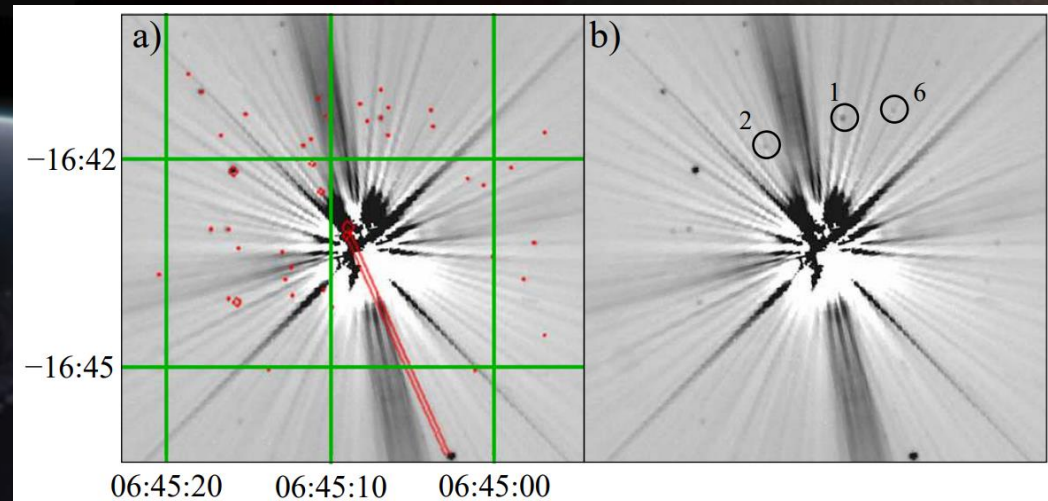




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Charge Injection Devices

- No charge transfer.
- Saturation protection.
- 32-bit architecture.



1:20 million

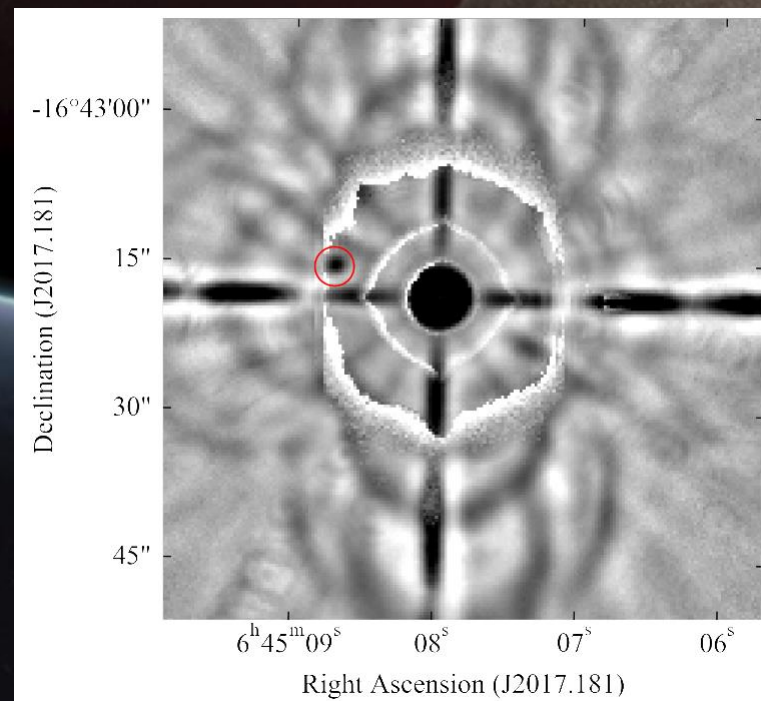
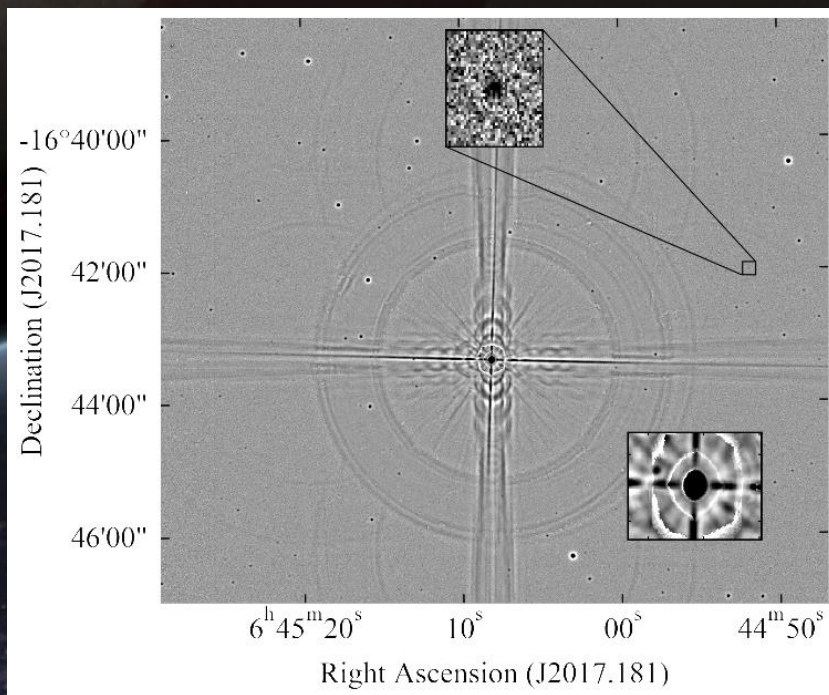


