assumption breaks down since these photons often yield more than one electron-hole pair. As a result, although the true e^-/DN, set by the electronics of read-out, remains the same across the CCD, the γ/DN can vary as a function of wavelength. Since we use a constant value in all error calculations, this means that we will slightly *under-estimate* the error in the far UV. However, this occurs at shorter wavelengths than we generally observe, so is essentially negligible.

In practice, we use several different pairs of bias and flat-field frames and several different regions on the CCD and average or take the median of the results. In particular, for spectral flat-field frames small regions elongated perpendicular to the dispersion direction must be used since the mean counts will usually vary as a function of wavelength.

There is also a "discretization" error (noise) of $\sim(e^-/DN)/2$ electrons due to the digitization process (*i.e.* round-off error), which is generally small (relative to the read-out noise) if the e^-/DN is at least a few times smaller than the read-out noise (*i.e.* the noise is "well-sampled" or "resolved"). In any case, this error would be included in rov above.

6.1.2 : Baseline and Dark Subtraction

The baseline is due to an offset voltage applied during read-out, which causes offsets in the DN in each row. This row-to-row offset is subtracted off during read-out (for the Lick system). To reduce the noise in these offset values, a 3rd-order polynomial is fit to the baseline at reduction time, and corrections are made such that this smooth curve is subtracted as the baseline offset.

There is a zero-exposure zero-light bias image which must be subtracted from each image. Short dark images are taken on each observing run and are used at reduction time to create a bias frame. Since the bias image is mainly column-to-column variations, usually the rows are averaged and then stretched out to create a low-noise bias image. The maximum deviation in the bias frame is usually only a few DN.