

# Low Fringing CCDs: Improving Instrument performance at ING

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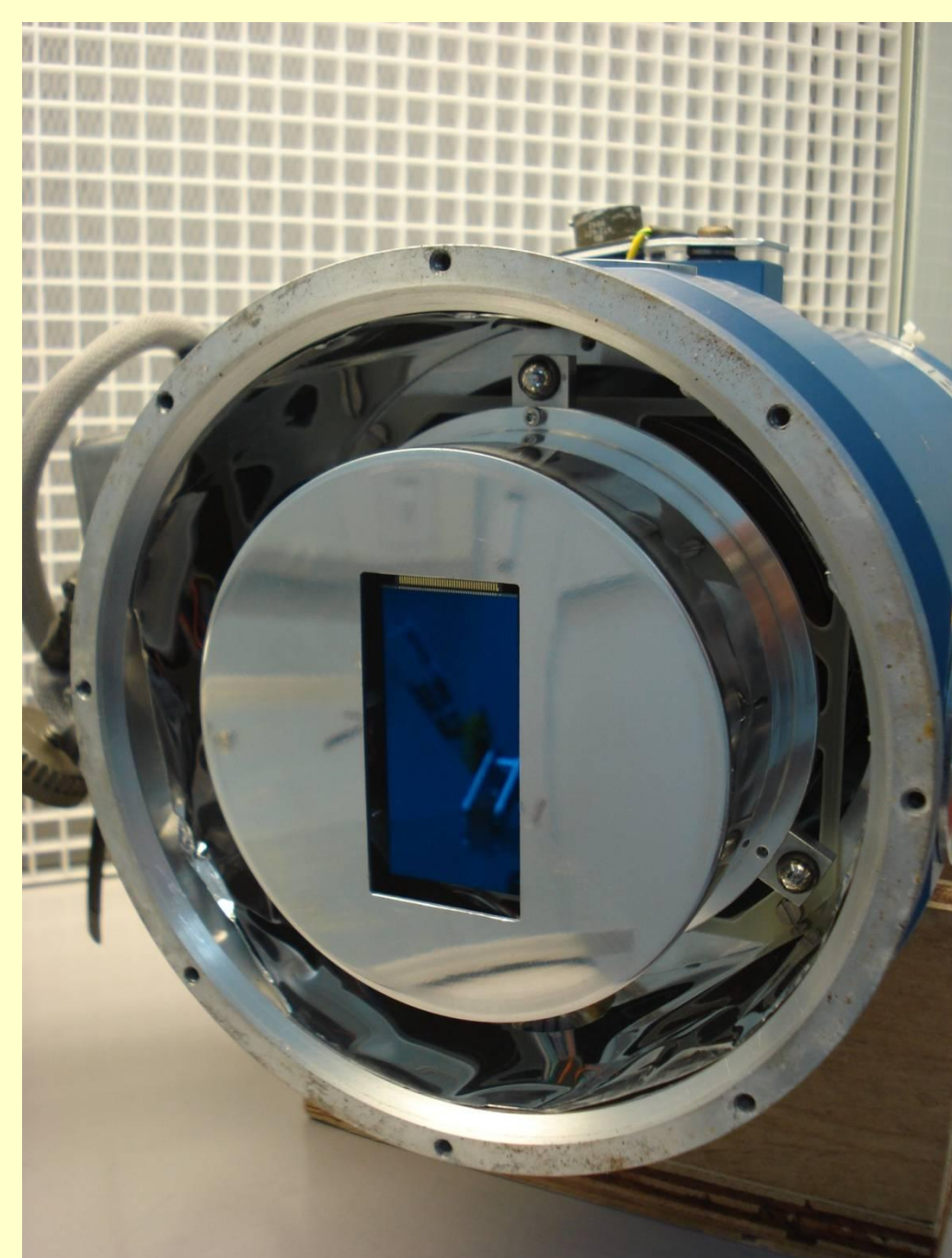
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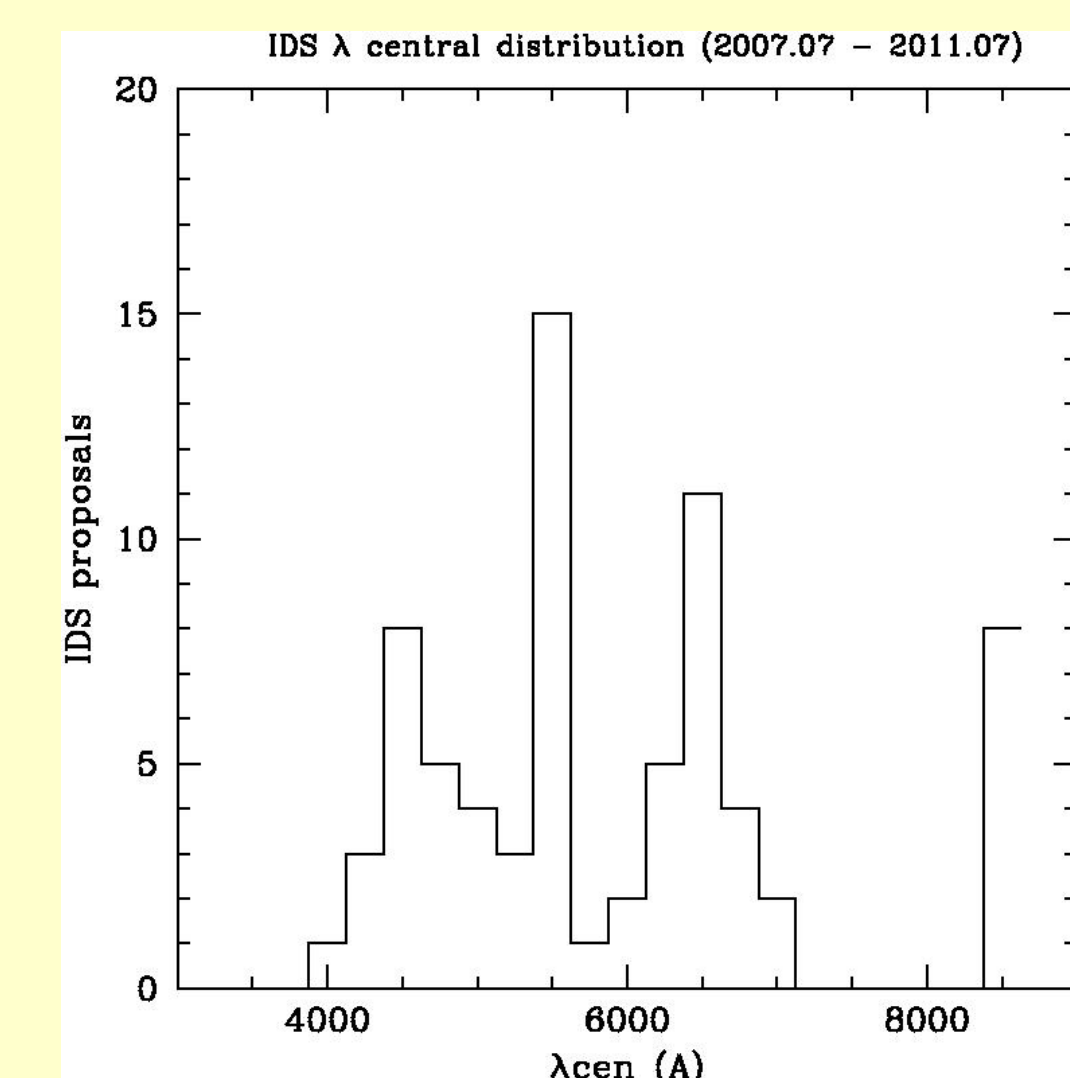
The ING has recently integrated an E2V CCD44-82 red-sensitive CCD into a cryostat for use on the INT Intermediate Dispersion Spectrograph. This is the latest in a series of red-sensitive low-fringing devices. At the WHT both ISIS and ACAM have already been fitted with these detectors.



