Progress on GTC Developments

Javier Castro

GTC Users Committee

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Summary

- Cassegrain/FC focal station

- OSIRIS new detector
- EMIR/FRIDA new detector
- HIPERCAM
- GTC-HRS

Cassegrain & Maintenace Platform

- Progress
  - Cassegrain focal station almost operative
    - Rotator & AG
    - Maintenance platform
    - SICM ongoing

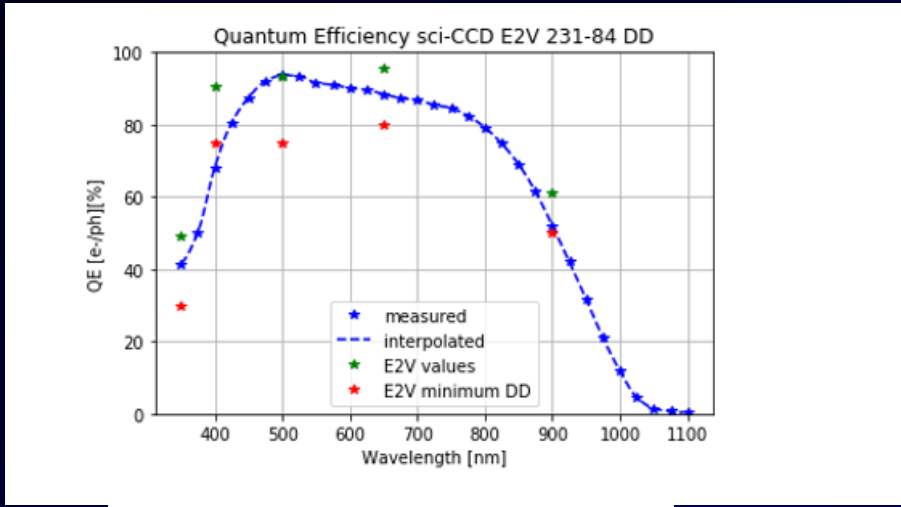
- Pending
  - Folded-Cass complementary platform
  - Full transfer to Operations (documentation, training, …)

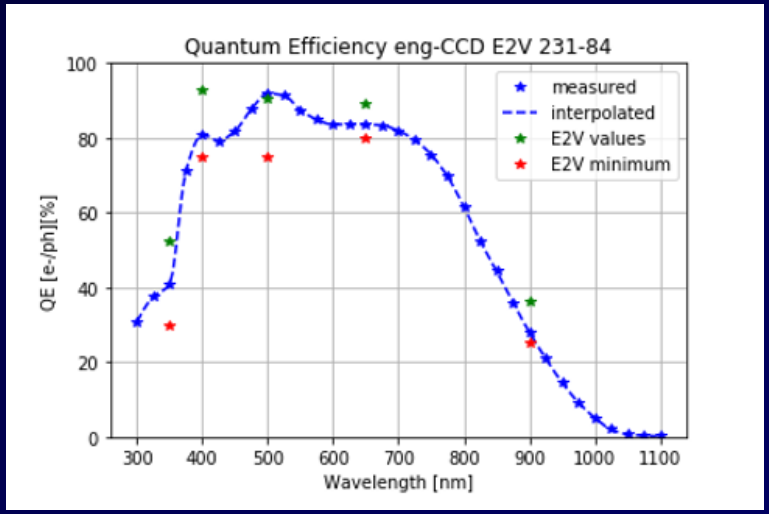
New OSIRIS Detector

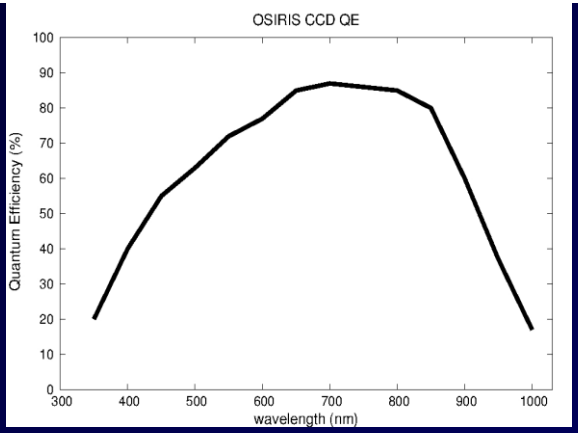
- Progress
  - Science CCD tested

New OSIRIS CCD. Performances

- Quantum Efficiency







New OSIRIS CCD. Performances

- Readout (IAC test system)

