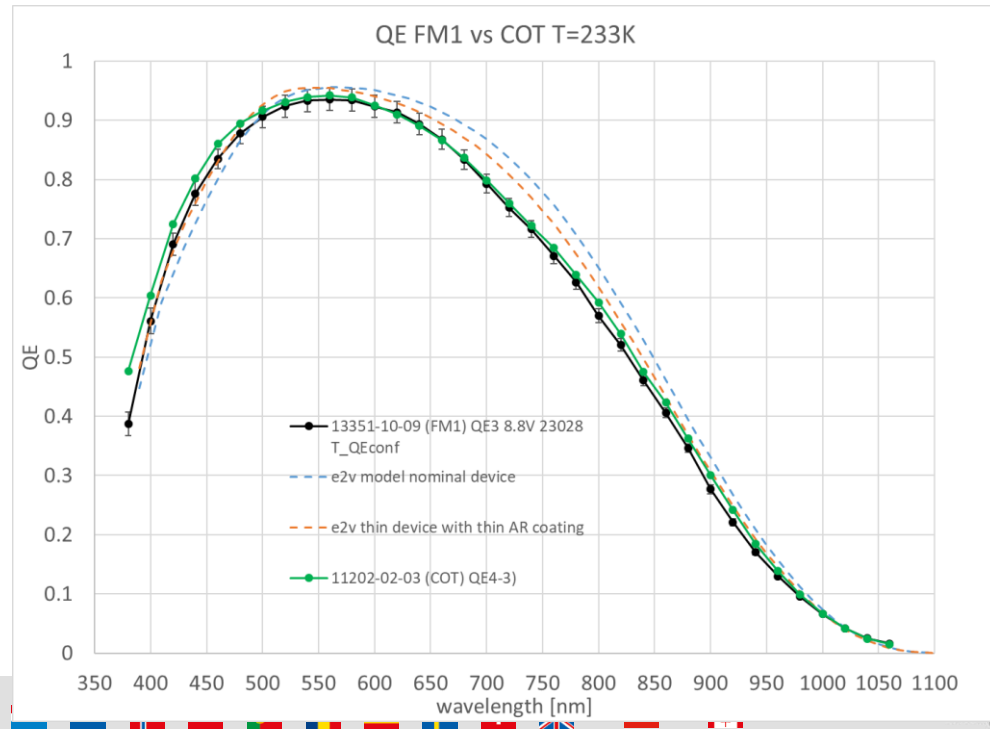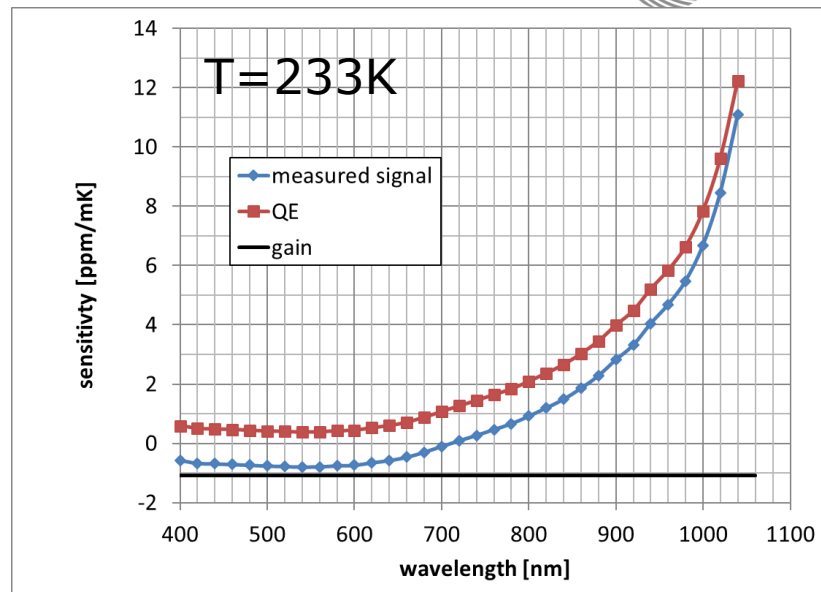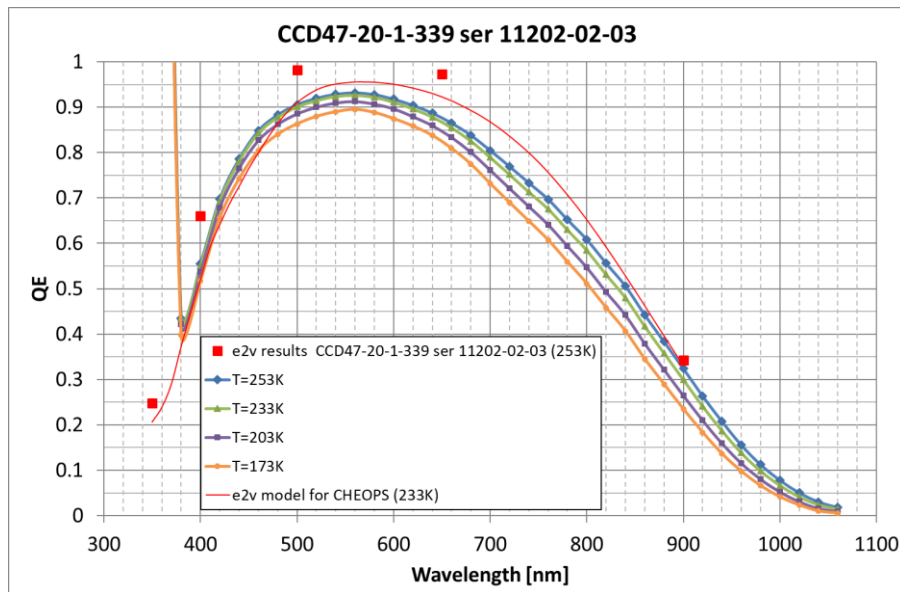# Temperature sensitivity of the QE for CHEOPS CCDs