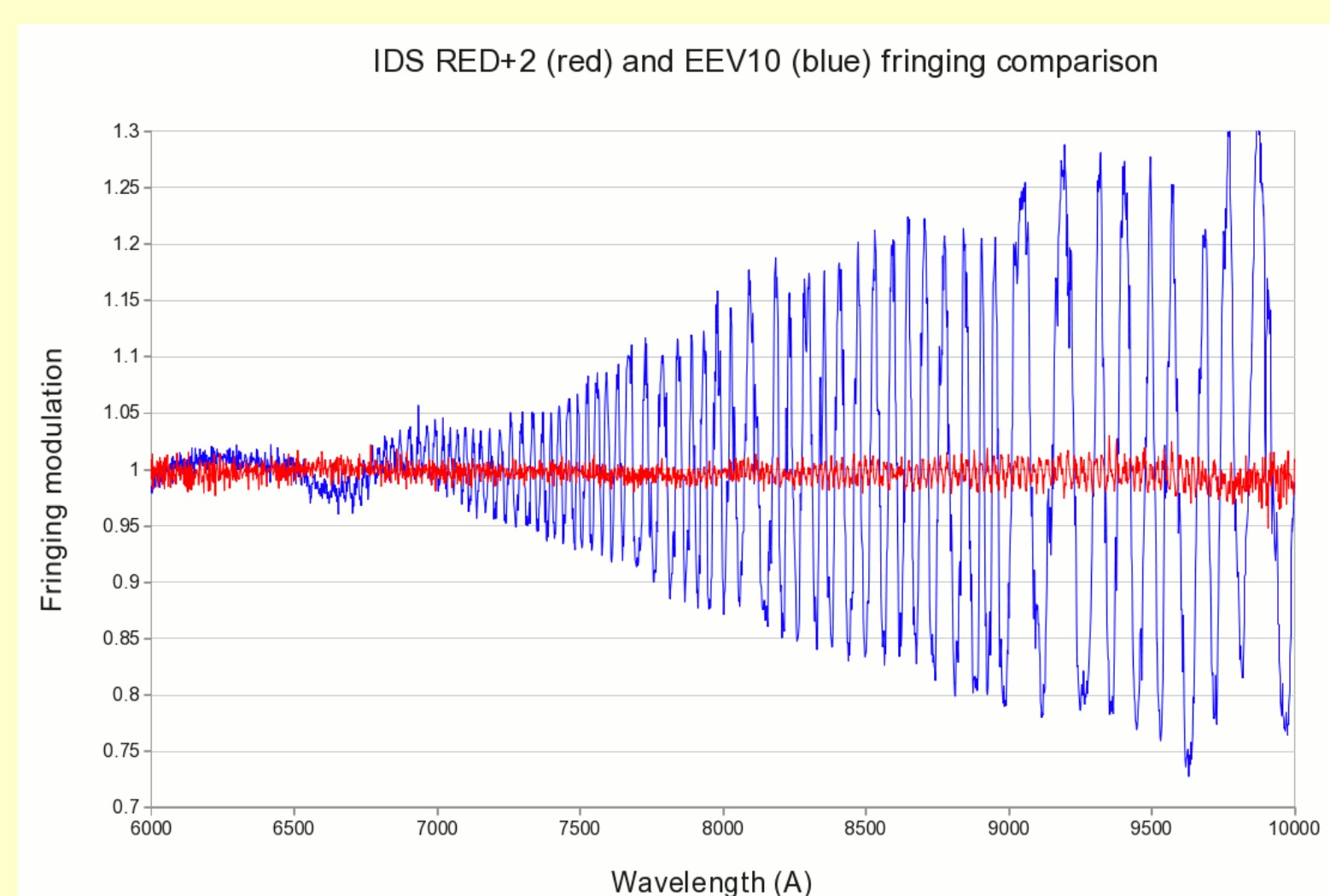
The recently commissioned 2k x 4k pixel Deep depletion low fringing device from E2V mounted on the 235 mm camera of IDS. The camera gives 3-4e noise, dark current <math>8e/hour</math> and linearity <math><1\%</math> up to 60kADUs



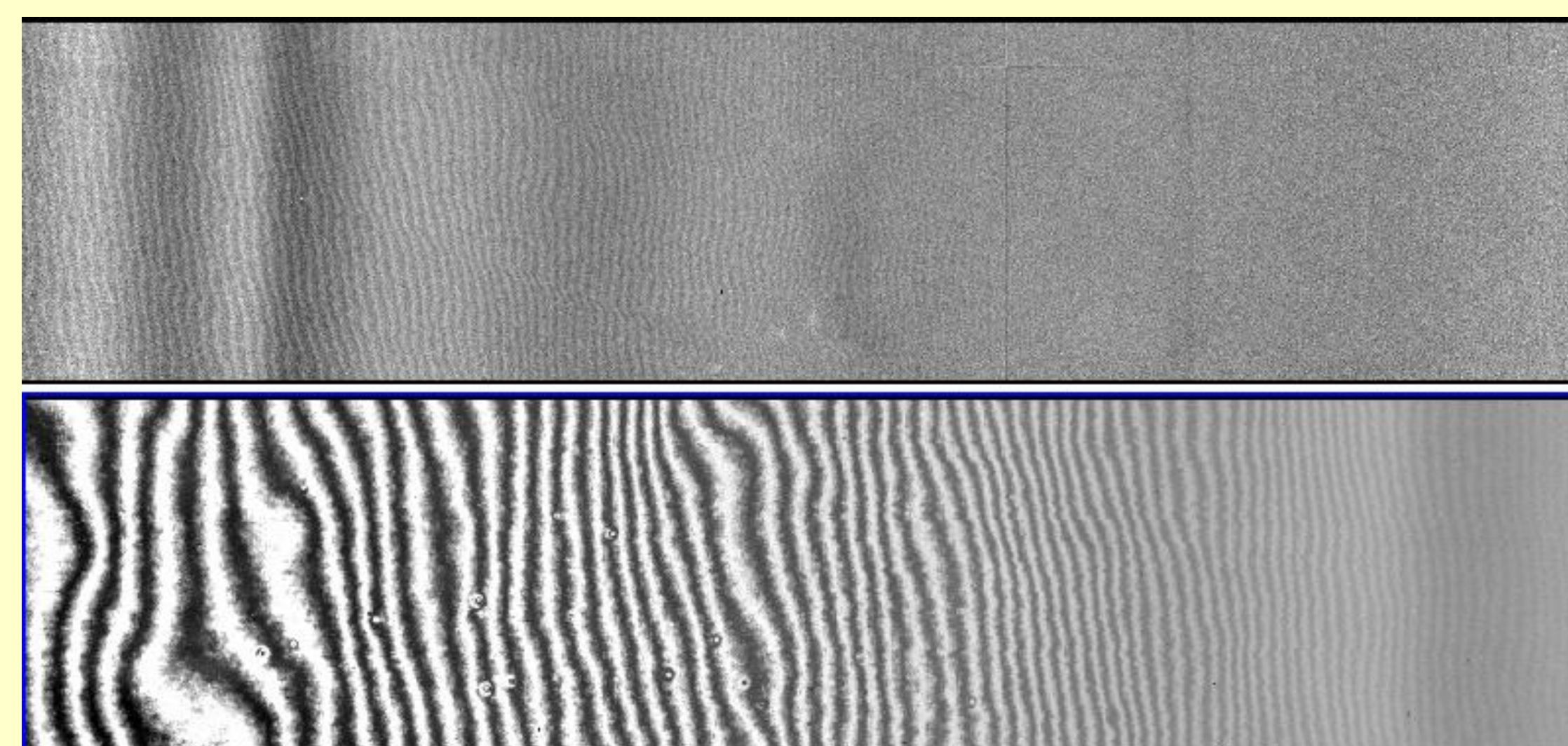
The mechanical design, manufacture and integration of the detector mounting is carried out at ING. The detector is mounted on, but thermally isolated from, a sprung kinematic mount. This keeps it parallel to the cryostat window. The separate thermal link is adjusted to give a temperature close to the expected operating temperature. The cryostat mechanical design, vacuum integrity and thermal performance is established over several thermal cycles with a mechanical sample CCD fitted to the cryostat, only then is a working detector fitted.