Modo	Frecuencia de píxel	Tiempo 1 frame (4096x4096)
IDLE	150 kHz	-
SLOW (1 canal)	150 kHz	116.63 s
MEDIUM (1 canal)	233 kHz	74.07 s
FAST (1 canal)	800 kHz	21.87 s
SLOW (4 canales)	150 kHz	30.58 s (ARC 31 s)
MEDIUM (4 canales)	233 kHz	19.53 s (ARC 20 s)
FAST (4 canales)	800 kHz	6.45 s (ARC 6.6 s)

Actual CCD/DAS

	Imaging/Spectroscopy (Standard)	Slow	Acquisition
Readout configuration	CCD1+CCD2_A	CCD1+CCD2_A	CCD1+CCD2_A
Readout velocity	200 kHz	100 kHz	500 kHz
Gain (e^-/ADU)(*)	0.95	1.15	1.46
Saturation (ADUs)	65,000	65,000	55,000
Binning (X x Y)	2 x 2	2 x 2	2 x 2
Readout time	21 sec	42 sec	7.8 sec
Actual readout noise	~4.5 e^-	~3.5 e^-	~8 e^-

Modo SLOW	LL (E)	LR (F)	UR (G)	UL (H)
Gain e-/ADU	1.62 e-/ADU	1.60 e-/ADU	1.63 e-/ADU	1.62 e-/ADU
RON e- rms (prescan)	3.4 e-	3.8 e-	3.5 e-	3.4 e-
RON e- rms (imagen)	3.6 e-	3.9 e-	3.6 e-	3.5 e-
RON e- rms (overscan)	3.4 e-	3.7 e-	3.6 e-	3.4 e-

Modo parámetro FAST	LL (E)	LR (F)	UR (G)	UL (H)
Gain e-/ADU	2.45 e-/ADU	2.40 e-/ADU	2.47 e-/ADU	2.44 e-/ADU
RON e- rms (prescan)	7.7 e-	7.9 e-	8.0 e-	8.0 e-
RON e- rms (imagen)	7.6 e-	8.0 e-	8.2 e-	8.1 e-
RON e- rms (overscan)	7.5 e-	8.0 e-	7.9 e-	8.0 e-

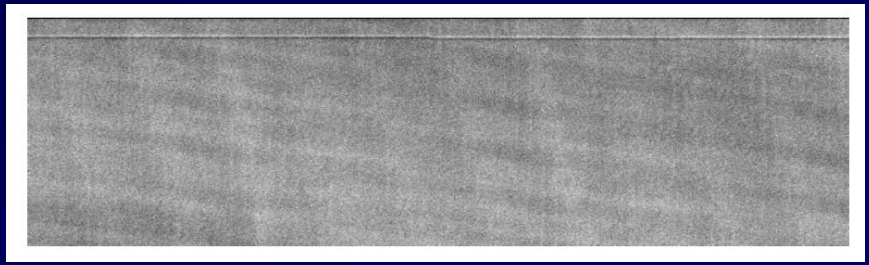
Canal /parámetro	LL (E)	LR (F)	UR (G)	UL (H)
Gain e-/ADU	1.62 e-/ADU	1.60 e-/ADU	1.63 e-/ADU	1.62 e-/ADU
Linearity error	0.08 %	0.08 %	0.07 %	0.08 %
Full Well (e-) >	91.038 e-	93.052 e-	90.723 e-	90.893 e-

Canal /parámetro	LL (E)	LR (F)	UR (G)	UL (H)
Gain e-/ADU	2.45 e-/ADU	2.40 e-/ADU	2.47 e-/ADU	2.44 e-/ADU
Linearity error	0.07 %	0.07 %	0.09 %	0.10 %
Full Well (e-) >	145.381 e-	149.467 e-	144.984 e-	144.482 e-

New OSIRIS CCD. Performances

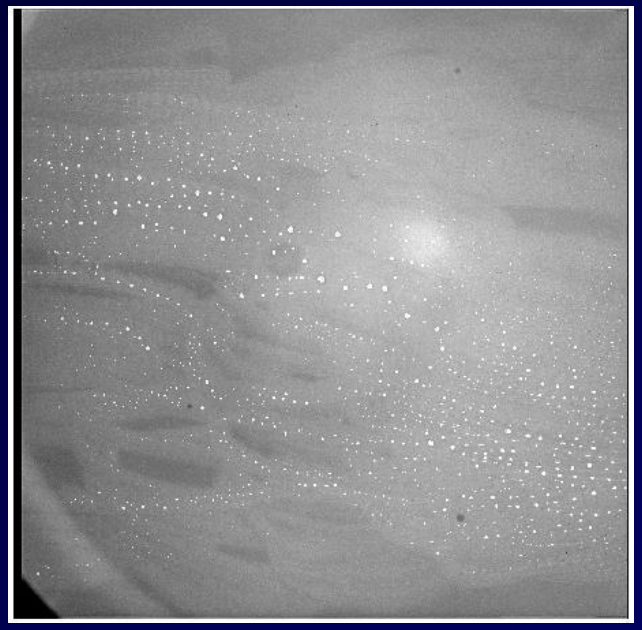
- Dark current
  - Teledyne 29 e^-/px/h @173K -> 1.8 e^-/px/h @160k
  - Measured < 12 e^-/px/h @160K (20s exposure)