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Charge Injection Devices



1:100 million

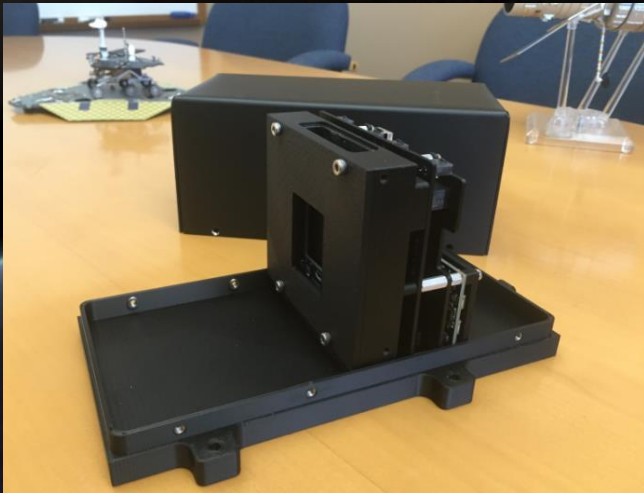


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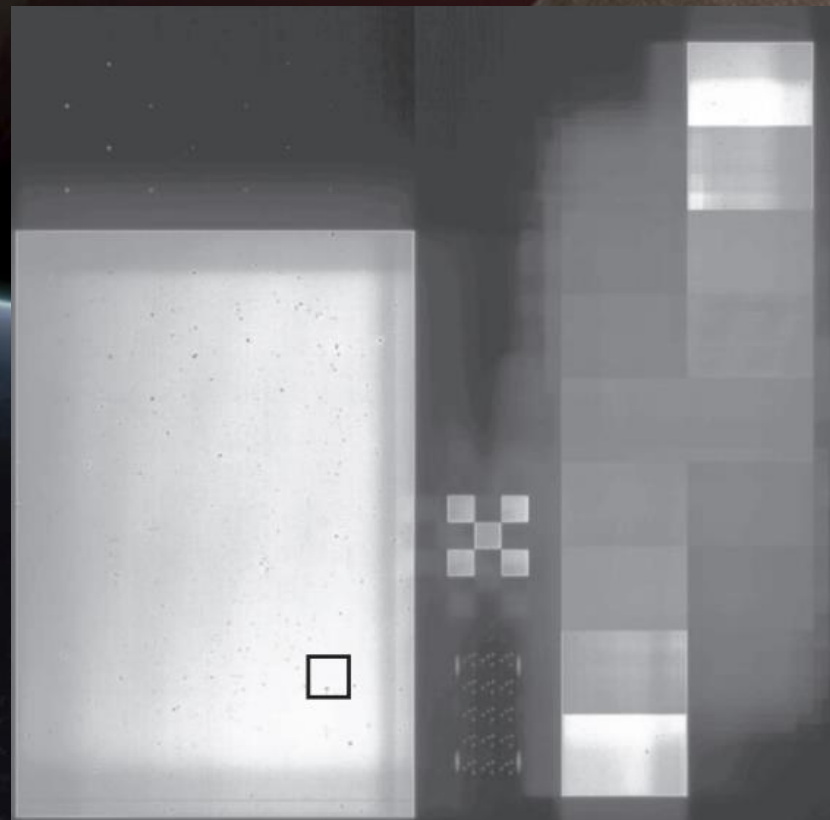
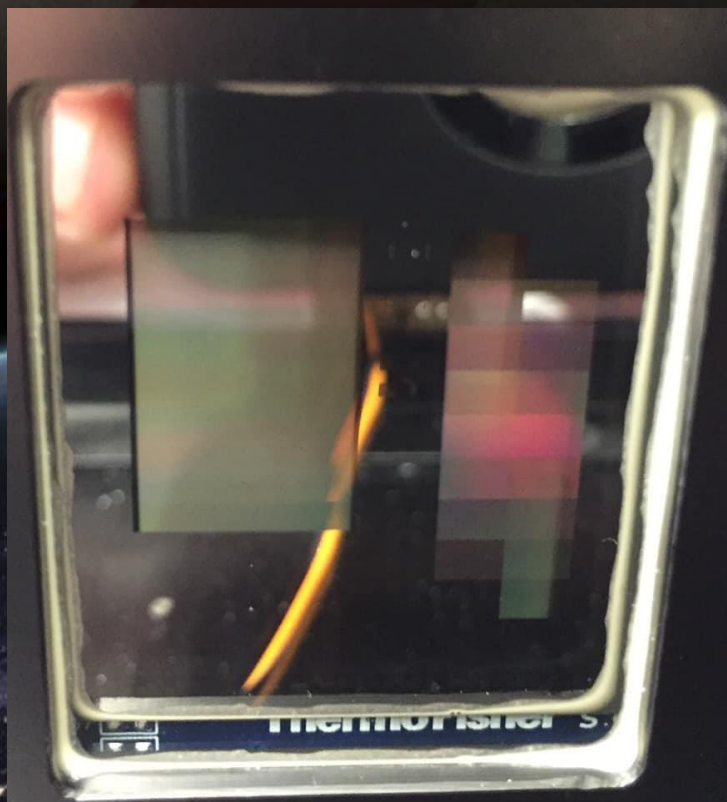
Rad Hard, TRL-8 (LEO)





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Rad Hard, TRL-8 (LEO)





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Lunar Applications



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