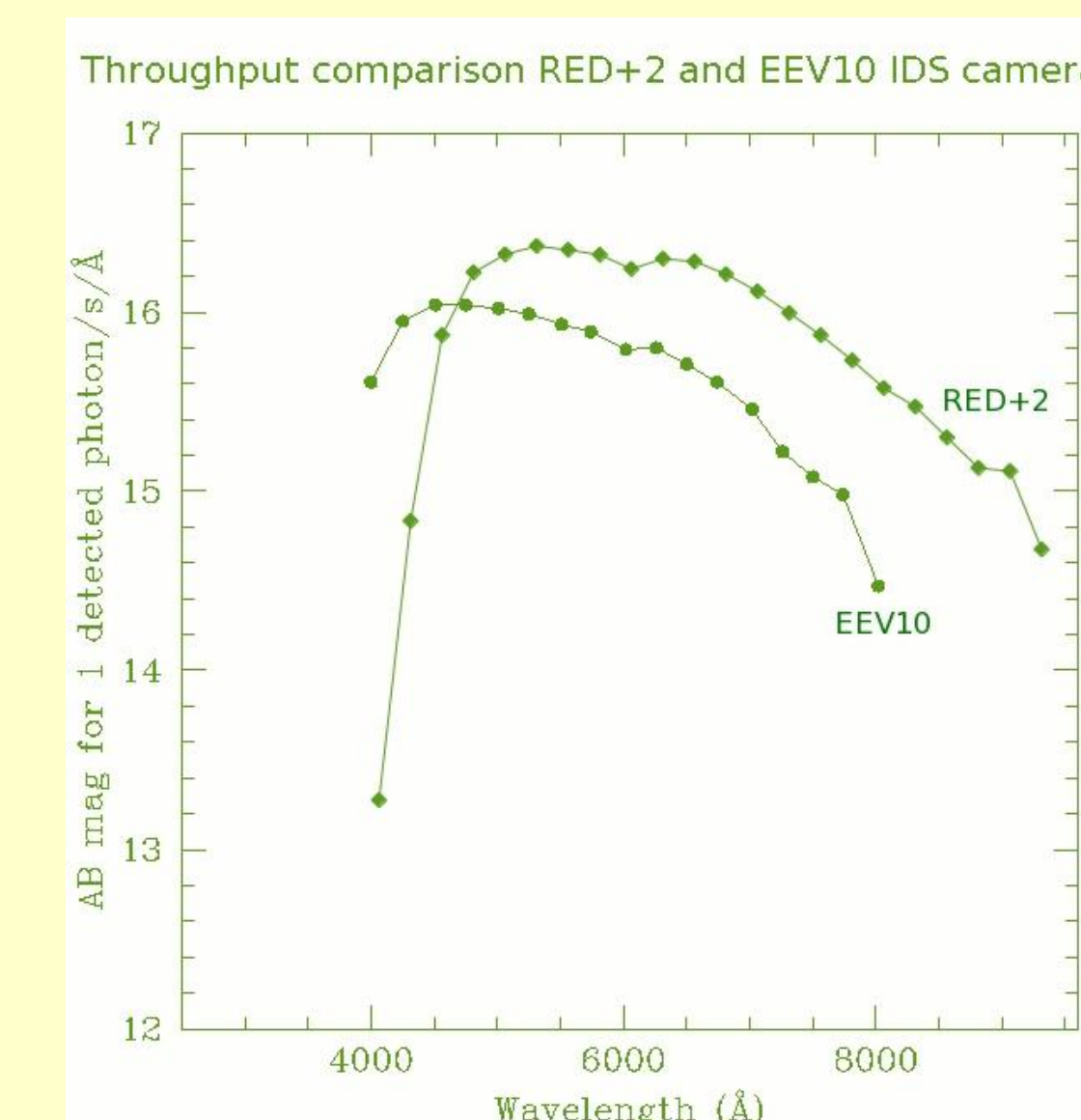
Distribution of central wavelengths used for IDS observing runs during the last 4 years. Three peaks can be seen around 4500A, 5500A and 6500A, suggesting the community ask for both blue and red regimes. This is the main reason why ING offers two possible CCDs on IDS, EEV10 (more blue sensitive) and RED+2 (more red sensitive).



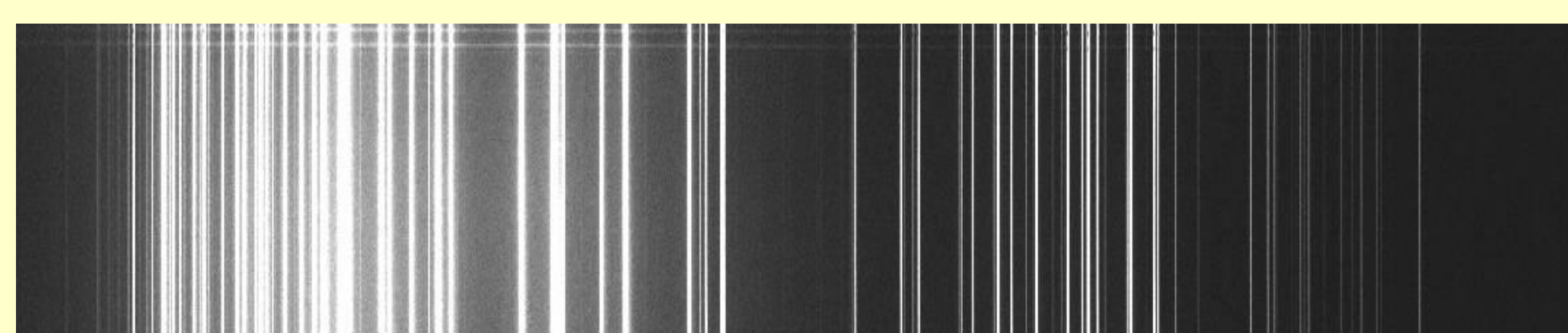
IDS RED+2 fringing plot (red) compared with that of the IDS EEV10 camera (blue), both obtained from white lamp flats taken with R300V gratings. RED+2 shows very low fringing ( $\sim 1\%$  in the red rising to 2% at 1000 nm) while EEV10 has severe fringing (between 3% at 700 nm and 30% at 1000 nm).