- Cosmetic
  - Excellent
    - Teledyne: 0 Darkness defect, 1 PR defect (dark), 6 Traps
    - IAC has not detected defects
  - PRNU anomaly (~10%) in 2 x 16rows at CCD edges)
    - Corrected by flat/dark subtraction



New OSIRIS CCD

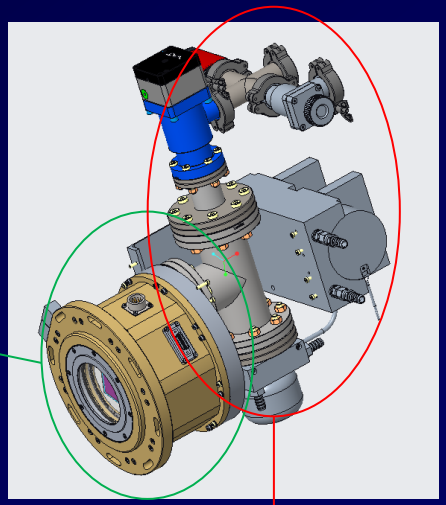
- CCD contamination during 2nd test run
  - Tests stopped



- CCD sent to Teledyne for cleaning
  - CCD already returned.
  - Clean by visual inspection. Not yet tested

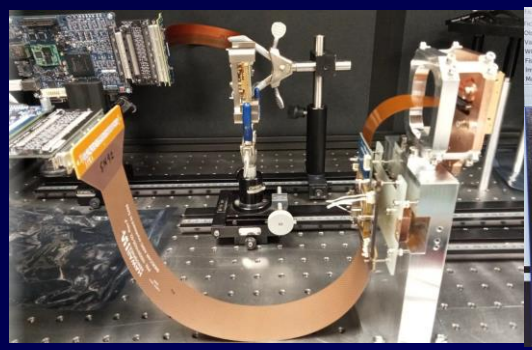
New OSIRIS Detector

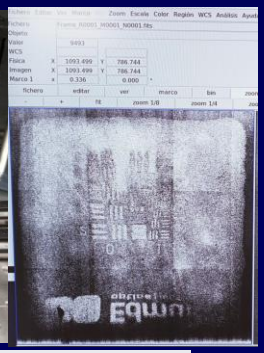
- Progress
  - Science CCD tested
  - CCD Controller upgraded to ARC-Gen III + Linux
    - DAS software refactorization (June)
  - CCD Head
    - Design finished. Fabrication ongoing
    - Assembly planned on April
  - Cryocoolers purchased
    - Free piston Stirling (Sunpower) received (more power)
    - Split Pulse Tube (Thales Cryo) purchased (less vibration)
  - Cryo system
    - Design ongoing, based on COTS components.
- Scheduled
  - Available by September for Semester 2022B



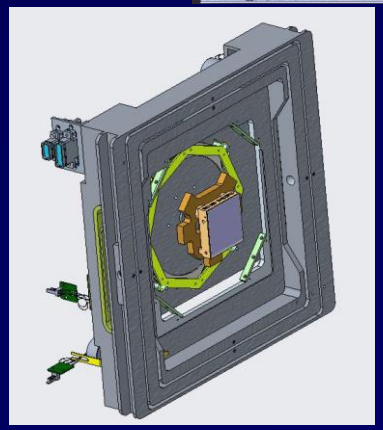
New IR Detectors

- Progress
  - Second Science Grade H2RG delivered on December 2021
  - H2RG support for test
  - Test of MACIE Acquisition board
    - Using ROIC (Multiplexer) + ASIC





  - Design of EMIR H2RG active support ongoing
  - Verification of Test Cryostat



- Goals (IAC)
  - System lab test (H2RG + active support + DAS) by July
  - Integration in EMIR by September 2022.

Others

- Hipercam @ FC-G
  - FC-Rotator fabrication ongoing (IDOM)
    - Factory test by June 2022
  - Hipercam upgrade (COMPO) ongoing (U. Sheffield)
    - Finished by May 2022
  - Integration limited by GTC activities
    - Not planned, but not available during 2022
- GTC-HRS
  - China funded instrument design
  - Agreement to have PDR on Q3 2022