Peter Verhoeve

14/04/2020

- ESA measurements of the temperature sensitivity exist for the commercial off-the-shelf (COTS) device CCD47-20-11202-02-03, but not for any of the EM or FM devices from the CHEOPS batch 13351

- The QE curves for the COTS device and the CHEOPS flight spare (FM1) device 13351-10-09 are quite similar:

- So it seems justified to use the sensitivity data from the COTS device for CHEOPS purposes

QE FM1 vs COT T=233K

Legend:
- 13351-10-09 (FM1) QE3 8.8V 23028 T_QEconf
- e2v model nominal device
- e2v thin device with thin AR coating
- 11202-02-03 (COT) QE4-3

COTS 11202-02-03 data

- QE data at 4 temperatures
- Data at 203-233-253K are used to derive the sensitivity at T=233K
- Note that the measured signal is temperature dependent through gain and QE
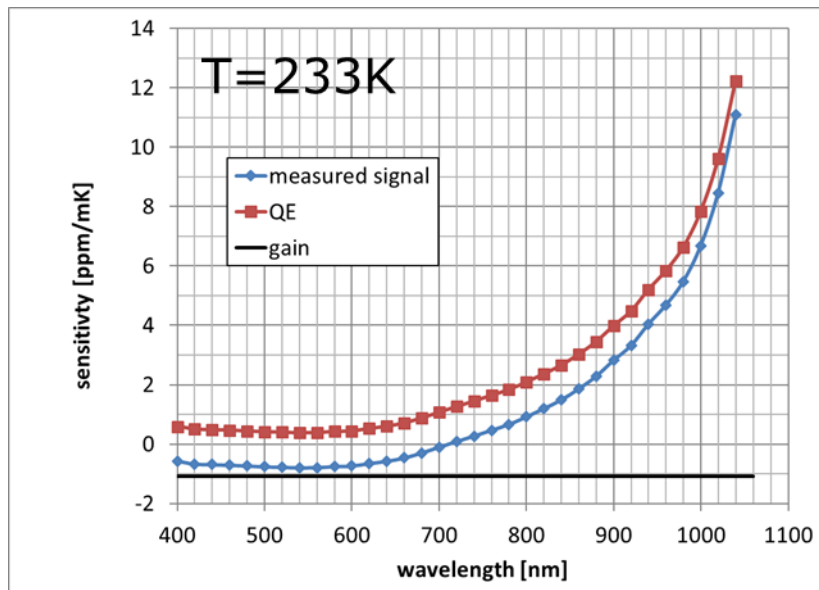- Gain is NOT wavelength dependent

Comparison with Corot data

Very similar !

Calibration of flight model CCDs for CoRoT mission

V. Lapeyrere,* P. Bernardi, J.-T. Buey, M. Auvergne and D. Tiphène
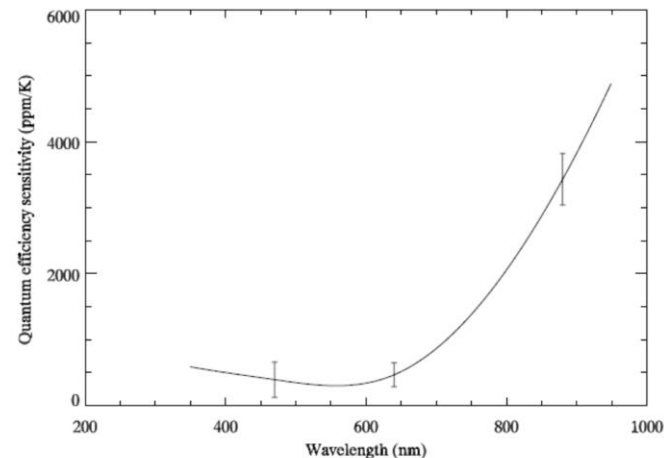*LESIA, UMR 8109, Observatoire de Paris-Meudon, 5 Pl. Jules Janssen, 92195 Meudon, France*

Figure 12. Evolution of the quantum efficiency sensitivity to temperature with wavelength [$\alpha_{Q_e}(\lambda, T_0 = -45°C)$]. Error bars represent dispersion on all CCDs.

QE temperature sensitivity for 11202-02-03 (233K)

Lambda [nm]	Sensitivity [ppm/mK]
380	0.488481
400	0.591256
420	0.506598
440	0.487927
460	0.468872
480	0.446262
500	0.416542
520	0.402866
540	0.382989
560	0.39014
580	0.42646
600	0.443201
620	0.527631
640	0.602754
660	0.710587
680	0.879138
700	1.071791
720	1.263546
740	1.446774
760	1.640746
780	1.834426
800	2.086421
820	2.362858
840	2.65579
860	3.024505
880	3.448744
900	3.983411
920	4.478907
940	5.202698
960	5.841491
980	6.63389
1000	7.839517
1020	9.622851
1040	12.23661
1060	12.7683

European Space Agency