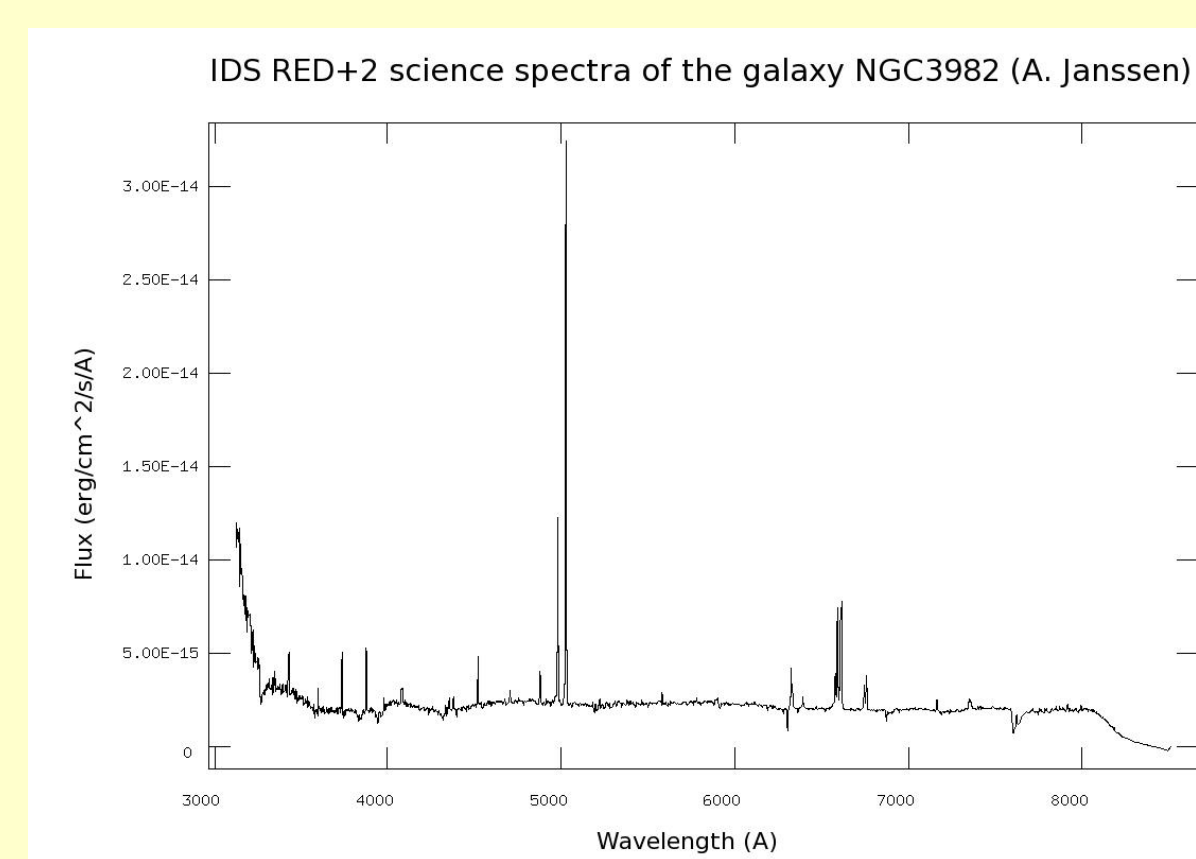
The mosaic shows the fringing images of EEV10 (bottom) and RED+2 (top) from which we produced the plot at left



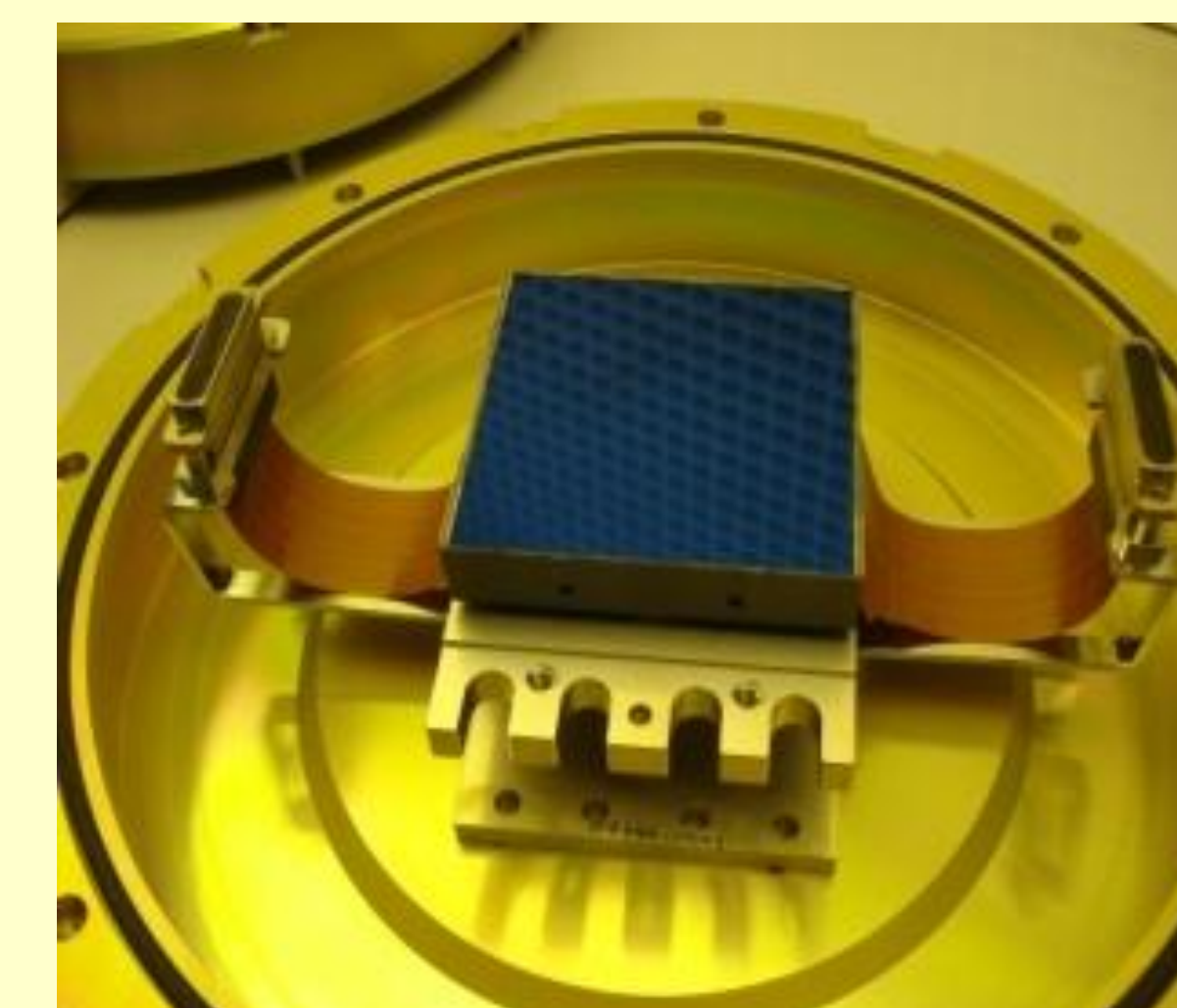
IDS throughput comparison between the former EEV10 and the new RED+2 CCD, showing the greater sensitivity of the latter in the red.



Reduced RED+2 image of CuNe arc spectrum, taken with R300V gratings, central wavelength 5520A.



RED+2 reduced science spectrum of the centre of the galaxy NGC3982 observed by the ING student Annemieke Janssen on 10 May 2011. Exposure time 30 min, R300V gratings, central wavelength 5520A.



An E2V CCD231 4k by 4k pixel low fringing device has recently been received and is expected to be commissioned on WYFFOS during 2012